

constant stimulus thus produced passes through the sympathetic fibers to the cervical ganglia, and thence to thyroid secreting tissue, which through vascular changes and hypertrophy and hyperplasia increases the output of the thyroid hormone.

The sensitiveness of the lesions is probably of more than passing interest. For this actual tenderness is not to be confused with a neurasthenic state, which may be associated with the disease, or even be a source of confusion in the diagnosis. The lesion is of such a distinct character that there is considerable local irritation and congestion. This constant stimulus is a cause of the increased number of impulses carried to the sympathetic, and results in not only an excess of thyroid secretion and the concomitant hypertrophic changes, but also in the rapid removal of the colloid into the circulating blood. This seems to be a very important link in the pathologic chain.

Other underlying lesions may be present, as outlined under simple goiter, and do not require repetition here.

The mechanism of the thyroid gland may be further upset or deranged by various exciting causes, such as focal infections, toxic states, intestinal stasis, and occasionally an enlarged thymus is an important factor. An inherited neuropathic tendency, excessive strain, worry, and mental shocks may have more or less influence in either predisposing or exciting the disorder.

The particular points for the practitioner to remember are that exophthalmic goiter is due to a toxic state, of which there are many gradations, from the excessive secretion of the thyroid gland; that the normal resistance of the gland is lowered through definite lesions of its innervation or circulatory channels, or occasionally of lesions of the other organs of internal secretion which are closely associated; that infections and toxins are often important considerations; and that direct manipulation of the organ may increase the disorder.

Pathology.—The enlargement of the thyroid gland is commonly an early symptom, occurring before the nervous, cardiac and exophthalmic manifestations. There are instances where it follows a simple goiter, although Graves' disease does not seem to be any more prevalent in regions where simple goiter is endemic than elsewhere. In these particular instances intestinal toxemia is often present. There are cases where the gland is very slightly enlarged, containing only small areas of hyperplasia. There is usually very little colloid, though there may be marked exceptions. It should be emphasized that there are various degrees of changes found in the gland though fundamentally of the same order. The blood supply is extensive, and the veins especially are fragile. The alveoli

are distorted, due to the increase of epithelial cells. Lymphoid nodules are frequently noted through the glandular tissue.

Research work of unusual interest to the osteopathic physician pertaining to the etiology and pathology of exophthalmic goiter has been carried out at the Mayo Clinic. An examination of cervical sympathetic ganglia removed at operation from such cases and certain animal experimentation has given definite results. The following is a summary of their principal findings:

"Degree of hyperpigmentation, granular degeneration, and reduction in the number of cells was in direct ratio to the continuance of symptoms of hyperthyroidism. The increased amount of perivascular connective tissue generally throughout the gland was similarly in direct ratio to the time during which symptoms of hyperthyroidism had continued.

"Increase of connective tissue in the ganglia from the chronic cases may be interpreted as due to the irritation from inflammation, or as merely a replacement following the destruction of the ganglionic nerve cells.

"Ganglia were intimately connected by firm adhesions to the surrounding tissue.

"There were changes in the outer and middle coats of vessels, and in the nerve fibers. There was an increase of connective tissue throughout the ganglion.

"It appears that definite histologic changes do occur as (a) hyperchromatization, (b) hyperpigmentation, (c) chromatolysis, and (d) atrophy, or (e) granular degeneration of the nerve cells. All of these are but successive steps in degeneration which, if uninterrupted, proceed to complete destruction of the ganglion cells affected. Not all of the ganglion cells in any of the ganglia examined were so completely destroyed as to render improbable their return to normal under favorable conditions. There is some evidence that in ganglia from cases clinically improved some of the cells have partially or wholly recovered."¹ They are inclined to the view that local infection in the cervical sympathetic ganglia plays an important part in the etiology.

The above pathologic changes of nerve fibers and ganglia support in many ways the findings noted at the A. T. Still Research Institute, not alone in the cervical region but in other regions of the body, that is, they are changes common to interosseous lesion pathology of various areas of the spine, and thus are predisposing factors that establish lowered resistance of tissue and derangement of function.

1. Collected Papers of the Mayo Clinic, 1916, '17, '18.

An important feature of the pathology is hyperplasia of the thymus. Simmonds finds it enlarged in three out of four cases. MacCallum¹ has found it enlarged in all autopsies that he has seen. The lymphoid structures of the spleen, liver, kidneys, intestines, and bone marrow is increased, while the lymphatic glands of various regions of the body may be enlarged, especially the cervical, bronchial, and axillary. This is probably due to a toxic condition.

Dilatation and hypertrophy of the heart is common, and in advanced cases myocardial degeneration is apt to take place.

Symptoms.—The outstanding feature of hyperthyroidism is the excessive secretion of the gland. The symptoms seem to be largely dependent upon the amount thrown into the blood-stream; still there is a possibility that there may be a certain perversion of the secretion, though if such exists it has not been discovered. It should be kept in view that in certain instances where the secreting activity of the gland has been markedly curtailed, by surgical means, for instance, even to hypo-functioning there may still exist some of the symptoms of exophthalmic goiter, which goes to show that other factors may be of decided importance. The thymus and other related organs, as well as the sympathetic nerves, are not to be neglected.

Kendall and Plummer (Mayo Clinic) "believe that the location of the active constituent of the thyroid, when it functions, is within the cells not of any particular set of organs or portion of the body, but that it is a constituent of cellular life and activity. Plummer states that the active constituent of the thyroid determines the rate at which any particular cell can produce energy, that is, it establishes the quantum energy which any cell can produce when it is stimulated, either from within itself or from without, so that the thyroid is directly related to the production of energy within the body. He has shown that one-third of one milligram of the active constituent of the thyroid increases the basal metabolic rate one per cent in an adult weighing approximately 150 pounds." This shows how important the secretion is not only to all related glands but to every cell of the body, and assists in establishing a physiological basis in the correlation of the symptoms of both hyper- and hypo-functioning of the organ.

As a rule the **thyroid** is not greatly **enlarged**. The size, shape, and consistency varies. It may follow a simple goiter. Many of them are soft and yielding, or cystic; others are hard, of a fibrous resistance, or nodular. Probably in the instances where hypertrophy is not discover-

1. MacCallum, A Text Book of Pathology.

able there is hyperplastic tissue scattered through the gland. Or it is possible there may be an intrathoracic thyroid, or **accessory** tissue in other regions, varying from the root of the tongue to the aortic arch, which has become diseased. Generally, both lobes are enlarged, though the derangement may be confined to a portion. Often there is pulsation and a thrill over the gland. Systolic murmurs are frequent. In the early stage of goiter, tenderness is noticeable due to the distension of the capsule.

The **eye symptoms** are: widened palpebral fissure or Dalrymple's sign; failure of the upper lid to follow the downward movement of the eyeball or V. Graefe's sign; insufficiency of convergence of the two eyes or Moebius' sign; exophthalmos, which may be unilateral (in about seventy five percent of the cases); and rareness of involuntary winking, are the principal eye signs.

Rapid heart action is an early and important symptom. This is given by all observers as the most constant of all symptoms. Palpitation is often disturbing. The pulse is forcible, especially in the vessels of the neck. There is generally a low blood pressure. The heart is apt to be dilated, and in chronic cases hypertrophy and degeneration are often found.

A **fine tremor**, eight to ten times a second, is an important symptom. This is usually present and is considered one of the cardinal diagnostic points.

Profuse sweating, emaciation, muscular weakness, especially of the legs, vomiting, diarrhea, a feeling of dyspnea, and polyuria are frequent symptoms. Anxiety, apprehension, headache, irritability, and fatigue are often early symptoms, but care should be taken that they are not entirely dependent upon a neurasthenic state.

Pruritus may be a distressing symptom. There may be abnormal pigmentation. Menstrual derangements are common, especially amenorrhea, owing to the anemia. And there may be various sexual disturbances. Exophthalmic goiter occurs oftener in women than in men.

The disease is commonly a chronic one lasting several years, unless the morbid cycle can be broken; still there are cases where it appears very suddenly and runs a rapid course.

McCarrison¹ says: "Our consideration of the morbid changes met with in Graves' disease will have brought into prominence the fact that they are indicative of toxic action. The lymphocytosis, the lymphatic hyperplasia, the lymphocytic infiltration of the thyroid, the liver and

1. McCarrison, The Thyroid Gland.

other organs; the chronic toxic inflammatory changes in the thyroid, liver and pancreas; the changes in the muscles, in the nervous system and in the adrenals; all these point to a condition of chronic irritation as the underlying factor in their production, and to the gastro-intestinal tract as the most common source of the toxic irritant."

Diagnosis.—The diagnosis as a rule is not difficult. Difficulty may arise where there is incomplete development of the disorder. Irritation of the sympathetic nerves is of the greatest significance, for the characteristic symptoms are dependent upon this condition. Neurasthenia, hysteria, paralysis agitans, and tobacco poisoning and alcoholism may mislead one. The enlarged and active gland, with murmur in the majority of cases, loss of weight, excessive sweating, diarrhea, tremor, and tachycardia, even without the eye symptoms, are specially significant. The tenderness of the osteopathic lesions is very often noticeable.

Prognosis.—A great deal depends upon the cooperation of the patient. Rest and diet are such important features of the treatment, that if the patient is not willing to follow instructions, great difficulty will be encountered in securing satisfactory results. Adjustment of the lesions and elimination of toxins are highly essential, but only in a certain number of cases will this suffice. This, however, will usually lessen the severity of the condition, and the patient gets along fairly well, but this may be far from securing the possible maximum results. The duration of the disease is often from five to twenty years, or even longer. And the patient frequently dies from some intercurrent disease, particularly pneumonia and tuberculosis. Weakness of the heart is the most important cause of death. Severe vomiting and diarrhea may so exhaust the patient that a fatal termination takes place. Surgical interference should not be too long delayed if there is no indication of improvement by other means.

Treatment.—Every case requires individual study, owing to the many possible exciting causes, especially those where infections and toxins play so important a role. The four cardinal features of treatment are: adjustment of the osteopathic lesions, rest, diet, and elimination of infectious and metabolic poisons.

Specific adjustment of the upper dorsal spine is primarily essential. The work should be definitely and quickly accomplished. Soft tissue manipulations amount to but little except as a preparation for the interosseous adjustment. Do not tire the patient. Often, following exact adjustment a definite lessening of the severe symptoms will be noticed. The activity of the thyroid will be appreciably decreased; the heart's

action slowed; the eye symptoms less noticeable; the tremor lessened; and the strength of the patient improved. Do not treat too often. Once a week is far better than every day. But usually twice a week in the majority of cases will secure the best results. Then later once in two weeks will be the best course to pursue. The tissues are irritable, and require time to establish a physiological balance, that if kept constantly excited by too frequent or too severe manipulation will increase rather than lessen the condition. This, however, does not apply to those cases where a certain amount of general treatment is demanded to improve systemic tone and overcome intestinal stasis, but even here do not unduly tire the patient, and keep away from the thyroid innervation except at stated intervals. There is nothing more important in osteopathic therapy, except definite adjustment, than not over-treating.

The cervical region should be normalized, and the upper ribs and clavicles carefully adjusted. But leave the gland alone, for manipulation over it further stimulates its function and there is a possibility of rupturing its fragile vessels. Normalization of the entire spine is important, owing to its bearing upon interdependent relationship, mechanically and physiologically, and the necessity of correcting all metabolic irregularities.

Both **physical** and **mental rest** are essential. This tends to lessen the excitability of the nerves, conserves the strength, increases the metabolism, improves muscle tone, and rests the heart. At least several extra hours in bed is always best. Lying down two or three hours during the middle of the day will accomplish considerable. In severe cases absolute rest in bed until the disorder is under control is imperative. In mild and moderate cases all excessive fatigue should be avoided. Unless such measures are followed the treatment otherwise may not accomplish anything. Stopping short of fatigue is the rule that must be followed.

The **diet** is important in order that the strength may be increased and harmful foods eliminated. If the carbohydrates in the small intestine are not sufficient, they may decompose into toxic substances that are harmful when absorbed into the circulation. An abundance of green vegetables and fresh fruit is best. Milk, fermented milk, butter milk, butter and cream are allowable. The patient should drink freely of water. Meat should be used sparingly, and avoid tea, coffee, and condiments.

Free elimination and fresh air are also important. It is the aggregate of details that counts so much, particularly in such a toxic and ex-

citable disease as exophthalmic goiter. The neutral bath (95 to 96 degrees) is better than either hot or cold baths. In such a nervous disease as this, suggestion is unquestionably a valuable measure in quieting the nerves and improving the mental viewpoint.

All focal **infections**, such as often found in the throat, nose, and buccal cavity, in the appendix region, gall-bladder, etc., should be eradicated.

If under carefully controlled treatment the patient does not definitely respond within from two weeks to a month, surgical measures should be seriously considered.

Myxedema

Myxedema is a chronic disease due to loss of thyroid function, and characterized by markedly decreased metabolism, trophic disturbances of the skin and subcutaneous tissues, and a cessation of mental development corresponding to the time of the injury of the thyroid.

McCarrison restricts the term "cretinism" to those cases where there is congenital thyroid deficiency. "After the first year of life, when ossification has proceeded to the extent of closure of the fontanelles, the case is only distinguishable from one of cretinism by this fact." In the **child**, all the functions are depressed, there is a low temperature, the bones do not develop, and the child may become stout. The mental development is retarded, and also the sex organs.

In the **adult** cases there is the same depressed metabolism. The skin is sallow, dry, and increased in thickness. The tongue is enlarged, the lips thick, and the feet and hands considerably changed in size. The nails may be thickened, and the hair falls out. The abdomen is apt to be pendulous. Heavy pads occur below the clavicles and on the chest, neck, abdomen, and sexual organs. Usually the thyroid cannot be palpated. In a few, the gland may be goitrous.

The **mental** faculties are sluggish. The speech is slow, and the voice more or less changed. Physical exertion is an effort, and the patient may have some difficulty in walking. And there is anemia, loss of appetite, and poor digestion. The number and character of symptoms are innumerable, depending upon the extent of thyroid insufficiency, and often upon predisposing and associated disorders. But the essential symptoms are those pertaining to the skin, and the mental apathy. In children the retarded physical and mental growth is the outstanding condition. Development of the disorder is slow.

Etiology.—Lesions of the thyroid innervation may cause a lessened

function of the gland, for correction of the lesions has been followed by markedly definite improvement in a number of cases. The disorder has followed operation on the gland. In other cases some form of infection, primary or secondary, is probably the cause of the injury and subsequent atrophy. In some instances there is evidently a family tendency. It occurs more frequently in women, and in cold than in hot climates. The menopause seems to be a predisposing factor. Overwork, anxiety, poor nutrition, and conditions that lower tissue resistance, are among the etiological considerations.

In well marked cases the **diagnosis** is easy. In others the disease may be mistaken for nephritis or jaundice. X-ray examination of the ossification centers is of decided value. The **prognosis**, in untreated cases, is considered hopeless, the duration being from four to seven years. The treatment with thyroid extract, or alpha-iodine, has resulted in marked improvement, though in severe cases it must be kept up continuously in order to supply the deficiency.

Treatment.—There have been several well marked cases that have responded to the osteopathic treatment. Adjustment of the lesions affecting the gland, and attention to the general health have been the methods administered. The response in a number of children has been most notable. In fact, to such an extent that all faculties and functions were completely recovered. Even in cases where thyroid extract had been administered with comparatively little results, the adjustment of the upper dorsal and cervical lesions, with attention to the diet, elimination, and general hygiene, was followed by normalization.

That the thyroid function when deranged, hyperthyroidism, hypothyroidism, or otherwise, can often be recovered through osteopathic treatment, adds a very important therapeutic measure in the treatment of this gland. But in view of the brilliant results secured in hypothyroidism, through the administration of the thyroid extract, one should not hesitate to use it if improvement is not otherwise forthcoming. Nevertheless, the very important point remains that thyroid extract is only supplying a necessary substance, however essential, to the bodily metabolism, and does not strike at the essential etiology of the disorder.

Cretinism

It should be kept in mind that there are many gradations and alterations in both hyperthyroidism and hypothyroidism, and that a "goiter" may present either picture, partly or wholly, or on the other hand may be normally functioning.

MacCallum says: "Unlike the myxedema cases which occur anywhere and everywhere, regardless of environment or hereditary taint, these people, known as cretins, are found in regions where the condition seems to be endemic or inherent in the environment, and we can usually trace in their parents or ancestors some similar thyroid defect."

This disease is found in various countries, particularly in certain parts of Switzerland, Austria, and Italy. McCarrison presents an interesting study of 203 cases of Endemic Cretinism found in Himalayan India. He thinks it is due to infection. There are a few cases in North America, probably mostly due to immigration. It is frequently confused with myxedema.

Cretins are of short stature, flat-chested and pot-bellied. The face is broad, low forehead, broad nose, prominent cheeks, thick lips, and large nose. The development of the bones is retarded; the skin is thickened and edematous; the hair is thin, and the nails brittle; the sexual organs as a rule do not develop; and in most cases a goiter, sometimes of huge size, is present. Most of them are stupid and apathetic; others are distinct idiots. Deafness is common.

There are sporadic and endemic cases, but the same underlying cause is probably present. It is claimed that most cases of the former should be classed as congenital myxedema.

Early diagnosis is essential. Removal of the patient from the goiter region, and thyroid substance is the treatment given, though results are not so marked as in myxedema.

DISEASES OF THE PARATHYROID GLANDS

Tetany

The clinical manifestations of the insufficiency of function of the parathyroid glands is well understood. This came about through the study of endemic tetany, and, especially, noting that tetany followed operations when the entire thyroid gland was removed. Considerable experimental work on animals was next in order, until the discovery was made that the thyroid gland and parathyroids are anatomically independent, and that tetany is entirely dependent upon the loss of function of the parathyroid glands. **Operative tetany** is now comparatively rare, since the surgeon is particularly careful not to injure the parathyroids in his operations on goiters, though mild forms may occur through damage of the tissues or extension of inflammatory processes.

There are **other forms** of tetany aside from operative, that occur in both adults and children, but instability and insufficiency of the func-

tion of the glands are basic to all cases. This is the common factor, which may be modified by tissue resistance and various hygienic factors.

In tetany there are paroxysmal, and often painful, contractions of the muscles of the extremities. Both sides are affected, and occasionally the spasms may extend to other muscles of the body. This is due to an abnormal excitability of the nervous system. Probably the secretion of the parathyroids have normally a restraining effect upon the nervous impulses, which when removed, or insufficient, or possibly perverted, results in the tonic spasms.

Thus the **predisposing condition** of tetany may be either **acquired** or **congenital**. Children may be born with defective parathyroids. In such instances there is probably a hypoplasia of tissue, which may markedly vary in a series of cases, and give rise to different degrees of tetany. Other factors, nutritional and toxic, would, very likely, be important exciting causes. Hemorrhages and fibrosis have been noted in some cases, that add to the injury of the tissues.

The blood and nerve tissues in tetany show a decreased amount of **calcium**. It is claimed by some that the abnormal excitability of the nervous system is due to the lack of calcium. Noel Paton¹ believes that, though this may bear some relationship, the parathyroids control the metabolism of **guanidine**, and that guanidine intoxication is the cause of the symptoms. Guanidine seems to regulate the tone of the skeletal muscles, and is closely related to urea.

Tetany may occur under many conditions: during pregnancy and nursing, the infectious and nutritional diseases, the diseases of the thyroid and very often gastro-intestinal disorders. There are various exciting causes, such as cold, worry, overfatigue, etc. Alcohol, ergot, morphine, chloroform, and other poisoning may precipitate an attack. But in all these cases the parathyroids are previously damaged.

The blood supply to the glands is from branches supplying the thyroid organ. This intimacy implies that the same sympathetic nerves to the thyroid vessels are in control. Probably there are distinct secretory nerves, as well as vasomotors, that are connected with the upper dorsal and cervical sympathetics. **Lesions** related to the corresponding spinal areas probably affect the integrity of the parathyroid function.

Schafer says: "The parathyroids are amongst the most vascular organs in the body. They are supplied each by a special branch of the inferior thyroid artery. The sinus-like capillaries come into close relationship with the epithelial cells of the gland. The nerves of the parathy-

1. Paton and Finlay, Jour. Exp. Phys., 1917.

roids, like those of the thyroids, pass both to the vessels and to the secreting cells. Some evidence has been adduced which seems to show that the cell-activity is controlled by the nervous system."

Hence it would seem that in many cases of tetany, aside from those cases due to operative injury and possibly certain congenital instances, **osteopathic lesions** affecting the nerve and vascular supply of the organs may so lessen, or pervert, the secreting cells that tetanic states may supervene, especially where lowered nutrition, toxins, and infections are inciting factors.

Symptoms.—The tonic contraction of the muscles may last a few minutes or may persist for several hours, and are usually confined to the hands and feet. The fingers and toes are first affected by the spasm, which extends upward toward elbows and knees. This is commonly preceded by numbness and more or less pain in the parts. Occasionally there is a general ill-feeling, depression, and headache. There may be rise of temperature, and some edema of the affected parts. There are no mental symptoms.

The fingers are partly flexed at the metacarpo-phalangeal joints and rigidly extended at the inter-phalangeal joints, the thumb is markedly adducted and the fingers drawn close together. The wrist may be flexed, and in severe cases the elbows flexed and adducted. When the feet are contracted the toes are drawn together, flexed, and may overlap, and the feet are arched.

Trousseau's phenomenon.—The spasm is increased by pressure over the median or ulnar nerves, or blood-vessels supplying the parts. This may also excite an attack. **Chvostek's phenomenon.**—Percussion over the facial nerve will cause quick contraction of the muscles innervated. **Erb's phenomenon.**—The electrical excitability of the motor nerves is markedly increased.

Diagnosis.—The characteristic attitude, and the irritability of the motor and sensory nerves, make diagnosis easy. It may be confused with **meningitis**, but in tetany there are no brain symptoms, while in meningitis there are no characteristic signs of tetany. Generally, there is little probability of confusing the disease with **tetanus**, or **hysteria**.

Treatment.—Most cases are of a mild type, and recovery is the rule. A great deal depends upon the underlying cause. Malnutrition, if long continued, is a very important factor that may readily predispose to the disorder. Rickets in children is often a basic consideration.

Rest, warm baths, and careful inhibitory relaxation of the tissues

materially assist in controlling the spasms. Attention to the thyroid innervation should not be neglected. In indicated cases thyroid feeding may be of assistance. The diet is of special importance, for many cases present some disorder of the gastro-intestinal tract. Meat should not be given. Milk is of great value, owing to its calcium content. The administration of calcium is highly recommended, for reasons stated under etiology.

Diseases of the Thymus

There is little known relative to the functions of the thymus. It is most active during the growth of the body, attaining its greatest weight from the eleventh to fifteenth years, after which it gradually atrophies, though a certain amount of the tissue remains throughout life. There is usually a gradual atrophy of the organ after puberty, associated with increase of connective and adipose tissues. In cases where it does not atrophy, there is often hyperplasia of the entire lymphatic system in the body.

There is some relationship between the thymus and sexual organs, and in experiments where the organ has been removed, ossification is delayed, muscular weakness and tremor occur, there is hyperplasia of the thyroid, parathyroids, and adrenals, and general cachexia, acidosis, and mental deterioration take place.

The inferior thyroid and internal mammary arteries from above, and the pericardiophrenic from below, comprise its arterial supply. The nerve supply is from the sympathetic, vagus, and possibly the phrenic. In cases of exophthalmic goiter there is frequently an associated enlargement of the thymus, which may be shown by the X-ray, due to failure of normal involution or a renewal of growth, that may be definitely influenced by adjustment of the osteopathic lesions.

In some of the acute infections as pneumonia the thymus may atrophy with some fatty degeneration and increase of connective tissue. This also occurs in starvation. If the condition is not of long standing recovery will take place.

In **status lymphaticus** there is hyperplasia of the thymus and enlargement of the lymphoid tissue of the body, and hypoplasia of the cardiovascular system. This is a constitutional defect, so that slight injuries or infections may prove fatal. It is found in some cases that there is hypoplasia of the chromaffin system. Whether this latter condition is primary or secondary has not been settled.

In males the secondary sexual characteristics are not fully developed.

The figure resembles the feminine type. The skin is pasty, and the beard is lacking or but little developed. In females the distribution of the hair may be somewhat similar to the male sex, slender limbs and chest, and disturbances of the menstrual function are noticeable.

The thyroid, thymus and lymphatic tissues are usually enlarged, while there is hypoplasia of the adrenals and chromaffin system.

The condition is met with in children who have a weak muscular system, increased adipose tissue, pasty complexion, enlarged tonsils and adenoids, and frequently are anemic. In children where the thymus is enlarged there may be excessive lymphocytosis.

The enlarged thymus may compress the trachea, interfering with breathing so that cyanosis and temporary loss of consciousness occur. Young children may die in the attack, probably due to compression of the trachea or to heart shock. Death in adults has occurred from trifling injuries, shocks, infections, and anesthesia. The underlying cause is probably a constitutional weakness.

Diagnosis is made from the clinical signs, percussion of the thymus and the X-ray picture, although these may not be positive. An excessive lymphocytosis is suggestive.

Treatment should consist of good general care of the patient, avoidance of injuries and shocks as far as possible, and careful attention to all lesions, especially of the upper chest and neck. By following this plan the child may overcome the condition. X-ray treatment is being employed with success in some cases. Operations have been successful in thymic hyperplasia where it has complicated exophthalmic goiter, and also in serious mechanical pressure in children.

Diseases of the Adrenal Glands

Experimental work supports the view that the cortex and the medulla have separate functions. The **medulla** of the adrenals is part of the chromaffin system, which includes tissue of the same character in the ganglia of the sympathetic, the carotid gland, and the accessory gland called Zuckerkand's organ. This system is derived from the same cells as the sympathetic nerves. The medulla receives a richer blood supply than any tissue in the body. The secretion of the chromaffin tissue is called adrenalin or epinephrin. The blood receives a continuous supply of the secretion, which acts upon the small blood-vessels and assists in maintaining blood-pressure. It also stimulates glandular tissue, and has some effect upon voluntary muscle which tends to counteract fatigue.

The **cortex** of the adrenal glands is of epithelial origin, and is part of the so-called interrenal system, which comprises very small masses of tissue in the sympathetic ganglia. These are located in the hilus of the kidney, broad ligament, inguinal canal, prostate, epididymis, and along the spermatic veins (Baker). The cortex is the chief glandular tissue of the interrenal system. The amount of tissue is not so great after puberty as before. The blood supply of the cortex is not so rich as that of the medulla. Abnormal activity is claimed to be the cause of certain sexual derangements, particularly sexual precocity.

Schafer states that the adrenals are very richly supplied with nerves. Each receives no less than thirty-three nervous filaments (Kolliker), derived in part directly from the splanchnic, in part from the suprarenal plexus, which is itself constituted by branches from the celiac, phrenic, and renal plexuses.

We have noted that in lesions (experimental) of the splanchnics a few cases presented acute pathological changes, congestion with some degeneration of cells, in the adrenals.

Macleod states that of the many functions of the adrenals that which is most directly associated with epinephrin is the production of glucose from glycogen. "When the nervous system is stimulated in such a way as to excite the glycogenolytic process, two effects both operating in the same direction with regard to the glycogenic function are developed: the one, a hypersecretion of epinephrin, which activates the sympathetic nerve endings, the other, the transmission of the nerve impulse to the liver cell."

Addison's Disease

This is a rare, chronic disease, more often occurring in men, that is characterized by muscular and vascular weakness, digestive disturbances, and pigmentation. Tuberculosis of the adrenals has been the most constant lesion found. In others, syphilis and atrophy have been noted, while in a few the condition seemed to be functional. It should be remembered that it is possible that lesions elsewhere in the chromaffin system may be the cause in some cases, for all the chromaffin tissues secrete adrenalin.

It is quite likely that in most cases there is some constitutional defect of the chromaffin system which underlies a certain tendency to the disorder. Infections, injuries, physical and mental strains may lower resistance and predispose to the condition.

Osteopathic lesions of the splanchnics may congest the organs, or

derange the secretions, or be of such a character that hemorrhages result, or fibrous changes follow, that would definitely incapacitate the cells and lower resistance.

Pathologically, the most common change is tuberculosis. Next in importance are atrophy and interstitial inflammation. Cancer of the organs has been noted in a few. The adrenal ganglia, the semilunar ganglia, and the solar plexus are often involved. The thyroid gland may be altered, which, when affected, is usually decreased in size. Brown atrophy of the heart is common.

Symptoms.—An insidious onset with muscular weakness, languor, and weak action of the heart are generally the first symptoms. Digestive derangements, such as nausea, hyperacidity, loss of appetite, may occur at the same time, or shortly succeed the general debility. Headache, insomnia, and depression frequently take place. Pigmentation, usually, shortly follows, though there are cases where it is only slightly noted. The disease is very chronic, of several years duration, with periods of intermission. Occasionally, a case runs a very rapid course.

The general weakness is most noticeable. There is low blood-pressure. The derangement of the stomach and intestines is characteristic. And the pigmentation, which at first is light yellow later assumes a dark brown color. The pigmentation may be more or less general, but the axillae, nipples, genitals, the palms of the hands, and the neck, waist or wherever the clothing presses upon the skin, are most pigmented. And pigmentation of the mucous membrane may be noted.

Diagnosis.—In typical cases, where there is esthenia, pigmentation, and gastro-intestinal disturbances, the diagnosis is not difficult. Where the clinical picture is incomplete, the diagnosis may be very difficult.

Pigmentation may occur in several other disorders, notably: in bronzed diabetes, abdominal malignancy, tuberculosis of the peritoneum, exophthalmic goiter, pellagra, marked intestinal stasis, stomach ulcer, pernicious anemia, certain skin diseases, etc., so great care has to be taken in atypical cases.

Treatment.—General treatment, with special attention to the adrenal innervation, diet, rest, and fresh air will accomplish something. In functional derangements, which are very few, recovery may follow. But owing to the often constitutional defect, the probability of tubercular, syphilitic, and other serious lesions, the prognosis is unfavorable.

DISEASES OF THE NERVOUS SYSTEM

DISEASES OF THE NERVES

Neuritis

Neuritis is an inflammation of the nerve fibers. It may be confined to a single nerve, localized; or general, involving a large number of nerves, when it is known as multiple neuritis. Osteopathically, there are **invariably lesions** of the osseous or muscular tissues, that correspond to the nerve fibers involved. The lesion either irritates the nerve directly or disturbs the circulation to the nerve. In those cases where the osteopathic lesion is not the immediate exciting cause, there will be found anatomical irregularities that predispose to the affection.

Localized neuritis may be due to: Local osteopathic lesions; Exposure to cold; septic foci; traumatism; and inflammation of contiguous tissues.

Multiple Neuritis may be due to: Osteopathic lesions, which are associated with infectious diseases, as in diphtheria, typhoid, scarlet fever, etc.; prolonged strain or exposure; metabolic poisons, as in diabetes, anemia, tuberculosis, cancer, etc.; alcohol, lead, mercury and arsenic poisoning; and **beri-beri**, which is probably due to lack of vitamins, or possibly microorganisms, or carbonic gas poisoning.

The inflammation may chiefly involve the connective tissue surrounding the nerve—**peri-neuritis**—or it may involve the deeper structure—**interstitial neuritis**. **Parenchymatous neuritis** is really a degeneration, due to excessive or prolonged irritation or pressure which cuts the nerves off from their centers. This is found in deeply seated osteopathic lesions. In experimental osteopathic lesions the first effect is degeneration of the medullary sheath. This is followed by degeneration of the axis cylinder. The local circulation is notably impaired. An acutely inflamed nerve is red and swollen. In **peri-neuritis** there is an infiltration of the nerve sheath with leucocytes. In the **interstitial form**, lymphoid cells are found between the nerve bundles. In the parenchymatous form, inflammatory signs are wanting. The muscles atrophy. Associated in all these forms the **osteopathic lesion** plays either an exciting or predisposing role, by disturbing nutrition to the tissue and thus setting up inflammation, which may lead to Wallerian degeneration¹.

Symptoms.—Localized Neuritis.—In the case of a sensory nerve,

1. See Osteopathic Lesion—Journal of American Osteopathic Association. May, 1906, and Deason's Physiology.

there is severe pain following the course of the affected nerve, with tenderness upon pressure. This may be followed by loss of sensibility. Trophic symptoms, such as glossiness of the skin and brittle nails, arise in more chronic cases, while in advanced cases, there is wasting of the muscles. Sweating, herpes, and occasionally effusion into the joints, occur. When a motor nerve is principally affected, muscular power is impaired, motion painful and muscular twitchings will occur. Finally contractions, wasting of the muscles, and even reactions of degeneration, may take place. A rare form is the so-called **ascending neuritis**, in which the inflammation extends upward from the peripheral nerves to the larger nerve trunks, or even the spinal cord, resulting in **myelitis**. This occurs most commonly in traumatic neuritis. The duration is variable. Many acute cases get well in a few days. Other cases may persist for months and even years.

Multiple Neuritis.—Inflammation involving several nerves which are affected simultaneously or in rapid succession. **Acute form.**—The attack usually follows overexertion or exposure to cold and wet, with probably some infection. This form is characterized by a chill, followed by a rapid rise in temperature which may reach 103 or 104 degrees F.; headache; pains in the back and limbs. There is weakness of the legs or arms, depending upon region involved, which may be so severe that the muscles atrophy. Sensory symptoms are variable. Most cases recover, though there are instances where the vagi, the nerves to the bladder, rectum, or heart, may be involved.

Alcoholic Neuritis results from a moderate amount of alcoholic drinking, continued over a long time. The first symptoms are usually numbness and tingling in the fingers and toes. Loss of power soon becomes marked, first in the lower, and then in the upper, extremities. The extensor muscles are most affected, causing wrist and foot drop. Occasionally there is paraplegia. There are hyperesthesia, tenderness and pain, especially in the legs. The cutaneous reflexes are commonly intact, and the deep reflexes, as a rule, are lost. Delirium is common, and hallucinations or illusions occur.

Neuritis from **lead poisoning** usually present the "wrist drop" and "foot drop", with colic, and "blue line" on gums.

Infectious Diseases neuritis is due to an attack of some infectious disease, and may be local or multiple. It is due to toxic materials absorbed into the blood. It is most common after diphtheria. The symptoms presented are those of neuritis due to any other cause.

Senile neuritis is probably due to arteriosclerosis.

Diagnosis.—As a rule, the diagnosis is not difficult. In the alcoholic form in some instances, there may be difficulty, and in cases with paralysis, care should be taken. The **prognosis** of neuritis is generally favorable.

Treatment.—It is very evident that the successful treatment of neuritis depends upon being able to ascertain the cause. Rest is important in all cases. Rarely has one any difficulty in locating the deranged structures that are predisposing to the attack; and usually correction of these disturbances, which are in the region involved, will give considerable relief. If the parts are too sensitive to handle insist on absolute rest and hot fomentations. The affected area should be kept warm and protected. Attention to the diet, and free elimination, are important. Metabolic disorders should be corrected, if possible. Give particular attention to any septic foci. A change of occupation may be necessary in some cases.

In alcoholic cases, the alcohol should be stopped as soon as possible. Passive movements and massage are helpful, but of course bear no comparison to specific osteopathic treatment. Relaxation of muscles along the spinal column and along the course of the nerve will at least give temporary relief.

If contractures and other changes remain after the acute attack, persistent treatment will generally result in recovery. (See also Painful Shoulders, Part I.)

Sciatica is usually a neuritis of the sciatic nerve, although all painful affections of the nerve are termed sciatica. In some cases it is a neuralgia when the nerve is swollen and presents an interstitial neuritis.

Osteopathic Etiology.—This affection occurs more frequently in males than in females. The usual period for sciatica is from the twentieth to the fiftieth year and the principal causes are **vertebral lesions** of the lower dorsal and lumbar vertebrae, especially lesions to the fourth and fifth lumbar. Occasionally the lesion is a subdislocated innominate, a downward displacement of a floating rib or a partial dislocation of the femur. Other causes are exposure to cold, contraction of muscles, gout, rheumatism and syphilis. Contraction of the piriformis muscle may bring direct pressure on the nerve. Focal infections, arthritis of the articular processes of the lower spine, and sacro-iliac and hip-joint disease should not be overlooked. In a few cases there are intraplevic causes, such as uterine and ovarian tumors, rectal accumulations and the fetal head during labor. Enlarged prostate may be a factor. It

is possible for the roughened edges of the sacro-iliac joint, internally, to irritate the sacral plexus as it passes over and thus keep up the pain. This may explain the occasional failure of treatment.

Symptoms.—Pain in the nerve along its course is the most constant symptom. The pain is most intense back of the thigh and above the hip-joint. The pain radiates downward through the entire nerve; it is of an annoying character and walking is especially painful. In rare cases there is wasting of the muscles, cramps, herpes and edema. In a few cases the neuritis may extend to the spinal cord.

Diagnosis.—The diagnosis of sciatica is usually easy. Care has to be taken in the examination to determine whether the affection is primary or secondary. It is difficult, in some cases, to locate the origin of the disturbance, especially if it is in the lumbar vertebrae, as frequently a very slight deviation of a vertebra will cause the disease; or some focal infection may be difficult to locate; or malformation of the fifth lumbar may be present; or asymmetry of the legs or the body be a factor. Careful palpation, measurements, and the X-ray are of diagnostic importance. **Hip-joint disease** and **sacro-iliac disease** can generally be easily distinguished from this affection. The lightning pains of **tabes** may simulate sciatica, but then there are other well defined symptoms of the disease.

Treatment.—Sciatica rarely runs a very long course, though there are cases that last for years. The treatment almost wholly depends upon the cause. If the cause can be determined at once, the probabilities are that severe cases may be relieved by a few treatments. Correction of the vertebrae, to relieve impingements to the nerve fibers as they pass through the intervertebral foramina, usually constitutes the primary treatment. Carefully examine the pelvic organs for disturbances. Occasionally deep treatment over the iliac vessels will be of great help. The innominatum, if deranged, should be corrected and all troubles of the hip-joint that are found must be corrected.

Cases of rheumatism and gout should receive their separate treatments, besides careful manipulations of the affected leg. Rest in bed should be insisted upon; this will usually markedly lessen the duration of the inflammation. Adjustment of the special points found deranged and a thorough treatment, if conditions permit, of the entire leg will be beneficial. Hot fomentations applied along the course of the nerve, and an inhibitory treatment back of the trochanter will at least give temporary relief. Extension of the leg is effective. Placing a patient upon his back and flexing the leg and thigh upon the abdomen, at the

same time keeping the leg straight and the foot flexed, is an effectual stretching method. As a rule, sciatica readily responds to osteopathy.

Neuralgia

Neuralgia means simply "nerve pain." The term neuralgia should be restricted to such nerve pains as are not caused by structural changes in the nerves. In cases where the pain is due to organic changes in the nerves, the disease should not be classed as a neuralgia, although it is practically impossible to draw an absolute line between functional and organic disturbances for the one may gradually progress (pathologically) into the other. In neuralgia there is always **disturbance** of the **blood supply** to nervous tissue, which may be of the character of congestive irritation, ischemia or altered states of the blood wherein it contains toxic substances or is below normal quality. It is well known that osteopathic lesions are very common etiological factors.

Osteopathic Etiology.—Neuralgia is essentially a disease of adults. It rarely occurs before puberty or late in life. Women are more prone to neuralgia than men and the tendency may sometimes be hereditary. Sufferers from neuralgia often present a peculiar "nervous temperament."

The exciting causes of neuralgia are impairment of general health; irritations of the nerve fiber or trunk by a displaced bone, ligament or muscle, which may affect the nervous tissue directly by mechanical irritation, or indirectly, by the disturbance of its blood supply, or toxic agents; exposure to cold or damp; overwork and worry; toxic influences of various diseases, as malaria, lead poisoning and alcoholism; irritation from carious teeth, and various septic foci.

Symptoms.—Pain, which is spontaneous and paroxysmal, is the most prominent symptom. It may be described as "darting," "shooting," "burning," "stabbing," "boring," etc. The pain is usually unilateral, following the course of the sensory nerves, and there are generally tender points along the course of the nerve. Especially are there points of tenderness near the central end of the nerve, where the displaced structures are irritating it. After the pain has continued for some time the skin becomes tender, reddened and swollen. The redness and edema are supposed to be due to vasomotor changes. Muscular spasms, trophic disturbances, skin eruptions, herpes and grayness of the hair are of rare occurrence. The duration of an attack varies from a number of minutes to a few hours.

Neuralgia of the Fifth Nerve.—This is by far the most frequent variety of neuralgia, and it is generally due to a displaced **atlas** or **infer-**

ior maxilla. The teeth sinuses, and other possible regions of focal infections should be thoroughly investigated. Anemia and products of metabolism may be underlying factors. All the branches of the fifth nerve are rarely involved. The **ophthalmic division** is most often affected; pain and tenderness being present about the supraorbital notch or foramen, the palpebral branch at the outer part of the eyelid, the nasal branch, and occasionally an ocular pain will be felt within the eyeball. When the **infraorbital branch** is involved, pain and tenderness are principally present at the infraorbital, nasal and malar points. When the **third division** is affected, the chief tender places are the inferior dental, temporal and parietal points. In nearly all cases of neuralgia of the fifth nerve, there is extreme tenderness in the region of the articulation of the atlas and the occipital, particularly the side on which the fifth nerve is involved. This tenderness in a few cases may be found as low as the second or third cervical vertebra. The pain may be so severe as to cause edema along the course of the affected nerve fibers, grayness of the eyebrows and locks of hair chiefly in the temporal region, and convulsive twitching of muscles.

Tic Dououreux is a vastly exaggerated neuralgia of the fifth nerve and is supposed to be a primary affection of the Gasserian ganglion. Starting in middle life from no apparent cause it increases in severity until it becomes unbearable and suicide is not an infrequent result.

Many methods to relieve have been tried including destruction of the ganglion but with various results.

Treatment should be the same as in the milder form of neuralgia but it will require critical examination to determine the causes which are liable to be obscure.

Cervico-Occipital Neuralgia.—This variety involves the **posterior branches** of the **first four cervical** nerves, affecting the region of the posterior part of the neck and head. The pain may extend as far forward as the parietal eminence and the ear. The chief tender points are about midway between the mastoid process and the spine, between the sternomastoid and trapezius (branches of the cervical plexus), and a point just above the parietal eminence. This form of neuralgia is chiefly due to **subluxation** of the **upper four or five cervical** vertebrae irritating the posterior branches of the spinal nerves. A draught of air or exposure to cold are common exciting causes. The pain is of a sharp lancinating nature or else it is heavy and tense. Tuberculosis of the cervical spine may be an underlying cause.

Cervico-Brachial and Brachial Neuralgia.—In these forms of

neuralgia the pain is referred to the area supplied by the **four lower cervical** and the **first dorsal** nerves. The tender points are in the axilla along the course of the ulnar, the circumflex at the posterior part of the deltoid and points at the lower and posterior part of the neck. The **lesions** exciting this form of neuralgia are usually found in the upper dorsal and upper cervical spines, but they may be as low as the sixth dorsal or as high as the atlas. As far as neuralgia of the ulnar nerve alone is concerned, it can be traced to the seventh and eighth cervical and first dorsal, and the lesion may be found occasionally at the fifth dorsal vertebra or rib. How a lesion as low as the fifth dorsal affects the ulnar nerve, it is hard to say definitely. There may be fibers directly to the ulnar nerve as low as this region, the nerve may be reflexly affected, the vasomotor supply to the ulnar nerve may be disturbed, or possibly the lesion interferes with fibers of the deep layers of the back muscles and thus contraction of muscles for some distance above the lesion would affect the ulnar and other nerves. The scaleni may be affected and involve the plexus. A bursitis may be present (See Painful Shoulders Part I). Focal infections are sometimes factors.

Trunk Neuralgia.—This includes dorso-intercostal and lumbo-abdominal neuralgia. The former, **dorso-intercostal** neuralgia, affects the intercostal nerves from the **third to ninth dorsal**, and is characterized by pain along the intercostal spaces, or in a few of them. The pain may be bilateral and symmetrical, which usually shows a vertebral lesion. Three points of tenderness are usually noted, viz., near the median line in front, and midway between these two points in the mid-axillary line. The pain is usually dull with acute exacerbations. **Lesions** of the **vertebrae** and **ribs** in the locality affected are by far the principal causes. Cold, exposure, strains, etc., are exciting causes of every-day occurrence. When the pain is bilateral and symmetrical the lesion is usually in the vertebra; when unilateral the rib alone may be involved. The most common lesion is a crowding together of the ribs anteriorly at the fifth and sixth interspaces. Carefully exclude a possible tuberculosis of the spine or ribs, aneurism, etc.

The pain of **herpes zoster** is not neuralgic, but neuritic, involving the posterior spinal ganglion. **Pleurodynia**, strictly speaking, is neuralgia of the pleural nerves, and not of the intercostals, but a deranged rib over the region of the pain is commonly the cause of the pleurodynia.

Lumbo-abdominal neuralgia involves the posterior branches of the **lumbar nerves**. Tender points are found near the vertebrae, middle of the iliac crest, lower part of the rectus, and in the male occas-

sionally in the scrotum, in the female in the labia. These are often bilateral and are usually of a constricting nature. The ilioscrotal branch is the one most commonly affected.

Subluxation of the vertebrae, and other lesions, as contracted muscles, are found along the lumbar vertebrae, and even as high as the lower dorsal vertebrae. Also lesions are found at the lumbo-sacral articulation. Pelvic disease is also a cause.

A downward displacement of the **lower ribs**, eleventh and twelfth, is a common disorder and may be the cause of severe neuralgic pains in the region of the iliac fossae. It may simulate ovarian inflammation, renal colic, or even appendicitis if on the right side. And septic kidney has been wrongly diagnosed from these lesions. In fact it may be a cause of inflammation of the deeper structures, such as the ovary and Fallopian tube.

A subluxation of the vertebrae at the fourth and fifth dorsals may cause severe neuralgic pains in the epigastrium.

Neuralgia of the Spinal Column.—According to medical writers this is especially found in weakly women and after concussion of the spine; that it is a troublesome symptom in hysteria, and in many cases it is due to a reflex stimulus from diseased viscera. Most of this is undoubtedly true, but they have not found out the real significance of these neuralgic pains. The various **tender points** along the spinal column are of paramount importance to the osteopath as a **guide** to his **diagnosis**; not only in certain cases, but in nearly every case. The tender points are not due, in nearly every instance, to reflex stimuli from diseased organs, but these tender points are often the result of a local lesion, and are many times the cause of the disorder to the diseased viscus. The neuralgic pains are simply a symptom that a lesion exists in the immediate locality.

Neuralgia of the Sacral Region and Coccygodynia.—This form involves the nerves in the sacral and coccygeal regions. The nerves between the bone and the skin are affected. The cause of the pain is generally due to derangement of the articulation of the **lumbar** and **sacrum**, and to severely contracted muscles over the sacral foramina; also to lower lumbar lesions. It may be a reflex from various possible disorders of the organs and tissues of the pelvis. In coccygeal neuralgia, the **coccyx** is commonly displaced in any one of the various displacements that are liable to occur. Special attention should be given to the fibro-articulation of the coccyx, and to the status of the lumbo-sacral and innominata. In adjusting the coccyx, place forefinger in rectum up to proximal end of coccyx, and with thumb externally over the section, exert traction until articulation is released; then adjust.

Neuralgia of the Legs and Feet.—This includes the **crural form**, in which the front of the thigh is the seat of the pain; also the form in which tender points are found along the course of the **sciatic** nerve. The latter form is quite a common one, although sciatica is rarely a neuralgia. It is a neuritis and will be found classed under that heading. The tender points presented are the lumbar, sacro-iliac, gluteal, peroneal, maleolar and external plantar. The various neuralgic pains of the legs and feet are generally due to **lesions** of the **lumbar, pelvic** and **thigh** regions, and to **weak arches**. **Metatarsalgia** occurs when the fourth metatarsophalangeal articulation is partially dislocated. Neuralgia in the heel, ball of the foot and toes may be due to local causes or to lesions higher up. Aside from the above care should be taken that there are no toxic factors that may be exciting causes.

Visceral Neuralgia.—This is a term applied to neuralgia of the gastro-intestinal tract, the kidneys, and the various pelvic organs.

Diagnosis and Prognosis of Neuralgia.—Neuralgia is to be diagnosed chiefly from neuritis, rheumatism, and the effects of severe pressure upon the nerves. In **neuritis** there is oftentimes a symmetrical affection, while in **neuralgia** there is a unilateral distribution and there are many remissions and intermissions and a varying of the pain from one place to another. In severe forms of neuritis, anesthesia succeeds the hyperesthesia of the sensory nerves. In cases of severe pressure upon nerves, the pain is continuous and neuritis will soon be manifested. In **rheumatism** the pain is localized in muscles or groups of muscles and does not follow the course of the nerve. The pain is increased by motion.

The **prognosis** is generally favorable, no matter how severe the attack. The prognosis is influenced only by the age of the patient and the cause.

Treatment of Neuralgia.—Consists, first, in the control of the paroxysm and, second, in the removal of its cause. In controlling the paroxysm, frequently one will be able to remove the cause. In a large majority of neuralgias the cause is directly due to a **displaced tissue**, generally a bone or muscle in the locality affected; often all that is necessary in order to perform a cure is to adjust the disordered tissue and the pain will cease. This usually can be done immediately, although there are cases which require several treatments before an adjustment of the parts can be accomplished; besides, in acute cases the involved region will be so tender that an attempt to correct the tissues sufficiently to relieve the paroxysm will be unbearable to the patient. In such instances when the cause cannot be removed at once, firm pressure or inhibition

over the involved nerves for a few minutes and local application of hot packs generally disperse the pain for the time being. The rules of hygiene should be observed in all cases.

The best time to **remove** the **cause** of neuralgia is between the attacks when the tissues are not as tender or contracted to such an extent as during the paroxysm. A diagnosis can then be made much more easily, and the tissues adjusted with less pain to the patient.

The details (as to the locality treated) for each form of neuralgia will be found under the discussion of each variety. The general health and diet should be considered. Peterson¹ says: "Morphine is, among the alkaloids, the most frequent cause of insanity. It is a sad commentary on the heedlessness of some medical men, but the family physician is responsible, in almost every case, for the development of the morphine habit and its far reaching consequences. It should be looked upon as a sin to give a dose of morphine for insomnia or for any pain (such as neuralgia, dysmenorrhea, rheumatism) which is other than extremely severe and transient."

Diseases of the Cranial Nerves

Olfactory Nerves.—This nerve may be affected at various points from its origin to distribution. The disturbances may produce hyperosmia, or anosmia. The lesions may be tumors, injuries to the head and various diseases of the brain, or diseases of the nasal mucous membrane.

The **treatment** of the nerve (beside treating the disease causing the disturbance) is to the cervical region with a view to controlling the blood supply.

Optic Nerve and Tract.²—The retina, optic nerve, chiasma and optic tract may be affected by various lesions.

The affections of the **retina** are organic or functional. Under organic there is hemorrhage and retinitis. Retinitis may be due to several diseases, as syphilis, Bright's disease, anemia, etc., Functional includes toxic and hysterical amaurosis, tobacco amblyopia, nyctalopia, hemeralopia and retinal hyperesthesia.

Included in the lesions of the **optic nerve**, are optic neuritis and optic atrophy.

Under lesions of the **chiasma** and **tract** are diseases of the chiasma and unilateral regions of the tract. Lesions of the tract and centers may be found in the tract itself, in the optic thalamus and the tubercula quad-

1. Nervous and Mental Diseases, p. 622.

2. See Diseases of the Eye, Part I.

rigemina, in the fibers of the optic radiation, in the cuneus, and in the angular gyrus.

A brief summary, only, has been given of the lesions found, it being the idea not to dwell upon symptoms, morbid conditions, etc., but to bring out essential osteopathic features in regard to the cranial nerves. For the various effects of these lesions and points of diagnosis, the reader is referred to the various works on nervous diseases.

Lesions peculiar to **osteopathic** practice, that affect the optic nerve and tract, are found chiefly in the upper and middle cervical vertebrae. The disorders to these vertebrae may involve fibers of the optic nerve directly—those that are supposed to originate in the cervical spine; they involve the retina and optic nerve by way of the fifth, as claimed by some; and the above lesions especially affect the blood supply to the optic nerve and tract, either interfering mechanically with the blood-vessels or obstructing and irritating vasomotor nerves. The most common lesions are sub-dislocations of one or all of the three upper cervical vertebrae. Still, lesions may be located as low as the third or fourth dorsal vertebra, which may influence vasomotor and sympathetic nerves, or the lymphatics. The three or four upper ribs should also receive due consideration.

Motor Oculi.—Lesions of the third nerve may affect its center or the course of the nerve. These lesions produce spasms or paralysis.

The only way that we can control the motor oculi is by way of the superior cervical sympathetic; also, it has a connection with the fourth, fifth and sixth nerves, and we can influence it to some extent by direct treatment to the eyeball and orbital muscles. It should be remembered by the osteopath that many of the lesions affecting the cranial nerves, are found upon post mortem examination, to be the effect of lesions in the spinal region; that many predisposing lesions are the disordered anatomical spinal tissues; as for instance in the third nerve, derangements of the atlas or axis may affect the nerve sympathetically (reflexly), or possibly by direct fibers, and produce the secondary effect—the so-called primary lesions of other schools—at the center or in the course of the nerve.

Patheticus.—This nerve may be involved by tumors at its nucleus, or as it passes around the outer surface of the crus into the orbit. Aneurisms or the exudation of meningitis may also compress its fibers. This nerve is purely motor, although it receives a few recurrent sensory fibers from the fifth nerve.

This nerve is controlled osteopathically, principally at the superior

cervical sympathetic. It has connections with the sympathetic by way of the cavernous plexus.

Trigeminus.—Lesions of this nerve are found in its nucleus and in the pons, and include sclerosis, hemorrhage, disease and injury at the base of the skull, tumors, aneurisms, inflammation of the nerve, and sub-dislocations of the **upper three cervical** vertebrae, or the inferior maxillary.

This nerve is an extremely important one from an osteopathic point of view, as it has a vasomotor influence over various vessels of the head and face, and secretory fibers to the lachrymal, parotid and submaxillary glands; also, it controls mastication, and to some extent deglutition, and influences hearing (tensor tympanum muscle). Diseases of the nasal mucous membrane and disease of the anterior portion of the eyeballs are largely due to the **vertebral sub-dislocations** and to derangements to the inferior maxilla. Our principal work upon this nerve is at the upper cervical vertebrae, the inferior maxilla, and the deeply contracted muscles in the upper cervical region. For the facial points of treatment **see neuralgia of the fifth nerve.** This nerve is closely related to the sixth, seventh, eighth, ninth, tenth, eleventh and twelfth nerves. Particular emphasis is given to the importance of treating this nerve in nasal catarrh and in eye diseases of the anterior portion of the eyeball. It contains trophic fibers to the eye, sensory fibers to the sclerotic coat and iris, and vasomotor fibers to the choroid plexus.

Abducens.—This nerve is especially liable to be affected by tumors and meningitis. It is controlled osteopathically at the superior cervical sympathetic, being connected with the sympathetic at the cavernous plexus.

Facial.—Lesions may occur in the cortical centers of the nerve, the nucleus and the nerve trunk. Paralysis of the facial nerve occasionally occurs (Bell's paralysis); also facial spasm may occur. This nerve is controlled at the stylomastoid foramen. **Lesions** to the **atlas**, anteriorly or laterally, are commonly found. In the region of the stylomastoid foramen, the nerve communicates with the great auricular of the cervical plexus, the trifacial, the vagi, the glosso-pharyngeal and the carotid plexus of the sympathetic. The facial nerve may be affected directly as it passes above the angle of the jaw.

Nearly every case of **Bell's paralysis** can be cured by osteopathic treatment. There are usually lesions to the upper two or three cervicals. Correction of the cervical vertebrae and massage of the paralyzed muscles, with care of the general health, will suffice, provided there is not an ex-

tensive central lesion. Although the disease may be due to syphilis, meningitis, tumors, etc., the most frequent causes are lesions of the **atlas, axis, and third cervical** and **exposure to cold**. The cold produces a neuritis in the Fallopian canal, and deep treatment beneath the angle of the jaw is effective. The **prognosis** of Bell's paralysis is favorable.

Auditory.—Lesions¹ affecting this nerve may occur anywhere from its cortical center to its distribution in the cochlea and vestibule. Disorders resulting from lesions to this nerve are nervous deafness, auditory hyperesthesia, tinnitus aurium, and Meniere's² disease.

The control of the nerve and the treatment of lesions affecting it, are effected principally at the **first and second cervical** vertebrae. The atlas is especially apt to be subdislocated anteriorly or in a rotary manner. The condition of the **upper dorsal** region should also be carefully examined, as vasomotor nerves to the ear may be impinged at this point. The auditory connects with the fifth, sixth and seventh nerves.

Glosso-Pharyngeal.—This nerve may be affected by tumors, degenerations, meningitis and various lesions. It is often very hard to determine exactly the pathology, on account of its various connections with other nerves, the vagi, facial, spinal accessory, olfactory and optic nerves.

This nerve is chiefly controlled at its exit at the jugular foramen. Osteopathically, **lesions** of the **cervical** vertebrae and **upper dorsal** vertebrae affect it. The deep muscles of the anterior and lateral regions of the neck and subdislocations of the atlas especially affect the nerve.

Pneumogastric.—On account of its extensive distribution, and the importance of its functions this is one of the most important nerves in the body. It distributes fibers to five vital organs—heart, lungs, stomach, liver and intestines—and to other organs of secondary importance. This nerve is associated with deglutition, phonation, respiration, circulation and digestion.

Hemorrhages, softening, etc., may involve the nucleus of the nerve, while the trunk may be impinged by tumors, thickened meninges, aneurism of the vertebral artery and **subdislocation** of the **upper five or six cervical** vertebrae, chiefly the atlas.

The nerve is most easily controlled at its exit from the foramen. Inhibition of the suboccipital region, between the mastoid process and transverse process of the atlas, will influence the nerve markedly, proba-

1. See Ear Section, Part I.

2. R. D. Emery reports a case of Meniere's disease as cured. A. O. A. Case Reports, Series IV.

bly reflexly; also direct treatment may be given the nerve as it passes along the anterior part of the neck near the trachea. The superior laryngeal branch may be treated below the great cornu of the hyoid bone and attention is particularly called to this in all affections of the throat where coughing is a feature; the inferior laryngeal, at the inner side of the lower part of the sternocleidomastoid muscle. The inferior laryngeal nerve may be affected by dislocation of the first and second ribs, producing pressure upon the nerve as it winds about the subclavian vessel. Fibers of the nerve have been traced to the spinal accessory nerve, as low as the sixth and seventh cervical vertebrae; consequently, lesions to the vagi nerves may occur anywhere in the cervical region.

Spinal Accessory.—Lesions of this nerve may cause paralysis or spasms to the structures to which it is distributed. The lesions consist of **subdislocations** of **cervical** vertebrae, chiefly the upper three or four. The nucleus may be involved by wounds, abscesses, caries of the vertebrae, tumors and meningitis. These lesions may also involve fibers of the trunk.

The special points of control of the nerve are at the jugular foramen, the sixth and seventh cervicals and the second, third and fourth cervicals.

Torticollis or **Wry-neck** is spasm of the muscles of the neck supplied principally by this nerve. There will be found either derangements of the **middle** or **lower cervical** vertebrae or the muscles are swollen from exposure to cold or from a blow. Sometimes the lesion is in the upper dorsal. The disorder is mainly a neurosis and, unless it has become chronic, the **prognosis** is favorable, and even in chronic cases, often considerable benefit can be obtained.

Hypoglossal.—This nerve may be affected by cortical, nuclear and infra-nuclear diseases, as well as by subdislocations of the upper cervical vertebrae. It communicates with the superior cervical ganglion, the vagi, the upper cervical nerves and the gustatory branch of the fifth nerve. We control the nerve at the anterior condyloid foramen and at the superior cervical ganglion.

Diseases of the Spinal Nerves

Cervical Nerves.—The **great occipital** nerve may be controlled at a point on the occiput between the mastoid process and the first cervical vertebra. The **small occipital** and the **great auricular** nerves may be controlled at a point just behind the mastoid process. The great auricular nerve and the frontal branch of the trigeminus nerve meet over the parietal protuberance. The preceding points are the

places where one may inhibit the nerves and control certain headaches or neuralgic attacks, although subdislocations of the upper cervical vertebrae, or contracted muscles between the atlas and occiput are usually the cause of such disturbances. Adjustment of the lesion will usually correct the disturbance. Carefully exclude possible caries or tumors.

Treatment of the upper cervical region, by relaxing muscles and correcting deranged vertebrae, constitutes the principal treatment of an ordinary **headache**. It is best to have the patient flat upon his back and the osteopath stand at the head of the patient, and, first, thoroughly relax these contracted muscles or correct the derangement of the vertebrae; then after the foregoing has been accomplished, give an inhibitory treatment of the sub-occipital region. In inhibiting, place the fingers over the contracted and tender tissue; hold tightly for several minutes, or at least until the tissues have thoroughly relaxed. Many times one will be able to detect a slight twitching underneath the fingers, and when such is felt, he knows at once that the headache is relieved. In inhibiting at any point along the spine, seek the contracted fibers and tender points and inhibit exactly over the area. Headaches that are due to a disturbed circulation of the brain, may be relieved by this inhibitory treatment in the suboccipital region. The treatment tends to reestablish a normal circulation to the brain. Although the large vascular areas such as the splanchnic, should, if possible, be normalized. Headaches may also be due to lesions at various points along the spine and ribs, and a correction of such points is necessary in order to cure the affection. A place often found involved is the upper dorsal region. **Reflex headaches** can be cured only by relieving the irritation. The treatment to the head would only be temporary. In headaches of the chronic type it is well to examine the scalp and if not freely movable over occipital region it may be adherent to the skull and cause pressure on the occipital nerves.

Lesions to the **phrenic nerve** usually occur in the region of the third, fourth and fifth cervical vertebrae. The lesion may be due to a deranged vertebra, or to disease of the membrane of the cord, or of the anterior horn of the gray matter (See Hiccoughs).

Paralysis of diaphragm from the phrenic may be single or double. When single it is not very noticeable. When double, respiration must be carried on by the intercostals and accessory muscles. When quiet, the patient may not notice it but on exertion there may be temporary dyspnea. Bronchitis with its constant coughing is a bad complication.

Various disorders of the phrenic nerve are principally treated in the area of the origin of the phrenic nerve. Tumors, aneurism, caries, and neuritis are possible complications.

Lesions to the **brachial plexus** are usually derangements of the cervical or upper dorsal vertebrae. Focal infections should not be overlooked. Direct injuries, contraction of muscles, a deranged clavicle, a cervical rib, or a dislocated shoulder are to be thought of. (See, also, Painful Shoulders, Part I) The X-ray as a diagnostic aid may be invaluable.

In obstructions to the **musculo-cutaneous** nerve, the power to flex the fore-arm upon the arm is greatly impaired. The lesion is most likely to be found between the fifth and sixth cervical vertebrae.

Clinically, the **median nerve** is of special interest from the fact that atrophy of the muscles of the ball of the thumb, which is pathognomonic of progressive muscular atrophy, may be caused by an affection of this nerve. The lesion is usually from the third to the seventh cervical vertebrae.

Lesions of the **ulnar nerve** may arise between the sixth and seventh cervical vertebrae, but are oftentimes found as low as the fifth dorsal, especially at the fifth rib on the side affected.

Lesions of the **circumflex nerve** may be found in the lower cervical vertebrae, but are commonly caused by dislocations of the humerus and clavicle.

Lesions of the **suprascapular nerve** occur most frequently from the fifth to sixth cervical vertebrae.

The **posterior thoracic** may be lesioned at the fifth or sixth segments, or by pressure injuries to the serratus magnus.

Dorsal Nerves.—The essential osteopathic points of the dorsal nerves have been considered under intercostal neuralgia. It might be stated that the posterior fibers of the sixth and seventh dorsal nerves supply the skin of the pit of the stomach. This is of value, clinically, as severe pains in the epigastric region which may result from impingement of these nerves, are supposed by the patient to be due to stomach disorder.

Diseases of the **liver** may be manifested by **pains** in the region of the right scapula. It has been suggested that the stimulus passes from the liver up the pneumogastric to the spinal accessory and down the spinal accessory to the trapezius muscle and thus causes the "liver pain."

Intercostal neuralgia is more common on the left side of the body. The intercostal veins of the left side empty into the left superior intercostal vein or the left azygos. Thus the blood, to reach the vena cava, is obliged to take a circuitous route and stagnation is more likely to occur than on the other side.

The glandular structure of the **mammary glands** is supplied by intercostal nerves from the third to the sixth interspace. Lesions here will cause various diseases of the breasts and adjustment will cure many of them.

Lumbar Nerves.—The lumbar nerves may not only be deranged by various growths, inflammatory processes and abscesses in the abdomen, but by lesions, infections, parturition, and developmental defects of the lumbar vertebrae. Tuberculosis of spine, sacro-iliac and hip joints, is not rare. In doubtful cases utilize the X-ray plate.

Lesions in the region of the **first lumbar** may affect the **iliohypogastric** and **ilio-inguinal** nerves and causes various irritations of the penis, scrotum, labium and thigh. Also, the perineal region may be involved, as well as connecting branches of these nerves to various visceral nerves underneath.

The **genital organs** may be affected by lesions to the **genitocrural** and **external cutaneous** nerves, caused by vertebral lesions of the second and third lumbar vertebrae. The latter nerve may be irritated by pressure underneath Poupart's ligament.

Lesions at the third and fourth lumbar vertebrae and sacroiliac articulation may affect the **obturator nerve**.

Sacral Nerves.—Lesions to the sacral nerves are especially liable to occur when an innominatum is subdislocated, as that changes the relative position of the femur with the body and causes impingement to the sacral nerves. Contraction of the pelvic and thigh muscles also affect sacral nerves. Other lesions to the sacral nerves may be located at the fifth lumbar and sacrum. It should be remembered that the centers of the sacral nerves are in the lower dorsal and upper lumbar region. Various lesions to the sacral nerves may be caused by pelvic inflammation, compressions by growths, and injuries and contractions of muscles within the pelvis. Sciatica has been described under neuritis.

GENERAL AND FUNCTIONAL DISEASES

Paralysis Agitans

(SHAKING PALSY)

Definition.—A chronic, nervous disease, characterized by tremors, muscular weakness, muscular rigidity and alterations in the gait.

Etiology.—The disease usually commences after forty years of age, but occasionally it occurs from the thirtieth to fortieth years. It is more frequent in males than in females. Heredity seems to have but little influence in the cause of the disease. Among the principal causes are physical injuries, exposure to cold and wet, emotion, worry, alcoholism, sexual excesses and acute diseases. Physical injury, in conjunction with exposure to cold is the best determined cause. Disorder of the vertebrae of the cervical or dorsal regions, or of the upper and middle ribs, can generally be found. Traumatic influences probably affect the nerve centers, causing a disturbed innervation, either by the direct effect of the deranged structures upon the nervous tissues or obstructing nutritive channels to the nervous tissues.

In most cases no changes have been observed in the central nervous system or in the sympathetic ganglia. Some observers have noted induration of the pons, medulla and cord, but these changes may be due to senility or to the indirect consequences of the long disturbance of function. In a few cases, interstitial sclerosis of the peripheral nerves is observed; these are probably secondary changes. Osteopathic experience regards paralysis agitans as an affection of the central nervous system, due to a disordered structure in the locality affected.

Symptoms.—The onset is usually gradual, but may come on quite suddenly after exertion. The **initial** symptoms are usually tremor, stiffness or weakness in one hand. In rare cases, at first there may be neuralgic pains, dizziness and symptoms of a rheumatoid nature. The tremor can be controlled by the will at the onset of the disease. The affection gradually extends until an entire side or the upper or lower limbs are involved. At this **advanced stage** of the disease, a peculiar muscular rigidity of the involved region takes place. Muscular weakness comes on at about the same time as the rigidity, and the loss of power varies much in degree. The condition is most marked in the fingers and hands, whence it extends to the arms and legs. It commonly passes from the right arm to the right leg, then to the left arm, and then to the left leg. At this stage the movement between the thumb and fingers is

like that of crumbling bread. The writing is greatly affected and in time it is impossible to write. The trembling may be so violent as to prevent sleeping. There is occasionally an intermission of days in the tremor.

On account of the rigidity of the muscles, the patient assumes a characteristic **attitude** and **gait**. The position of the body is that of a tendency to go forward, the head is bent forward, the back curved outward, the arm bent at the elbow and held away from the body, and the knees so close together that they rub in walking. The gait is a "propulsive" one, and when once started in a forward walk, the patient's gait becomes more and more rapid and he cannot stop until he comes against some object. The expression of the face is stiff and mask-like, the speech slow and monotonous and the voice shrill. The patient is generally restless and troubled with insomnia. The general health is in fairly good condition. Reflexes are usually normal. The intellect is generally retained, although the physical ailment may cause mental depression.

Diagnosis.—Is usually easy and can oftentimes be made at a glance. **Disseminated sclerosis** has a tremor, but is shown particularly in voluntary movements. The speech is scanning and the gait ataxic. The disease begins in the lower extremities, the attitude is different from that of paralysis agitans, and there is nystagmus. In **chorea** the movements are general, irregular and more intermittent, and it particularly involves muscles of the face. Also chorea is a disease of children and young adults.

The **tremors** of old age, hysteria, and certain toxic conditions due to tobacco, alcohol, etc. are generally easily diagnosed.

Prognosis.—The disease does not necessarily shorten life; the patient oftentimes dies with some intercurrent disease. Improvement usually results from careful, prolonged treatment. Early treatment, of course, will give the most satisfactory results, and occasionally, if taken very early, the case can be cured.

Treatment.—A most careful examination of the physical structures of the patient should be made, particular attention being paid to the **cervical** and **dorsal vertebrae**, the upper and middle **ribs** and the **muscles** along the spinal column. All irregularities found should be corrected if possible, and strong, thorough treatment given to the region of innervation of the affected parts. Traction of the rigid areas is of some value. Treatment of the arms and legs will also be of aid. All mental strain and physical exhaustion should be prevented if possible.

General **hygienic measures** are to be employed. The life of the patient should be quiet and regular. Bathing, fresh air, massage and out-door life will aid in improving the general health. **Persistent** treatment will retard the progress and frequently improve the general condition. Simple and hysterical tremor must not be confounded with that of paralysis agitans. E. Ashmore¹ reports an interesting case which shows about what may be expected under treatment.

Acute Chorea

(ST. VITUS DANCE)

Definition.—A functional disorder of the nervous system, chiefly affecting children, more than twice as frequent in females as males; characterized by irregular involuntary muscular contractions, often slight mental disturbance, and liability to endocarditis.

Osteopathic Etiology.—The disease affects children of all stations, but is more common among the lower classes. The greater number of cases occur before the age of twenty. It sometimes develops during the early months of pregnancy, when it often assumes the maniacal type. Chorea is frequently associated with endocarditis and rheumatism and delayed menstruation. It occasionally follows infectious diseases of childhood, especially scarlet fever. Fright, mental worry, sudden grief and overstudy may bring on an attack. Children of neurotic stock are more susceptible. Heredity plays some part as a predisposing cause. Reflex irritation from worms or from genital irritation has a slight influence upon the disease. Overwork in school is an important factor.

Derangement of the **anatomical structures**, involving the nervous system along the spinal column, is the most common predisposing cause. Most of the anatomical displacements are found in the cervical vertebræ, although the upper dorsal may be involved.

Pathologically, as yet, no constant anatomical lesions have been found. Emboli occur in some cases, but this might be expected, as endocarditis so frequently occurs as an effect and not the cause of chorea. "In cases not rheumatic, the most probable explanation of the symptoms is to be found in vascular changes, having their origin in disturbed nutrition." (Holt) According to osteopathic theories and investigations, the disease is due to various irritations to the spinal centers and nerves of the affected region. The disordered nerve cells may be the result of direct pressure, hyperemia, anemia, etc., and the action upon the brain

1. A. O. A. Case Reports, Series IV.

centers is possibly a reflex act. Of late acute chorea is regarded by some as an infectious disease.

Symptoms.—In the majority of cases the muscular movement is not severe. They are purposeless and the child appears awkward. Restlessness, disturbed rest at night, crying spells, pain in the limbs, headache and irritability, are some of the premonitory symptoms. In **mild cases** one hand, or the hand and face, are involved. Occasionally there is some difficulty in talking. The irregular, jerky movements are characteristic of this disease. The child is anemic, and the muscles are weak. In **severe cases** the movements are general, the power of speech is lost, and the patient is unable to get about. The condition usually occurs after one or more mild attacks, although it may occur primarily. During an attack of chorea, the child's disposition changes, he becomes irritable, cannot concentrate his mind, memory is affected and hallucinations may occur. The reflexes do not usually differ from the normal. **Maniacal chorea** is most serious, and often proves fatal, although recovery may occur. This form occurs most frequently in pregnant women. Speech is greatly affected and insomnia, fever and maniacal delirium develop. The **duration** is from six to ten weeks, in the average case. Mild cases may recover in a month or less, others last six or more months. There is a tendency of chorea to recur; rheumatism seems to favor this tendency. In children recovery is the rule.

Diagnosis.—In the majority of cases chorea is easily diagnosed. The symptoms are generally very characteristic. In a few cases of hysteria there may be difficulty of diagnosis, but history and rhythmical movements will usually differentiate. In **hereditary ataxia** the slow, irregular movements, the scolioses, scanning speech, talipes and the existence of other cases in the family, will differentiate this from chorea. **Cerebral sclerosis** usually occurs in infancy; impaired mentality, exaggerated reflexes, rigidity and chronic course of the disease, are points which render the diagnosis easy.

Treatment.—Nearly all cases can be cured.¹ The predisposing causes of chorea, osteopathically, are usually found to be subluxations of the vertebræ or ribs at any point, but particularly in the cervical vertebræ. Chorea is one of the diseases of the nervous system, in which constant morbid changes are not found upon the post-mortem examination. Possibly the reason is because the lesions causing the diseased state are not deeply seated enough to primarily affect motor centers; but are lesions of the spinal column and ribs, affecting simply the nerve

1. See A. O. A. Case Reports, Series II., III., IV., V.

fibers reflexly, as they pass through the intervertebral foramina. There will be found well marked lesions, and upon their correction the osteopath finds complete recovery largely depends.

The muscle, or group of muscles, involved, will give a **direct clue** as to where the lesion will probably be found. In nearly all cases, it is in the spinal region of innervation to the affected muscles. Other cases may be due to cerebral lesions, as well as to intestinal and uterine disturbances. Search should be made for possible **reflex** irritation, such as intestinal parasites, adherent prepuce, eye strain, nasal abnormalities, etc.

All cases should be taken from school, carefully guarded from excitement, and placed under the most favorable **hygienic** conditions, with a certain amount of discipline as to self control. The more serious cases should be placed in bed, so that rest will be secured as well as diminished liability to heart complications.

The **diet** must be carefully watched and the bowels attended to regularly. A milk diet during the early stage is highly recommended. Do everything possible to restore the general health. Mild gymnastics, in most cases, will be found of service. Amusement should be given the child, in the open air if possible. In severe cases where the skin is harsh and dry, the hot air bath, providing the strength is good, will give considerable relief from the intensity of the disease. A few cases of acute chorea run into a **chronic form**, but the latter, as a rule, yields to osteopathic treatment.

Choreiform Affections

Myoclonia is a sudden contraction of a few muscle fibers, a single muscle or of a group of muscles. A neurotic tendency, infections and toxic conditions are factors. Occasionally epilepsy may be associated with it. Osteopathically there can be but little doubt that the innervation to the muscles involved is interfered with.

The lower extremities are usually first affected and it may be sudden or gradual in appearance. It is progressive and slowly involves the arms and, rarely, the face. Usually the spasms cease during sleep.

Prognosis is rather favorable. Examination should show the cause of the nerve interference and its correction bring relief.

Dubini's disease is probably associated with certain diseases of the cord and brain and is characterized by sudden, sharp pains in the head, neck and lumbar muscles, extending to the lower extremities in the form of a short, sharp spasm, usually at regular intervals. Later

there may be symptoms of hemiplegia. The disease is apt to progress and death may occur during a convulsion.

Habit spasm usually results from overstudy and nerve exhaustion with impairment of general health, and is incident to early life. The child is usually a neurotic. The symptoms are twitching of the mouth and eyelids, grimaces and jerking of the shoulders. **Treatment** for the general condition, with correction of any spinal lesions, will generally give relief.

General tic resembles habit spasms closely. In some cases the patient is apparently healthy, while in others there is some brain disorder. There are coordinate spasmodic movements of the head, face and upper trunk, swallowing and abnormal vocal sounds. The movements are rapid and frequently repeated. **Prognosis** is uncertain and will depend largely on general conditions. In **convulsive tic** there is usually a repetition of certain words or sounds with a convulsive twitching or movement of certain muscles.

Infantile Convulsions

(ECLAMPSIA)

Infantile convulsions may be due to various causes. A neurotic inheritance is an important predisposing factor. They may precede the development of many diseases of the nervous system, and also occur as the result of peripheral irritation. Dentition in association with rickets, and intestinal parasites are common causes. They may be the early symptoms of acute, infectious diseases. Scarlet fever, measles, pneumonia and smallpox are very frequently preceded by convulsions. They may be due to debility, resulting from gastro-intestinal disorders. Malnutrition is a predisposing cause. Disease of the bones, especially rickets, may be associated with convulsions. Lesions of the brain are other causes. A protracted instrumental delivery may cause a hemorrhage of the meninges.

Symptoms.—In severe cases the fit may be identical with epilepsy. It is more often not so complete as true epilepsy. Convulsions vary considerably, but there will be no difficulty in diagnosis. It may come on suddenly, or be preceded by restlessness, twitching, sometimes grinding of the teeth and fever. The spasms may be either of a tonic or clonic type preceded by a cry and loss of consciousness. The attack may be single, but the fits may follow each other with great rapidity and terminate fatally. It is rare for the child to die during a convulsion. Exhaustion and asphyxiation may cause a fatal termination. As in epi-

lepsy the temperature often rises during the fit. A transient paresis sometimes follows, if the convulsions have been chiefly limited to one side.

Diagnosis.—The diagnosis is generally easy. The attack is usually due to the ingestion of some indigestible food or to some peripheral irritation, or an acute disease. Convulsions, appearing immediately after birth or injury, are probably due to meningeal hemorrhages or serious injuries to the cortex; although a few of these cases will present grave lesions of the cervical vertebræ, probably often due to protracted instrumental delivery. Infantile convulsions usually occur between the fifth and twentieth months. Convulsions occurring after the second year are more likely to be true epilepsy. The **prognosis** depends almost wholly upon the cause, severity and duration.

Treatment.—The **first step** in the treatment is to determine the cause if possible. Treatment in the region of the sixth and seventh dorsals will often give relief; thorough work along the lumbar region and the sacrum will many times be sufficient, if the convulsion is due to intestinal disorder. C. M. Proctor reports that in male infants he has relieved convulsions quickly, in several cases, by pushing back the foreskin and has always found, in such cases, either a phimosis or an adherent prepuce. In female infants it might be well to examine the clitoris. Dilatation of the rectal sphincter may be of aid. It may be necessary to vomit the patient, when it is due to undigested food in the stomach; and in some cases an enema should be used, when the irritation is in the intestines. In a few cases, when the convulsions are due to dentition, a lancet applied to the gums will be all that is required. A thorough treatment to the cervical region, to control the circulation, should always be given; at the same time apply ice to the head. The patient should be put in a bath of 95 to 98 degrees F., should the preceding treatment not have the desired effect, or, better still, use the bath at once and treat at the same time.

Owing to the neurotic tendency and the oftentimes trivial causes that precipitate an attack everything possible should be done to build up the general condition—adjustment of all lesions, regulated diet and disciplined habits.

Epilepsy

Definition.—A chronic affection of the nervous system, characterized by attacks of unconsciousness, which are usually accompanied by general convulsions. When there is merely a momentary loss of

consciousness it is called **petit mal**. Loss of consciousness with convulsions is called **grand mal**. When the convulsion is localized, with or without loss of consciousness, it is called **Jacksonian epilepsy**. Certain cases of temporary loss of consciousness are termed **psychic epilepsy**.

Etiology.—Epilepsy usually begins before puberty, and comparatively seldom after the twenty-fifth year. Males suffer somewhat more frequently than females. Heredity predisposes to the disease to some extent, but probably not so greatly as many writers would claim. Neuroses, as insanity and hysteria, and intermarriage of relatives, are important elements to consider. When epilepsy is inherited, it is almost always due to some morbid state of the nervous system. Other predispositions to the disease may be caused from defective general development of the brain, from impairment of the general health, and from an exhausted nervous system.

Many **exciting causes** may be found: mental emotion, fright, excitement and anxiety; blows and injuries to the head; infectious diseases; syphilis; alcoholism; masturbation; ocular and aural irritation; disturbed and delayed menstruation. Epilepsy may be excited by reflex convulsions from intestinal worms, gastric irritation, etc. Also thickening of the membranes of the brain, pressure from a tumor at the periphery, uterine diseases and many other sources of irritation may be found, that are the exciting causes of epilepsy.

Important exciting causes of epilepsy are, undoubtedly in many cases, due to **lesions** of the **vertebrae** and **ribs** especially the vertebrae of the cervical region, although in some cases the lesion is in the lower splanchnic region or in the ribs (chiefly from the fourth to the eighth). These lesions to the spinal tissues disturb the nutrition to the vasomotor nerves. If the real seat of the disease is in the cerebral cortex and the medulla, the cervical lesion, and in fact other lesions, could readily affect the nerve force and circulation to and from these regions. The vertebral artery circulation, where a cervical lesion exists, may be involved and affect the brain. In cases where lesions of the vertebrae and ribs exist in the upper and middle dorsal region, the vasomotor innervation to the brain may be involved, for in this region the vasomotor nerves to the cranium, etc., pass from the cord into the sympathetics. Birth injuries may affect the brain tissue, through cervical lesions, hemorrhages and asphyxiation.

Conklin attaches considerable importance to stasis of the sigmoid and ascending colon. Lesions involving this region may result in toxins entering the blood and affecting nervous tissue.

To illustrate a specific exciting lesion, the following is interesting. The case was one of epilepsy that was evidently caused by a dislocated right fifth rib. By producing an irritation in the region of this rib, so that the lesion was increased, the patient could be made to immediately suffer from an attack of epilepsy. By resetting the rib, at once the sufferer would be entirely relieved. The case was cured after three months' treatment, the chief work being to keep the rib in place. Rarely a subdislocated innominate bone, or some lesion remote from the brain, is located and found to be causing epilepsy. Important lesions in most cases will be readily located in the cervical region. Booth reports: "I have records of seven fairly defined cases of epilepsy—such as have been so pronounced by M. D.'s. I find in all of them **marked lesions** in the **upper cervical** and in most of the cases the occiput is posterior upon the atlas or twisted. In all cases there was a thickening of the soft tissues, especially in the upper cervical. The lower cervical was also much involved but not so noticeably. All of the cases also presented marked disturbances in the upper dorsal; most were decidedly anterior, and one very posterior. One was almost a confirmed drunkard; notwithstanding the fact, he recovered to such an extent that he went to work, and I understand has been holding his position for more than three years. He had had to give up his work entirely. One was a hopeless case in every particular and did not seem to receive any benefit from the treatment. I think it was entirely beyond help from any source. The others responded very well and the results were definite and decided. The length of treatment in successful cases ranges from about five weeks to a little over a year. But those that were treated the greater length of time were not treated continuously."

After one convulsion has occurred, others readily occur, owing to the proneness to changes in the nerve centers. Very little is known as to the pathology of this disease. Convulsions may be caused from irritation of both the cortex cerebri and the medulla oblongata. From a study of the character of the auræ, one is led to believe that there is a disturbance, in most cases, in the centers of the cerebral cortex; and that the lesions so generally found along the spinal column are the true exciting causes of the disease. Perhaps in a few cases the irritation may be to the medulla reflexly. The lesions found on osteopathic examination may act reflexly, as has been stated, upon the centers in the brain and excite them; or the circulation is deranged, and consequently the nutrition to the brain and meninges, by vasomotor control and the vertebral vessels, is impaired.

The splanchnic area and the cervical region should always receive special attention. This in conjunction with all possible reflex sources, and, not least, the general health, restoring a stable nervous system if possible, are of greatest importance.

As a rule, **pathological** lesions are not found. To the naked eye the appearance of the nerve centers is largely that of healthy organs. The changes revealed by the microscope are most probably those of secondary origin. Recent experiments seem to show that the motor zone of the cortex is affected.

Symptoms.—These will be considered under the three varieties, known as grand mal, petit mal and Jacksonian. **Grand mal.**—In most cases the seizure is preceded by a pronounced sensation known as the **aura**. This differs greatly in various individuals. It may begin in a finger or toe and rise until it involves the head, when the patient screams and falls to the floor unconscious. In other cases the sensation may start from other parts of the body, as the epigastric region, where it may simply be a slight discomfort; or other sensations may be felt, as that of a ball rising from the stomach. The aura may start from any part of the body as a numbness, tingling, chilliness, etc., and may, also, be manifested through the optic, olfactory, auditory and gustatory nerves, by flashes, smells, sounds and tastes. "Intellectual auræ" may also be manifested. Some form of auræ is met with in nearly one-half the cases of epilepsy. Others lose consciousness so early that the patient is not aware of the onset. In cases not attacked suddenly and not preceded by an aura, a prolonged prodrome may be present for several hours or a day. The patient may feel irritable, dizzy or dispirited. Or he may be quiet and calmly await the attack. In a few cases certain movements may precede an attack, as running rapidly forward in a circle, or standing on the toes and rotating rapidly. The attack proper is sudden. The patient falls with a peculiar cry. The **convulsion** or fit may be divided into **three stages**, that of **tonic** spasm, of **clonic** spasm and of **coma**.

The **tonic spasm** succeeds the epileptic cry; there are loss of consciousness, pallor of the face and the contraction of pupils. The body assumes a position of tetanic rigidity, the head is retracted and rotated, and the spine curved, owing to an unequal affection of the muscles of the two sides. The jaws are fixed, the arms are flexed at the elbow, the hands at the wrist, and the fingers are clinched. The legs and feet are extended. The muscles of the chest are involved and respiration is suspended. This stage lasts a few seconds. The **clonic spasm** follows the tonic

spasm. The muscular contractions become intermittent. From slight vibratory motions, the intermittent muscular contraction becomes general. The arms and legs are thrown about violently, the muscles of the face are distorted, the eyes rolled, and the lips open and close. The muscles of the jaw contract violently and the tongue is apt to be bitten. The pupils are dilated, the face cyanosed (though at first the face is pale and pupils contracted) and blood streaked, frothy saliva pours from the mouth. The feces and urine may be discharged involuntarily. The temperature rises about one degree F. This stage lasts about one or two minutes. The period of **coma** may last from a few minutes to several hours. Usually if left alone, the patient will awaken after a few hours. In a few cases mental confusion follows the waking. During the stage of coma, the face is congested but not cyanotic. The muscles are relaxed and the breathing is noisy. Epileptic attacks during sleep, **nocturnal epilepsy**, are not rare. This may continue for some time without the patient being aware of it.

Petit Mal.—In this variety of epilepsy, convulsions are absent. The seizure consists of momentary unconsciousness with fixed, staring eyes, dilated pupils and rarely any twitching of the muscles. After the attack the patient resumes his work. There may be attacks of vertigo, without unconsciousness, and the patient may fall. In a few instances there may be auræ of various kinds. Petit mal may be a forerunner of grand mal or the two may alternate. Between grand and petit mal there are many grades of epilepsy varying in severity.

Jacksonian Epilepsy.—The affection is always symptomatic of lesion in the motor area of the cortex. The lesion is quite apt to be a tumor, though various injuries, inflammation, sclerosis, softening, hemorrhage or an abscess may be the cause. Consciousness is retained and the convulsions are limited in extent. Tonic and clonic spasms of the same character as in general epilepsy occur. A slight numbness, tingling, or twitching may precede the attack.

The **severity** of epilepsy **varies** extremely. The seizure may occur but once a year or it may occur several times in a day. In many cases a marked periodicity is observed. The mental functions are not, as a rule, injured, but when the seizures are frequent, the health fails and the mental capacity is reduced. Many sufferers from epilepsy are subjects of chronic gastric catarrh, and have at the same time an inordinate appetite. Quite frequently a fit may follow inordinate eating.

When there is a **series** of **convulsions**, which follow one another in rapid succession and which are associated with high fever, the term

"status epilepticus" is applied. The most **common form** of epilepsy is the **major** form. About two-thirds of all attacks occur between eight a. m. and eight p. m.

Diagnosis.—**Uremic convulsion** closely resembles an epileptic convulsion. When the history of the case, analysis of the urine, increased temperature and the general health of the patient are all closely observed, error should be avoided. In **reflex convulsions of children**, a careful search, and if necessary waiting a short time, will readily determine the source of the attack. When **nocturnal convulsions** take place without the knowledge of the patient the attack is epileptic. In **hysterical convulsions** the patient rarely loses consciousness. They rarely hurt themselves, never bite the tongue, the temperature is normal, opisthotonos does not occur, and the duration is usually longer. In **Jacksonian epilepsy**, the attack is limited to some portion of the body, or it may gradually extend into a general convulsion. Care should be taken to recognize petit mal.

Prognosis.¹—Records show that many cases have been cured and a much larger number have been benefited.

Treatment.—Osteopathic treatment has been especially successful in epilepsy, as compared with other treatment. Although the osteopaths do not claim a cure in every case, by any means, still about four out of every ten have been cured, while one-half of the remaining have been greatly helped in regard to the lessening of the severity of the attack, and in rendering the attacks less frequent. Conklin through his special treatment of fasting, dieting, enemata, spinal adjustment, and particular attention to the large bowel, especially cecum and colon, has increased this percentage. This is based on several hundred cases.

Important lesions are usually found in the cervical region, from the third to the seventh vertebra, though they may be as high as the atlas. These lesions may affect the brain in various ways; probably in the manner described under the etiology. Lesions are also found in the dorsal vertebræ and when occurring below the cervical region, the lesions are generally found in the upper and middle dorsal regions, though they may be located at any point along the spinal column.

The treatment is according to the rule that applies to all osteopathic work: an individual correction of the lesions presented in the case at hand. If any general movement or treatment might be given, it would be strong traction of the head to stretch the cervical vertebræ, or rather to separate them, so that the circulation to the brain may be

1. See A. O. A. Case Reports, Series I., III., V.

equalized. Another general measure is to hyperextend the neck with fulcrum at juncture of atlas and occiput, thus releasing the upper anterior tissues that may impede cerebral circulation.

If the lesions in such cases are in the cervical vertebræ, probably they affect the cervical sympathetics. A **careful search** for a source of excitation must be made throughout the entire body. An irritation of the intestinal tract may be the exciting cause; or some irritation of the genito-urinary tract may be found, as phimosis, masturbation, etc., so that it is very necessary that great care be taken in the examination. Subjects of masturbation usually present lesions along the genito-urinary center in the spine. All possible reflex irritations should be eradicated.

Proper **hygienic measures** should be added. Pay particular attention to the bowels. Place the patient in the knee-chest position and thoroughly raise the cecum and ascending colon in order to improve circulation and promote elimination. Baths are important, and plenty of fresh air and out-door exercise are of much significance. The patient's mind should be occupied. The question of food is an important one; general diet—carefully regulated as to the amount given—should be prescribed. A vegetable diet is usually best. Reduction of salt seems to have a good effect. The patient must not be allowed to eat too much at a time, nor too often. If the bromides are being used, they should be withdrawn gradually.

In most cases of true epilepsy a continued treatment of several months is necessary. Unless the patient can follow out the treatment for several months, or even years, in a number of cases it will be entirely useless to take the treatment; although if the lesion present is very apparent, and the patient is enjoying fair health otherwise, and has not been affected long, a treatment for a few months, or even weeks, might be all that is necessary.

Surgical interference may be indicated in Jacksonian epilepsy. Trephining has been practiced successfully in a number of cases and the risk from operation with modern surgery is so reduced that one is frequently justified in advising an operation.

During an attack, a special treatment cannot be given to lessen the severity of the fit in all cases; in fact, most patients prefer not to have the seizure shortened as the after effects are more disagreeable. In some cases, at the beginning of the seizure, exerting a firm pressure upon the sub-occipital will quiet the patient. This treatment probably controls the circulation of the brain, by way of the superior cervical ganglion. In cases where the exciting factor seems to be in the intestines, and the

peristaltic action of the bowels is reversed, causing a reversion of the nerve current of the vagi, a rapid, firm kneading over the abdomen, so as to establish normal peristalsis, will suffice to prevent an attack, if one is notified of its approach. In some cases a rapid, thorough stimulation of the solar plexus will lessen an attack. Possibly it reduces the blood pressure in the brain, by bringing blood to the splanchnic region.

In all cases during the convulsion the patient should be carefully protected from injuring himself. A towel should be twisted and placed in the mouth, so that the tongue cannot be bitten. Do not place small articles as corks, etc., between the teeth, as they are liable to enter the pharynx and cause suffocation. The patient should be watched to protect him from any injury; otherwise the attack should usually be allowed to spend itself.

Migraine

(SICK HEADACHE)

Migraine or sick headache is a neurosis, characterized by a paroxysmal pain in the head, usually unilateral and periodical, with nausea, frequently vomiting, and disorders of vision.

Osteopathic Etiology.—The disease usually begins in the first half of life, rarely earlier than puberty and is slightly more frequent in females. Some weakened or depressed condition of the nervous system, due to lesions of the upper cervical vertebræ, lesions of the inferior maxilla, anxiety, overfatigue, anemia, digestive derangements, **eye-strain** and menstrual disorders, is generally the cause. The hereditary factor is very important. This is frequently associated with derangement of the **large bowel**, especially cecum and ascending colon, resulting in toxemia.

It is supposed by some to be a **vasomotor** disturbance, because there are symptoms, as pallor and flushing of the skin, which show an involvement of the sympathetic system. It is possible a spasm of cerebral arteries, followed by vascular dilatation, takes place. The seat of the pain is believed to be in the meninges of the brain. Possibly in many cases where the atlas is found involved and causing the affection, some meningeal fiber of the fifth nerve is impinged by the lesion. Caries of the teeth and **nasal troubles** are causes of the disease in children.

Symptoms.—A **paroxysmal** headache is the principal feature of migraine. The attack may occur without warning, although there are usually malaise, restlessness and a disturbed vision preceding the headache. The **prodromal** symptoms vary to a great extent. Other pro-

dromal symptoms besides those given, may be vertigo, spots before the eyes, tinnitus, chilliness, etc. The pain is of a sharp and stabbing nature and is oftentimes limited to the temporal region of one side. Others describe the pain as of a binding or of a boring nature. It is continuous. It may be in the occiput instead of in the side of the head.

Hyperesthesia of the surface is noticed, but the tender points of neuralgia of the fifth nerve are absent. The patient is sensitive to light and noise. Flashes of light occasionally attend the pain in the head. Hemianopia is not infrequent. The temporal artery may be contracted, the face pale and the pupil large. In others the eye is dilated, the face flushed and the pupil small. Nausea and vomiting are frequent, with loss of appetite. In some cases where the stomach is full, vomiting the contents will relieve the attack. Should the stomach be empty, vomiting of mucus may occur, and is later followed by vomiting of bile. Tenderness is commonly found about the region of the occipital and upper cervical muscles. Attacks rarely occur oftener than once in ten or fifteen days. During the intervals the patient may be quite well. The **duration** is anywhere from a few hours to several days.

Diagnosis.—The sensory symptoms, the paroxysmal character, the severity and definite course, usually readily distinguish migraine. **Growths** of the **brain** may be the cause of symptoms closely simulating migraine. In such cases an ophthalmoscopic examination may reveal a choked disc.

Prognosis.—Is usually favorable when the attacks are light and of short duration. Cases of long standing and of great severity are not so easily cured, although in most instances great relief can be given the patient. There are very few cases in which the severity and frequency of attacks cannot at least be lessened. Oftentimes attacks of migraine cease after middle life.

Treatment.—The **atlas** or one of the **upper cervical** vertebræ is almost invariably subluxated. This is not always the direct cause of migraine, but it is an important factor in the causation. **During** the **attack** many cases can be completely, or at least partially relieved, by a careful treatment in the upper cervical region. But there are some cases where treatment of the cervical region is entirely unsuccessful, and, in fact, aggravates the attack. The details of treatment vary in every case. If any defects in general health or any error in the mode of living can be found, these of course must receive first attention. Rest, diet (a vegetable diet is best) and regularity of meals are usually to be specially considered. Anything that is known to induce an attack must be

carefully avoided. In some patients the attacks cease so long as they remain free from mental work, but as soon as they return to their studies the paroxysms occur.

Every case should be thoroughly examined before a course of treatment is laid down. Causal conditions can generally be found, and the correction of such usually results in a cure, or at least in great relief. Errors in diet; digestive disturbances, as a disordered biliary tract; disorders of the pelvic organs; eye-strain; nasal disorders; mental and physical fatigue, and affections of the nose may induce attacks.

A beneficial treatment for many, aside from adjusting the spinal lesions, especially the cervical and usually a rigid splanchnic area, is to place the patient in the knee-chest position and thoroughly raise the bowels of the right side beginning in the right iliac, loosening possible adhesions, etc.

The earlier the treatment, the more likelihood of a cure. Cases of long standing are generally harder to cure. Preceding a paroxysm, relief can usually be given, but after the paroxysm has reached its height it is harder to give relief. The patient should rest in a quiet room which is darkened and well ventilated. Besides the indicated osteopathic treatment (generally a cervical one), hot applications to the nape of the neck and keeping the extremities warm are helpful. The nerves involved are the vasomotor, occipital, frontal and temporal. A free evacuation of the bowels will relieve a few cases, while washing out the stomach will help others. Hot fomentations over the splanchnics for thirty minutes may be beneficial. During the intervals, valuable adjuncts will be found in the use of systematic exercises and frequent bathing. Do not fail to have the eyes examined.

Occupation Neurosis

These are a group of maladies of the nervous system, due to excessive use of certain muscles in some oft repeated act, and characterized by spasm of the muscles concerned. There are several varieties, as writers' cramp, telegraphers' cramp, piano players' cramp, violin players' cramp, typewriters' cramp, etc.

Professional spasms, that involve muscles of the shoulder girdle, are not rare among osteopathic practitioners, due to prolonged faulty methods of technique.

Osteopathic Etiology.—A nervous temperament predisposes to the development of the affection. Previous injuries and strains of the involved parts are important factors. Faulty methods of writing, and in the other disorders, strained or cramped positions of the affected tis-

sues, predispose to attacks. Slight **lesions** of the bones, joints, ligaments and muscles are commonly found, involving the motor and sensory nerves of the immediate locality. The majority of all cases occur between twenty and fifty years of age.

Distinctive **pathological** changes have not been found. Each case has particular lesions of its own. The details of the case are characteristic of the one case only. The affection is often primarily a spinal one, due to deranged action of the spinal centers concerned in the various acts; though, no doubt, excessive use of a group of muscles may result in contractions, spasms, contractures and nutritional changes, that in turn will establish definite osteopathic lesions. This is an illustration of a "vicious circle."

Symptoms.—Symptoms of the various varieties of professional neuroses develop slowly and gradually. A cramp or spasm affecting the used member is an early symptom. Tremor, weakness, stiffness, fatigue and heaviness of the affected part are present most of the time. In severe cases neuritis may develop, and a glossiness of the skin be present. Associated with the inability to perform the usual work, may be mental worry and depression.

Diagnosis.—The history of the case and the limitation of the disease to one member, usually make the diagnosis easy: **Cerebrospinal** diseases, as hemiplegia; early **tabes**, affecting the arms; and progressive **muscular atrophy**, have to be carefully excluded.

Prognosis.—As a rule is favorable. Osteopathic treatment, in the majority of cases treated, has resulted in recovery.

Treatment.—Rest of the part, mental quiet and attention to the nutrition of the patient, are the first essential considerations. A change of occupation may be necessary if excessive use of parts and faulty methods can not be corrected. The treatment consists of a correction of the parts irritating or disturbing the spinal centers or nerves affected. The ulnar, radial and median nerves all innervate muscles employed in writing. Lesions of the cord affecting these nerves may be found from the fifth cervical to the sixth dorsal. In a few cases lesions occur as high as the atlas. When the **radial** and **median** nerves are involved the lesions are principally found in the upper dorsal vertebræ. When the **ulnar** nerve is involved the lesions are usually slightly lower. The lesions may affect the fibers of these nerves directly (mechanically), but more probably the vasomotor nerves are involved, as in this region the vasomotor fibers to the arm pass from the cord to the sympathetic fibers. The brachial plexus originates higher than the upper middle dorsal region,

still some of its nerves are frequently affected in the dorsal region by osteopathic lesions, for removal of the same relieves the disorder.

Other lesions affecting the arms are oftentimes found in the ribs on the side involved. Any of the first five ribs may become deranged and affect the innervation of the arm. The clavicle in a few cases may be abnormally low. A bursitis may be present. Occasionally slight subdislocations of the shoulder joint (especially anterior) and elbow joint are found. Gymnastic exercises of the arm and hand, coupled with a general treatment of the shoulder, arm and hand, are beneficial. Hydrotherapy, massage and friction of the involved member are useful. In severe cases "breaking up" fibrotic tissue, and muscle training frequently secures good results.

Hysteria

Oppenheim defines hysteria as "a psychosis, which does not express itself by disorders of the intellect, but in defects of character and emotional disturbances, whose real nature is hidden under an almost unlimited and varied number of physical symptoms of disease."

The affection is about equally divided between the two sexes. A neurotic tendency, often inherited, is an important underlying factor. This condition, when associated with lack of mental discipline, is very apt to lead to the mental depression and outbreaks of hysteria. A large number of cases are between the ages of puberty and twenty-five. After forty-five the disorder is infrequent.

White, Osler's System of Medicine, says: "The significance of Freud's theory is the tracing of every case to sexual traumata during childhood. Sexual experiences differ, however, from ordinary experiences—the latter have a tendency to fade out, while the idea of the former grows with increasing sexual maturity. There results a disproportionate capacity for increased reaction which takes place in the subconscious. This is the cause of the mischief." A distinction is made between the sexual and the sensual.

Anders points out that lack of proper mental development, improper hygienic surroundings and chronic toxemia are causes.

The **direct causes** of hysteria may be many, and include physical and mental influence, or both. Traumatism of various regions of the body, but especially of the spinal column, may excite hysteria. Some slight lesion of the vertebra or rib may be all that is discoverable. A correction of the same is occasionally all that is necessary to remove the direct cause; still there is usually considerable disturbance of the spinal

tissues, especially slight curvatures and muscular contractions. Prolonged emotional excitement, overwork, defective education and many moral and mental influences are potent and frequent causes. Masturbation or an adherent prepuce occasionally is the cause of the affection in boys, or any excitation that produces exhaustion. Disturbances of the sexual system in both sexes are responsible for many cases. The menstrual period and the menopause are frequent periods for the manifestation of the disease. The disease often affects prostitutes. Disturbances of the digestive, nervous and circulatory systems, and general diseases of an exhaustive kind are exciting causes of hysteria. Dr. Still said that occasionally the colon is prolapsed and crowded down upon the pelvic organs. Hazzard¹ is of the opinion that "a majority of the cases show a depression of all the ribs, narrowing the thorax and often causing enteroptosis."

Symptoms.—The symptoms may be extremely varied, including any symptom of the many nervous diseases. The **sensory symptoms** are numerous. The most common is anesthesia, which may be found in certain parts of the body, usually one side (the left) of the body. Geometrical areas that bear no relation to the innervation is characteristic. The patient may not know of the sensory derangements until discovered by the physician. When there is **anesthesia** without other nervous symptoms, the case is commonly hysterical. The most marked symptom is analgesia, where the patient is insensible to painful impressions. A pin may be placed deeply into the flesh, and not be felt by the patient. The anesthesia may extend to the mucous surfaces, and even deeply down to the tissues of the joints. Organic and tendon reflexes are not changed. There may be other symptoms of disturbed sensation; as an absence of pressure, temperature and muscular sensation.

Hyperesthesia may be present nearly as often as anesthesia. Hyperesthetic areas may be found in various regions of the body, but especially along the spinal column and in the ovarian region. The "hysterical spinal irritability" is of special interest to the osteopath. The spinal column may be affected as a whole, or in segments, or confined to a single vertebra. Especially when a spinal irritability is in segments, or confined to a single vertebra, are local derangements of the spinal column apt to be found. Correction or even **pressure** upon these areas will often relieve the patient. Severe pain over the heart may simulate angina pectoris. **Globose hystericus** is of quite common occurrence.

Charcot refers to the ovarian hyperesthesia as follows: "It is

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indicated by pain in the lower part of the abdomen, usually felt on one side, especially the left, but sometimes on both, and occupying the extreme limits of the hyperesthetic region. It may be extremely acute, the patient not tolerating the slightest touch; but in other cases pressure is necessary to bring it out. The ovary may be felt to be tumefied and enlarged. When the condition is unilateral, it may be accompanied with hemianesthesia, paresis, or contracture on the same side as the ovarialgia; if it is bilateral, these phenomena also become bilateral. Pressure upon the ovary brings out certain sensations which constitute the aura hysteria, but firm and systematic compression has frequently a decisive effect upon the hysterical convulsive attack, the intensity of which it can diminish, and even the cessation of which it may sometimes determine, though it has no effect upon the permanent symptoms of hysteria."

The **special senses** may be disturbed, although these symptoms are usually transient. There may be blindness; narrowing of the field of vision, due to anesthesia of the periphery of the retina; loss of hearing; loss of smell or loss of taste.

Motor disorders may be of different forms of paralysis, as hemiplegia, paraplegia or monoplegia. In fact all forms of **paralysis** may be found in hysterical patients. Osler says: "There is no type or form of organic paralysis which may not be simulated in hysteria." The affected muscles do not atrophy. The paralysis is usually general, and contractures are common. Local paralysis, as of the bladder, vocal cords and other parts of the body, commonly occur.

Contractures and **spasms** may also occur. True epilepsy may even be simulated by hysterical spasms, but on careful observation the characteristic attack of epilepsy is found wanting. Firm pressure may increase the severity of an attack as well as bring it on. The spasms are of various parts of the body, as the diaphragm, bronchi, abdominal muscles, bladder, etc.

Various **disturbances** of the **viscera** may occur. Of the digestive tracts, the appetite may be disturbed or depraved. Diarrhea or constipation may be present. Flatulency is a common symptom. The respiratory tract may be another point of considerable disturbance in many cases. Dyspnea, aphonia, hiccough, cough, and exaggerated breathing, as when cold water is poured on one, are common manifestations. Various **cardiac** vascular symptoms may be manifested, especially a rapid heart. Various **vasomotor** derangements are common.

Physical manifestations, as amnesia, lack of will power and an

excitable nature—easily moved to laughter or tears—are frequent. The moral tone may be lowered. Even delirium, catalepsy, ecstasy and, trance, may be mentioned among the psychical phenomena.

The **hysterogenous zones** are of more than passing interest to the osteopath. Tyson writes as follows, in regard to the hysterogenous zones: "These are hyperesthetic areas especially studied by Richet, on which persistent pressure will sometimes excite a hysterical attack. While the ovaries are favorite hysterogenous zones, the zones may be in any part of the body; as for example, the sides of the trunk. Such pressure may also cause an existing attack to subside. Hysterical spasms may also be localized or limited to groups of muscles." Especially when zones along the spine and side of the trunk are located, the attack of hysteria may be completely relieved by correcting the localized deranged tissues.

Convulsive seizures are not uncommon and may follow various prodromal symptoms. Some authors divide the symptoms of hysteria into convulsive and non-convulsive forms.

These are part of the many manifestations that are presented by various hysterical patients, and it is readily seen that an osteopath has to be continually on his guard.

Diagnosis.—The diagnosis is generally quite easy. The characteristic emotional symptoms, associated with any of the many other symptoms which have no organic lesion, are characteristic of the disease. Care has to be taken, though, in some cases where symptoms are presented which have organic lesions. The history, the attack and neurotic temperament, will largely decide the nature of the affection. After the "outbreak" the patient often feels decidedly better.

Prognosis.—Death may occur from exhaustion, but such a termination is rare. Recovery is the rule, although the duration may be long. Recovery usually takes place rapidly, after the exciting cause has been determined and removed.

Treatment.—First of all, the osteopath should have due appreciation of the mental characteristics of the disease. Whatever is dominating the patient mentally must be either changed or abolished. It is not always necessary to be harsh and severe with the patient; but one should be firm and unyielding. He can do a great deal by having complete mental control of the hysterical patient.

A most careful examination should be made for an exciting cause, and when found it should be removed. This naturally constitutes a very important part of the treatment. A light general treatment is commonly

indicated. The general health, especially the bowels, should be carefully attended to. The hygiene, exercise and amusement of the patient should receive due consideration. One has to gain the confidence of the patient, and then be firm but kind to him. Relative to diet Yeo¹ says: "The diet should be simple, abundant, and supplied regularly, and at not too long intervals as is frequently the case in boarding schools. All strong stimulants are best avoided, and the hysterical should not indulge in strong tea or coffee, or exciting wines and liquors."

The "rest cure" as introduced by Weir Mitchell, is applicable in some cases. This method consists of plenty of food, especially milk, absolute rest of the body and mind, massage and electricity with isolation of the patient from friends and sympathetic relatives. Doubtless a general osteopathic treatment would be much better than massage. Yeo says that to the application of hypnotism and suggestion "we look with little sympathy and less confidence."

During the hysterical **convulsions**, the patient should be watched, but extreme measures should not be practiced. There is little danger of patients hurting themselves. Throwing cold water in the face, or a cold bath may produce the necessary mental shock. Pressure over the ovary as stated in hysterogenous zones, or some other zone of the body, or pressure upon a large blood-vessel, as a carotid, will oftentimes stop an attack.

Neurasthenia

"Closely allied to, and in some cases almost inseparable from, hysterical states are those morbid conditions to which, in modern times, has been applied the term neurasthenia." (Yeo). Neurasthenia is a fatigue neurosis that is characterized by mental and physical irritability and inefficiency. Headache, backache, insomnia, and debility of the gastrointestinal tract are common symptoms.

The affection is often found in that class of people who are predisposed to hysteria. The disease is more common among men than women, usually occurring after the twentieth year. The predisposition may be inherited or acquired. Church states that "debilitating conditions in the antecedents of neurasthenics," and "defective education that omits discipline and the cultivation of self control" are important predisposing causes. Many of the exciting causes that produce hysteria will cause neurasthenia. Various **lesions** along the spinal column, chiefly in the cervical and upper dorsal regions, include the predisposing causes of a

1. Manual of Medical Treatment.

large majority of cases. This spinal irritation, taken in conjunction with overstrain of mind and body, or probably in many cases the spinal irritation as the predisposing cause of the over strain, results in nervous exhaustion. Particularly overwork, associated with care and anxiety, is an exciting cause of great significance.

The neurasthenic patient is generally of a **neurotic temperament**. The affection may, also, result from various chronic diseases, toxic conditions, sexual excesses, alcohol and tobacco. Thompson¹ believes that improper sexual hygiene and perversion or abuse of the marital relation are most important factors in the development of neurasthenia in both sexes, and a regulation of this is imperative for a cure. The symptoms are due, to a greater or less extent, upon **spinal, cerebral, cardiac and gastric disturbances**, but all of these conditions are usually dependent upon **vertebral and rib lesions** of the upper dorsal and cervical regions. Care should be taken whether the condition is secondary to organic lesions. The lesions in the vertebræ are generally slight lateral deviations, in the ribs upward displacements of the vertebral ends, followed by contraction of the deep muscles in the neighborhood of the lesions. A posterior condition of the atlas and a lateral lesion between the third and fourth dorsal are especially apt to be found. As to spinal areas most affected Stearns² says the predisposing irritations are located particularly in the first two cervical, the first two dorsal and the last two lumbar vertebræ.

These various lesions probably cause an impairment of nutrition in the nerve-centers of the cord and brain, or both. Definite **morbid anatomical changes** have not been found resulting from nervous debility or irritability. Still, it seems probable that certain changes in the nerve-cells may result from excessive functional activity. **Traumatism** is a prominent causative factor in both **neurasthenia** and **hysteria**. **Railway** and other **injuries** frequently produce osteopathic lesions that result in nervous disorders. That there is a demonstrable pathological basis resting in sympathetics and spinal nerves, there can be no doubt.

Symptoms.—To enumerate the many symptoms of neurasthenia in detail is hardly necessary. The nervous debility may affect any organ of the body, owing to the exhaustion of the nervous energy, thus lessening the functional activity of that organ.

The most noticeable symptoms are various **sensory disturbances** and **muscular weakness**, dependent in part upon the spinal lesions.

1. Cosmopolitan Osteopath, October, 1903.

2. Journal of Osteopathy, January, 1904.

The patient generally feels weak and tired. Headache, pains in the back and sacrum, tender points along the spine, and various sensations of numbness, tingling, etc., are felt.

The **mental faculties** are oftentimes irritable and weak. An inability to concentrate the thoughts with depression, fear, vertigo, insomnia, and many other mental symptoms, may be manifested.

Palpitation, irregular action of the heart and pain over the precordia may be present. **Ocular** disturbances, particularly blurring of letters and narrowing of the visual field, **visceral** symptoms of many kinds, and **vasomotor** phenomena, as chilliness, flashes of heat and sweating, are among the many symptoms of which the patient complains.

Genito-urinary disorders in the male, and ovarian and uterine irritation and painful menstruation in the female, are occasionally symptoms dreaded by the sufferer. Polyuria is frequent.

The symptoms or signs of great importance to the osteopath in neurasthenia, as in many other diseases, are the tender points along the spinal column. They give direct clues as to where the lesion may be found.

Diagnosis.—Error in diagnosis can usually be prevented by a study of the history of the case and symptoms. Care must be taken in determining between symptoms of organic diseases and the symptoms of a true nervous exhaustion.

Prognosis.—Is almost invariably good. Only in cases where there is a tendency to mental disorder should the prognosis be guarded. Much depends upon the thorough cooperation of the patient. It usually takes some time to perform a cure among the poorer class, as the requirements demanded for a cure are oftentimes expensive.

Treatment.—Naturally the treatment, exclusive of the manipulation to correct the various lesions found, is extremely varied, owing to the many exciting causes and symptoms to contend with.

As has been stated, the lesions are usually found in the upper spinal region; still lesions are occasionally located in the lower spinal region, especially in female sufferers, when the pelvic organs are disturbed. The many mental symptoms, as inability to concentrate the mind, insomnia, vertigo, headache, etc., are best treated through the cervical region, with attention to the heart's action and the excretory organs. Careful attention should be paid to the deep posterior muscles between the atlas and occipital bones.

Rest is very necessary. Changes of scene and occupation, attention to the surroundings, careful dieting, hydrotherapeutic measures,

pleasant companions, relief from responsibility, bathing, etc., should receive careful attention and consideration by the osteopath. Set rules cannot be given. The details of treatment that should be adopted are dependent upon the individual case. Every well trained osteopath will be familiar with such measures.

Careful attention must be given to the secretions, excretory organs and the circulation. A study of each case will bring out the various irregularities that may exist.

When the nervous involvement is extensive, a "general treatment" may be given. Such a treatment would affect the entire nervous and muscular system, and tend to equalize disturbed nerve force. Bringing the muscular system into play and relaxing contracted muscles calls for more blood and nerve force, and consequently a nutritious diet.

The "rest cure," as introduced by Weir Mitchell, may be employed to considerable advantage in many cases. Yeo says: "It is in certain cases of this disease that the 'rest cure,' devised by Weir Mitchell, has proved so remarkably successful. But there can be no sort of doubt that it has been applied far too indiscriminately, and that for this, as indeed for any special method of treatment, a careful selection of suitable cases is needful." The diet should consist principally of milk at first, followed in a few days by soft boiled eggs, boiled rice, lamb chops, graham bread, stewed fruits and butter, and a little later by roast beef, vegetables and light puddings. Porter's system of milk diet has proved effective in many cases. Tea, coffee and alcohol should be avoided.

During the entire course of the treatment, care should be taken to correct any lesion that may bear directly upon the cervical sympathetic, the solar plexus and the hypogastric plexus, as they are the great reflex centers of the body.

DISEASES OF THE SPINAL CORD

Acute Myelitis

Acute myelitis is an acute inflammation, with softening of the substance of the cord, giving rise to marked disturbances of motion, sensation and nutrition. When the whole thickness of a section of the cord is involved, the condition is termed **transverse myelitis**. When an extensive area is involved, it is termed **diffuse myelitis**. When the gray matter around the central canal is especially affected, it is termed **central myelitis**.

Etiology.—There can be no doubt that osteopathic lesions are very potent predisposing factors. Osteopathic lesions of the spine, even of a muscular nature, readily disturb the cord circulation. It may follow repeated exposure to wet, cold or exertion; or be a sequel to the infectious diseases, as smallpox, typhoid fever, typhus, puerperal fever or measles. It may be due to traumatism or disease of the vertebrae, as caries or cancer. Syphilis is a frequent cause.

Pathology.—To the untrained, naked eye, the cord may present little or no change. The nervous tissues are in various stages of degeneration. On section the substance of the cord is red and soft, the line of demarcation between the gray and white matter is lost or extremely indistinct, and minute hemorrhages are sometimes seen. In very acute cases, affecting the white and gray matter, after injury, when the membranes are cut, the substance of the cord may flow out as a reddish creamy fluid.

The nerve fibers are much swollen and the axis cylinders broken up. Blood discs, leucocytes, and numerous granular fatty cells may also be present. The blood-vessels are distended and dilated. There may be thickening and hyaline degeneration of the vessel walls and hemorrhagic extravasation.

Symptoms.—Acute Transverse Myelitis.—This is the type most frequently met with. The symptoms differ with the situation of the lesion, which is generally in the dorsal cord. At the onset there may be pain; numbness and tingling in the back, radiating into the limbs. There is usually moderate fever, malaise, chills, muscular pains, a coated tongue and constipation. Symptoms of **motor paralysis** soon develop, which may become more or less complete. Both motor and sensory symptoms vary to a marked degree, depending upon the pathologic involvement. The reflexes are lost at first. They may soon return and are exaggerated

below the lesion. Following this the muscles often become rigid and contracted. Unless the lesion is in the lumbar or cervical cord, reaction of degeneration or much wasting of the muscles, as a rule, does not occur. A girdle sensation frequently occurs at the level of the disease. At first there is retention of the urine and feces, later incontinence. Bed-sores soon develop; also drying and hardening of the skin. The nails become thick and brittle. Death may occur from exhaustion, or heart or respiratory failure, but it is rare; segments of the cord may be completely and permanently destroyed, causing persistent paraplegia. H. A. Greene¹ reports a case, due to injury, which was greatly benefited by treatment.

Acute Diffuse Myelitis.—In the acute forms the course of the disease is rapid. The trophic disturbances are more marked than in the former type. This form is likely to follow exposure to cold, injuries, tumors, syphilis or one of the infectious diseases. There may be chills, fever, malaise, pain in the back and limbs, and occasionally convulsions. The reflexes are generally lost. The motor functions are rapidly lost. There is incontinence of urine and feces, rapid wasting of the muscles and bed-sores develop. The disease may prove fatal in from six to ten days.

Diagnosis.—Landry's Disease.—In this the bladder and rectum are not affected. Trophic disturbances are absent. There is but slight loss of sensation, no reactions of degeneration and no girdle pains.

Multiple Neuritis.—Both arms and legs involved, and slow onset. The bladder and rectum are rarely involved; the girdle pain is absent.

Acute Poliomyelitis.—There are no sensory symptoms and the rectum and bladder are not affected.

Prognosis.—In very acute cases death occurs in from three to ten days. Milder cases generally recover with some loss of motor power, although in a few cases treated by osteopathy recovery was complete, due probably to the case being seen early and thus degeneration prevented.

Treatment.—Lesions of the vertebræ are usually readily found in cases of myelitis. Generally, deranged vertebræ are found in the upper dorsal region, and occasionally lesions are located in the lumbar and cervical vertebræ. The treatment of myelitis is chiefly to correct these lesions, so that the normal circulation of the cord may be reestablished. One has to be very **careful** when treating the lesions not to cause additional injury to the cord. An inhibitory treatment to the muscles

1. A. O. A. Case Reports, Series V.

about the lesion may be all the treatment that can be given at first; nevertheless, it aids nature just so much in overcoming the excessive irritation of the cord tissues. Nature has the curative means, provided they may operate unobstructedly. In a few cases the ribs in the region of the spinal lesion will be found deranged and interfering with trophic fibers, blood-vessels and lymph vessels of the cord. The patient should be kept in the prone posture at first.

Warm baths and massage will be found of additional value. The bowels and bladder should receive special attention. An ice-bag to the spine may be beneficial. If there is any danger of bed-sores, use alcohol to stimulate and harden the skin. Rest, liquid diet and good nursing are necessary. Later on careful exercising of the limbs will be beneficial.

Chronic Myelitis.—This defines the conditions when the inflammation is subacute with the paraplegia and other symptoms which then naturally appear, present, and also with the signs of both degeneration and repair. The symptoms develop slowly as compared with the acute form. It should not be confused with atrophy, pachymeningitis or tumors of the cord. **Treatment** is practically the same as in acute form. Surgical measures may be indicated. Loudon¹ reports a case due to injury which was greatly benefited.

Poliomyelitis

(INFANTILE PARALYSIS)

Definition.—An acute infectious disease occurring most commonly in young children, characterized by paralysis, rapid wasting of certain muscles, and fever. It is an acute myelitis that affects the anterior horns of the cord. There are no sensory symptoms.

Etiology.—It usually occurs in children under ten years of age, and the majority of cases occur before the fourth year. It is more common in summer than in winter. The infection seems to gain entrance through the nasal mucous membrane. Traumatism, exposure to cold and overexertion, are probably predisposing causes. It has occurred in severe epidemic form.

Morbid Anatomy.—The disease is most frequently seen in either the lumbar or cervical enlargement and is usually unilateral, though there is considerable variation in the extent of the lesions. In very early cases, the condition of acute hemorrhagic myelitis, with degeneration and rapid destruction of the large ganglion cells, has been found. In older lesions the anterior cornu in the affected region is atrophied and

1. A. O. A. Case Reports, Series II.

there is destruction of the multipolar ganglion cells. The anterior nerve roots are atrophied, the muscles are wasted and undergo a fatty and sclerotic change.

Symptoms.—The child may have a slight fever, malaise, muscular twitching, headache, some rigidity of the neck, and sometimes vomiting. This may last a day or several days or only a few hours, when paralysis sets in abruptly. The **paralysis** is rarely complete and groups of muscles only may be affected. As a rule, the paralysis comes on abruptly, but it may come on slowly, taking several days to develop. In a few weeks, atrophy sets in and the limb becomes flaccid, soft and wasted. The paralysis remains stationary for a time when improvement takes place, but complete recovery is rare. Sometimes the growth of the bone of the affected limb is impaired. Usually there are no sensory disturbances and the bladder and rectum are not affected. The condition of the reflexes is dependent upon the extent of involvement of the cornual cells. Occasionally the bulbar muscles are affected.

Diagnosis.—This is not difficult except in the early stages. Careful study of the case is commonly all that is necessary. Landry's paralysis and peripheral neuritis are to be differentiated.

Prognosis.—Complete recovery is rare. Improvement is the rule. Ivie¹ tabulates sixteen cases, all showing good results. W. B. Davis² reports a case cured by six months treatment and still well after three years. T. M. King² one case cured and one greatly benefited and A. S. Craig² one much helped. Florence Gair, F. P. Millard, A. G. Walmsley and others report gratifying results in many cases.

Treatment.—In the treatment of chronic cases, F. P. Millard³ says "Five minutes' time is sufficiently long in treating a patient, and sometimes too long. * * * Start in and move every spinal joint. That takes about two minutes. Spring the sacro-iliac articulations just enough to get motion. Then give a specific cervical treatment. Do not stop to relax muscles in a child. Adjust as rapidly as possible. Make every spinal joint yield to motion. Spend only one minute, or possibly two, on the cervical vertebræ. So far we have consumed four minutes. The last minute we loosen up the wrist or ankle, according to the extremities that are involved." This outline has been followed with gratifying success by Gair, Green, Bush and others in many chronic cases. The procedure in acute cases is condensed from A. G. Walmsley³: "Isolate,

1. A. O. A. Case Reports, Series V.

2. A. O. O. Case Reports, Series I.

3. Millard, Poliomyelitis.

keep cool and absolutely quiet. Stop all food until the temperature drops to 100° F. or lower and until the pain subsides when fruit juices may be given followed by heavier foods. Give patient all the water he will drink. Where the spine is sensitive, and it will be in many, use hot fomentations until a specific treatment can be given. If the fever is running high cool compresses will be grateful and help reduce temperature. Irrigate the colon twice daily with saline water. Do this first thing when called. Later once daily will do and then discontinue. Look carefully to the nose and throat and wash with saline or boracic solution. Keep feet warm as they may be cold even with high fever. Treat the case over a long period. See that he does not overdo and observe all dietetic and hygienic measures." Both these men lay great stress on the importance of specific adjustments and massage of muscle tissue has little place in their treatment. This, with drill at home can be attended to by the mother.

Ivie¹, among other good ideas on treatment, gives the following: "May I suggest that when such severe results (the acute stage) follow a slight infection, that we may expect to find a lesion located at such a point as will interfere with one or more of the anterior root arteries which join and supply the anterior spinal plexuses. As there are only five or ten of the anterior root arteries (Dana), the lesions affecting them can be located throughout a wide range of the spine. In a great many cases we find that the correction of lesions well up in the dorsal and even in the cervical region have increased the amount of the improvement well beyond that received in the correction of the lumbar lesions alone. To **promote resolution**, correct the lesions, both muscular and bony, and relax the muscles of the spine daily; move every vertebra to the limit of all its possible motions; use flexion, extension, rotation, and lateral flexion at least once every day for at least a week; and help to overcome stasis by keeping the child off its back, turning it from side to side, and letting it lie on its stomach as much as possible. The limb, to be kept in its best condition, should be kept warm; treated gently; held in a natural position by the use of sand bags and clothes cradle, thus beginning early the **prevention** of deformity; the paralyzed muscles should not be kept on a stretch, as that will retard any possible improvement; stimulating rubs and baths should be given frequently." In the **chronic stage** he advocates: "Now that the nerve cells have been given a chance to regenerate (removal of lesions), the best thing to do is to force them to work if possible. To do this, the so-called resistance exercises

1. Journal of the American Osteopathic Association, February 1906.

or educational movements are to be strongly recommended; the idea being to place the limb in a given position and then ask the child to fix all its attention on the limb and to earnestly attempt to hold it there while you move it, or to keep making the attempt while you move the limb through its whole range of motion in that direction. These movements should be so calculated that the resistance of the child will exercise the group of muscles affected. The mother or nurse can give these exercises every night on going to bed."

Acute Ascending Paralysis

(LANDRY'S PARALYSIS)

Definition.—An acute disease, characterized by an advancing paralysis, beginning in the legs, passing upward to the trunk and the arms and finally it may involve the centers in the medulla. **Toxic** and **infectious** influences that congest the nerve courses and ultimately destroy the cells seem to be the important factor. The anterior gray matter of the cord is involved, and it is probable that many cases are a form of acute poliomyelitis. The spleen is congested and in some instances the lymphatics.

Etiology.—A definite cause has not been found, although osteopathic lesions are important predisposing factors. A toxic cause seems probable. The disease is most common in males between twenty and forty years of age. It may follow traumatism, exposure, cold or the infectious fevers.

Symptoms.—Weakness of the lower extremities is generally the first symptom, though the arms may be involved first. This is shortly followed by paralysis. The paralysis then extends to the trunk and within a few days the arms are also affected. The muscles of the neck are next involved and finally those of respiration, deglutition and articulation. The reflexes are abolished. The muscles are relaxed, but generally do not waste or show electrical modification. Sensation is usually not affected, but there may be tingling, numbness, hyperesthesia and muscular tenderness. The sphincters are not involved as a rule. The spleen is usually enlarged. The **course** is variable. Death often occurs in from two days to a few weeks. When the improvement takes place, the part last affected recovers first.

Diagnosis.—This is not always easy. It is sometimes impossible to differentiate between this disease and **multiple neuritis**. The history, the motor paralysis, the absence of wasting and of electrical modi-

fication, as well as the absence of involvement of the sphincters, will definitely aid in the diagnosis.

Prognosis.—The prognosis is unfavorable. A large majority of cases prove fatal. In a few cases treated osteopathically, results were favorable if the patient was seen early. The muscles of the spinal column were markedly contracted.

Treatment.—The treatment of Landry's disease consists principally of thorough treatment of the spine, especially of the lower dorsal and lumbar regions, and attention to the underlying toxic condition. The treatment should be most thorough; the vertebræ and ribs found disordered should be corrected and each vertebra should be carefully separated (if conditions permit) from its neighbor. When the paralysis has extended to the trunk and neck, a thorough treatment all along the spinal column should be given with a view to relaxing the contracted muscles and to render flexible the entire spinal column, so that the cord may be properly nourished and the progress of the disease checked. Careful relaxation of the contracted spinal muscles unquestionably has a potent effect upon the cord circulation, which tends to check and retard degenerative processes. Treatment of the limbs directly will be found a help, as well as direct treatment of all tissues paralyzed. If swallowing is impossible, the patient should be fed through the rectum, or by the stomach or nasal tube. See that the patient is carefully nursed. Massage is beneficial.

Locomotor Ataxia

(TABES DORSALIS)

Locomotor Ataxia is frequently met with. It is a disease of the spinal cord wherein the ultimate effect is a sclerosis of a progressive character of the nerve courses of the posterior column. It is claimed that the origin is in the protoplasmic processes of the posterior spinal ganglion. The characteristic symptoms are incoordination, Argyll Robertson pupil, lightning pains and loss of knee-jerk.

Osteopathic Etiology and Pathology.—Most cases develop between the ages of thirty and forty, although it is occasionally seen in young men, and rarely in children from hereditary syphilis. Males are much more frequently affected than females (10 to 1, Osler), and the disease is much more frequent in cities. Predisposing causes are given as syphilis, prolonged exposure to wet and cold, and sexual excesses, although there is a disposition on the part of neurologists to confine

the cause of true tabes to syphilis, some records showing as high as 90 per cent. of the cases from that cause. Tabetic symptoms develop in from five to fifteen years after syphilitic infection. There are no data to show the probable proportion of syphilitic cases which later develop tabes, but it is undoubtedly small. As all cases of tabes examined by osteopaths show spinal lesions, it is reasonable to suppose that by interfering with the nutrition to the spinal cord, they allow consequent degeneration. It is also quite probable that osteopathic treatment for syphilis would, for the same reason, prevent sclerosis and resultant tabes. That syphilis is not the only cause, is also held by some authorities. Starr cites a true case from a severe blow in the dorsal region. Osteopathic observation would lead to a differentiation of tabes, according to the cause. Cases have been recorded, which simulated true tabes in most symptoms, which did not have a history of syphilis. J. Knowles makes the point that probably certain cases simulating tabes have reached what might be called an irritation stage (pathologically) of the nerves and their centers, sclerotic changes not having taken place; and he believes these cases would naturally yield to osteopathic treatment. Teall confirms this view by being of the opinion that these cases are the ones largely due to traumatism, exhaustion or exposure, and the probabilities are that in time sclerotic changes would take place, resulting in true tabes. In such cases there can be no question as to the osteopathic lesion, which would be sufficient to materially interfere with the peripheral sensory nerves and disturb the protoplasmic processes to the spinal ganglia and sensory tract. As a rule they are in the lower dorsal and lumbar regions. Cases are reported which had marked sacral and coccygeal lesions.

Pathologically, Dana speaks of locomotor ataxia, "as a post-infective degeneration, which first attacks the posterior spinal ganglia or corresponding cells of the special senses, due to a prolonged poisoning of these parts by the toxins of the infection." The first change is in the posterior roots. Without doubt osteopathic lesions can readily affect the nutrition of these roots. This is shown upon examination in cases where the vertebral lesions impinge the tissues surrounding the spinal nerve at its exit, (or otherwise damage nervous stimuli and circulation) and also where the displaced head of the rib crowds upwards against the spinal nerve and again where the rib impinges the corresponding sympathetic ganglion which lies anterior to the head of the rib. Very likely in many cases the syphilitic infection is an exciting factor, but it seems plausible that osteopathic lesions, traumatism, cold, exposure and excesses predispose by disturbing the circulation to involved areas. The

changes are at first inflammatory, followed by degenerative changes in the nerve courses which cause connective and neuroglia overgrowths to take the place of fibers in the sensory tract, and finally in the motor tract. Thus from the posterior ganglia, a section between the columns of Goll and Burdach is involved, and the progress of the sclerotic change is upward in the cord. The pia mater and coats of the vessels are thickened. The principal changes in the cord are in the lower dorsal and upper lumbar segments and the cord may be changed in shape. In long-standing cases there is degeneration of the ascending antero-lateral tract, of the direct cerebellar tract, and of the pyramidal tract. The cerebral changes in some cases consist of sclerosis in the restiform bodies in the inferior peduncles of the cerebellum, and of certain cranial nerves, especially the third, optic, vagus and auditory nerves, and also cortical changes may occur.

Symptoms.—Authorities divide the symptoms into three stages—the pre-ataxic, ataxic and paralytic. This division is largely an arbitrary one. **Motor symptoms** are usually the most prominent. There is inability to coordinate the muscles. The patient first notices that he cannot walk steadily when in the dark or when he has his eyes closed. Later he finds that he cannot maintain his equilibrium even in daylight; this is ascertained when the patient places his feet together and the eyes are closed (sign of Romberg). As a rule this is unaccompanied by muscular wasting, so there is no loss of motor power. Soon the gait becomes characteristic; in walking the feet are lifted high and are brought down heavily on the heel; the ball of the foot comes down last, producing what is called the “double step;” the walk is straddling; the limbs are thrown about, and there is staggering, due to **incoordination**. Incoordination also develops in the hands, but usually later in the disease. Sudden involuntary movements and palsies are other motor symptoms. The latter occur in about twenty per cent of cases and as a rule are of short duration. Paralysis and muscular atrophy do not develop until after a few years.

Pain is an early symptom and always present; it is of a darting, shooting or stabbing character and appears in paroxysms. It is most common in the legs, lasting but a second or two, and often accompanied by a hot, burning feeling. Herpes may appear along the course of the nerve. Anesthesia and hyperesthesia of certain areas may occur. A girdle sensation may be a noticeable symptom. The **muscular sense** is more or less impaired; there is a feeling as if there were cotton between the patient's feet and the floor. Retardation of tactile sensation is a

common symptom. The power of localizing pain is often lost. The **knee-jerk** is lost early in the disease. Occasionally, however, cases are met where it is retained. The skin reflexes are also impaired; in some cases they may be increased at first, but later are sure to be involved with the deep reflexes. The **pupil** does not respond to the light, but still accommodates for distance, constituting the **Argyll Robertson** pupil. Ptosis may develop with or without strabismus. Optic atrophy, which may lead to blindness, paresis of the ocular muscle, and contracted pupils, may occur. The ocular symptoms may appear early in the disease.

The **visceral pains** or **crises** are chiefly gastric and are sometimes accompanied by obstinate vomiting. Laryngeal, rectal, urethral and nephritic crises may occur, and at times are exceedingly severe. Laryngeal crises may be manifested by intense dyspnea and noisy breathing. Constipation is common. There may be retention of the urine resulting in cystitis. Sexual power is generally lost early.

Trophic changes occur later in the disease. The so-called arthropathies, or joint lesions, may occur at any period of the disease. It consists of an enlargement of the joints, associated with serous exudations, which rarely become purulent; atrophy of the heads of the bones; destruction of the bones and cartilages; or spontaneous fracture or dislocation may occur, owing to the brittleness of the bones. There is no pain and the large joints are most frequently affected; these may be excited by an injury. Herpes, skin ecchymoses, edema, local sweating, alterations in the nails, perforating ulcer of the foot, onychia, decay of the teeth and atrophy of the muscles may occur. The auditory nerve is rarely affected, but in some cases there may be deafness. There may be attacks of vertigo. Olfactory symptoms are rarely met with. Cerebral symptoms are rare. **Paralysis** may develop and the patient becomes bed-ridden. The disease itself does not prove fatal; the patient may live for years until some intercurrent disease causes death.

Diagnosis.—This is usually easy when the characteristic symptoms are developed. The presence of lightning pains, absence of the knee-jerk, early ocular palsies, a squint, ptosis and Argyll Robertson pupil make the diagnosis conclusive. Care has to be taken in making diagnosis from peripheral neuritis, paresis, ataxic paraplegia, cerebral disease and some diseases in which the posterior columns are disturbed.

Prognosis will depend largely on the exciting cause, as it is least hopeful from syphilis, but the earlier the case is treated the better the

chance. The progress of the disease can sometimes be arrested and occasionally cases presenting symptoms of the first and second stage are entirely relieved with persistent treatment.

Treatment.—Experience in the treatment of locomotor ataxia has been that often the disease can be checked and the symptoms relieved; but curing a case of locomotor ataxia, except in the early stages, is seldom possible. When there is degeneration of nerve centers, there is no hope for a cure. Those with a syphilitic history are by far the hardest to relieve. Antisyphilitic treatment should be considered. Cases with a syphilitic history presenting preataxic symptoms, Argyll Robertson pupil, lightning pains and loss of patellar reflex have been cured; unfortunately these cases are not always diagnosed.

The treatment consists of thorough correction of the spinal derangements found, especially through the lumbar and lower dorsal regions. If the disease has involved the arms or brain, thorough treatment should be given the entire length of the spine with a view to increasing the circulation in the spinal cord and brain, and thus checking or preventing the tissue degeneration. "In the early stage, deep massage to the muscles of the back promotes the flow of venous blood through the spinal vessels and their anastomotic branches, and is the best means of relieving the congestion which is supposed to exist." (Starr) The lower spine will be found to be rigid and should be well sprung to get mobility.

Careful treatment of the limbs should be given, but be exceedingly **cautious** in the treatment of the limbs of **advanced cases**, as there is considerable danger of producing fractures. Stretching the thigh muscles and internal and external rotation treatment of the legs should be given. See that the bowels are moved daily and be positive that there is no retention of the urine in the bladder. A catheter has to be used in some cases. The patient should be careful about taking too much food, and especially beware of indigestible food, as it irritates or excites gastric crises.

During **painful attacks** the patient should rest in bed, and with careful treatment the attack can generally be relieved. Hot applications are of considerable aid.

At all times excesses should be avoided. Occupation of some character should be given the sufferer. Do not promise to cure the patient, and make it plain at the start that it will probably require a long time to show much improvement. Systematic exercises to reestablish coordination should not be neglected.

Hereditary Ataxia

(FRIEDREICH'S ATAXIA)

This is a rare hereditary disease, due to sclerosis of the columns of Goll and Burdach and the pyramidal tracts. There are ataxia, muscular weakness, nystagmus, speech disorders and loss of knee flex. Almost invariably there will be found a neuropathic history. Alcoholism, syphilis and insanity in the parents are predisposing causes. Tuberculosis may be a factor. Acute diseases, especially infectious fevers, dentition and injuries to the spine may be exciting causes. It occurs most frequently in males about the seventh or eighth year and very seldom after puberty. Several members of the same family are apt to be affected. The disorder is transmitted by the female. "The degeneration of the posterior and pyramidal columns seems to occur at the time of cord development, when malnutrition or hereditary dyscrasia would disturb it most."

Pathologically. "the spinal cord is smaller throughout than normal; we have also a combined disease of the posterior and lateral tracts (Schultze), a degeneration of Goll's tract in toto, of Burdach's almost entirely, and of the direct cerebellar, the crossed pyramidal (?), and of Clarke's columns, in which we find not only atrophy of fibers, but also a degeneration of the ganglion cells. Gower's tract may likewise be involved." (Oppenheim).

Symptoms.—Impaired coordination, beginning in the legs and later extending to the arms, is the first marked symptom. The gait is peculiar; it is swaying and irregular and it lacks the pronounced stamping gait of locomotor ataxia. There is a loss of reflexes, while no sensory symptoms are present as a rule. The sphincters are normal. Nystagmus is present and is a characteristic symptom. The speech is scanning. Talipes and lateral curvature of the spine are common. The mind becomes sluggish in later stages. The course is always very slow.

Diagnosis.—This is not difficult as a rule, owing to the usual family history presented. The spinal curvature, nystagmus, incoordination, scanning speech, irregular gait, and deformity of the feet are symptomatic. In **locomotor ataxia** the gait, sharp pains, anesthesia and Argyll Robertson pupil will differentiate between the two. Differentiation will also have to be made from chorea, ataxic paraplegia and multiple sclerosis.

Treatment.—The same treatment as in locomotor ataxia is followed. Lesions presented have been found at the tenth and eleventh dorsals, and at the second and third cervicals, although, as a rule, the en-

tire spinal column is quite debilitated. Some improvement will be noted in these cases, but not much can be expected from treatment; contractures may be prevented.

Spastic Paraplegia

Spastic paraplegia begins as a stiffness in the legs, with no sensory symptoms, but finally the muscles become rigid and slowly paralyzed. The reflexes are exaggerated.

It may occur, in a few instances, as a primary disease, "being a degeneration of the motor neurone, whose body lies in the brain cortex and whose axone lies in the lateral pyramidal tract." Usually it is secondary to tumors, inflammation and softening of the brain. Multiple sclerosis, hemorrhage, transverse myelitis, syringomyelia and other diseases of the cord, injury, exposure and overexertion are exciting causes. Syphilis may be a cause. It generally develops between the ages of twenty and forty.

Pathologically, the degeneration involves the lateral pyramidal columns of the cord. It begins at the periphery and extends upward until finally the axones atrophy and neuroglia overgrowth takes place and sclerosis of the motor tracts results.

Symptoms.—Muscular stiffness in one leg is usually the first symptom, which gradually disturbs both sides. The muscular stiffness increases to a rigidity, and even cramps, so that it is with considerable difficulty that the patient moves about. The reflexes are exaggerated. The joints, as well as the muscles are stiff, so that the toes are dragged upon the ground and the legs are kept close together, abduction of the limbs being difficult. On the whole, there is much tiredness, stiffness, rigidity and hardness of the leg muscles, so that all motions with them are performed with great effort. Sensory and trophic symptoms are lacking; control of the bladder and rectum is usually normal. The progress of the disease is slow. The upper extremities may be involved in after years, but the common extensive disturbance is with the legs, so that they may be entirely useless and the muscles atrophy from disuse, although rigidity and contractures remain.

Treatment.—The prognosis is usually unfavorable, though frequently the patient may be considerably benefited. A few cases that have been **caused** by **traumatism**, cold or exposure have yielded to osteopathic treatment and all symptoms disappeared. The treatment is largely that of locomotor ataxia. The lesions are readily located in the spinal column. In a few cases a slight posterior curvature of the dorso-

lumbar region is found, but the majority of the lesions are in the lower dorsal region. Special care should be given to the bladder and bowels. Prolonged warm baths are beneficial. Treatment of the legs is always secondary to that of the spine. The diet should be nutritious and one easily digested. Give the patient plenty of fresh air and sunlight with cheerful surroundings. E. C. Link¹ reports two cases, one of over one year's standing, completely recovered, and another much improved.

Ataxic Paraplegia

In **ataxic paraplegia** there are ataxic and spastic symptoms, due to both posterior and lateral sclerosis. Traumatism, cold and exposure are etiologic factors. It is found in diffuse myelitis, general paresis, leptomeningitis and in toxic conditions as in pernicious anemia. The posterior and lateral columns are degenerated, so that in the former there is an ascending degeneration and in the latter a descending.

Symptoms.—These comprise those of **tabes** and **spastic paraplegia**. Incoordination, ataxia, lightning pains, anesthesia, rigidity of muscles and exaggerated reflexes are the principal symptoms. The muscles easily fatigue; sensory symptoms are not so troublesome as in tabes; there may be visceral crises, sometimes Argyll Robertson pupil; and possibly spasms of the upper extremities and jaw. The course of the disease is slow.

Diagnosis.—This is not difficult as a rule. First, there is ataxia; then increased reflexes, fatigue of the muscles and paraplegia. **Tumor** of the **cerebellum** may confuse the diagnosis.

Treatment.—There is frequently a chance to greatly benefit these cases, and even in some instances a cure may be performed, provided the case is seen early. Thorough treatment of the spine to relax the muscles and to adjust the ribs and vertebræ is the indication. Stretching the spine, if carefully done, is beneficial. Muscular manipulation improves the spinal cord circulation, and osseous correction removes probable impingements to nutrient channels and nervous influences induced by cold, exposure, traumatism and secondary disturbances. Care of the general health, hygiene, diet, etc., are important.

Syringomyelia

Definition.—A chronic affection of the spinal cord in which there is an embryonal neuroglial overgrowth about the central canal, with cavity formation. It is characterized, clinically, by progressive mus-

1. Journal of Osteopathy, Oct. 1904.

cular atrophy, peculiar disturbances of sensation and various trophic and vasomotor disorders. The onset generally takes place before the thirtieth year. Males are much more commonly affected than females. It is claimed by some that the disease is infectious. It frequently follows trauma.

Pathologically, the condition begins with an overgrowth of embryonal neuroglial tissue. This is followed by degeneration of the gliomatous tissue with a formation of cavities, or this cavity formation may be the result of hemorrhage. The disease, in most cases, involves only the cervical or dorsal regions, and is usually in the posterior or postero-lateral tracts. The cavity may prevail throughout the entire cord, but usually only the cervical and dorsal regions are involved. The cavities lie in the gray matter outside of the canal.

Symptoms.—The onset is slow. The symptoms depend upon the situation and extent of the cavity. As the disease most frequently involves the cervical region, the neck and arms are usually affected. At first neuralgic pains may develop in the muscles. Later there is progressive muscular atrophy and loss of painful and thermic sensations. Tactile and muscular senses are usually intact. The reflexes are increased and a spastic condition is present. The lower limbs usually escape, but when they are involved the clinical picture may be that of **amyotrophic lateral sclerosis**. A lateral curvature is present. When the disease extends into the medulla, there will be various bulbar symptoms. Trophic changes and vasomotor disorders are common.

A form of syringomyelia, known as **Morvan's disease**, is characterized by neuralgic pains, cutaneous anesthesia and painless felons.

Diagnosis.—The progressive muscular atrophy, the retention of muscular and tactile senses, and the loss of thermic and painful sensations are typical symptoms. The diseases with which it may be confounded are: **Cervical Pachymeningitis**. The pain is usually greater, the tactile sense is lost and it runs a more rapid course. **Anesthetic Leprosy**. The trophic changes are more marked, tactile sensation is lost and the phalanges often drop off. **Progressive Muscular Atrophy** and **Amyotrophic Lateral Sclerosis**. Sensory symptoms are wanting.

Prognosis.—The prognosis is unfavorable. Duration is from five to twenty years.

Treatment.—Little can be done except attending to the diet and hygiene of the patient and meeting urgent symptoms. Probably, continued treatment along the spinal column would influence to some extent the circulation of the cord in the region of the involvement. Hot

applications are of value in relieving pain and cramps. The X-ray has proven of some benefit in checking the progress of the disease.

Amyotrophic Lateral Sclerosis

"This is a chronic, progressive form of spinal paralysis, characterized by the symptoms of progressive muscular atrophy in the arms and by lateral sclerosis or spastic paraplegia in the legs." (Starr). It is similar to progressive muscular atrophy, except, in addition, there is sclerosis of the pyramidal tract. (See Progressive Muscular Atrophy.) Osler classes progressive muscular atrophy of spinal origin, amyotrophic lateral sclerosis and progressive bulbar paralysis as diseases of the whole efferent or motor tract, wherein these disorders may simply be various stages in the same case. He says, "A slow, atrophic change in the motor neurones is the anatomical basis, and the disease is one of the whole motor path, involving, in many cases, the cortical, bulbar, and spinal centers." There can be no question that for the student, a classification of spinal cord diseases according to the whole motor tract, the upper motor segment, the lower motor segment, etc., is a scientific classification from our present knowledge of the histology and physiology of the neurone, but for clinical purposes the usual classification is given. Osteopathically, we are greatly in need of a new nosology, either according to the cause of the disorder or to the physiological disturbance.

Amyotrophic lateral sclerosis does not occur so frequently as progressive muscular atrophy. Heredity plays a part, and it affects older people. **Injury** to the **spinal column** is undoubtedly an important factor. Exposure and cold may be exciting causes. Infectious diseases and syphilis are probably important causes.

Pathologically, there are atrophy in the anterior cornu and sclerosis of the crossed and direct pyramidal tracts. There is sclerosis of centers in the medulla.

Symptoms.—Atonic atrophy, muscular weakness and fibrillary contractions, of varying degrees, are characteristic. The reflexes are exaggerated; the arm and leg muscles become weak and finally rigid and atrophied. This results in deformity. Disturbances of sensation are not pronounced. The sphincters may be slightly affected.

Diagnosis.—The disease is not so prolonged as progressive muscular atrophy. Differentiation has to be made from multiple arthritis and transverse myelitis and syringomyelia.

Treatment.—The same treatment as outlined for progressive muscular atrophy is indicated. The disease may be retarded and life prolonged.

Progressive Muscular Atrophy

A disease characterized by a slow, but progressive, loss of power and by muscular atrophy. Anatomically, it is characterized by degeneration of the ganglion cells of the gray matter in the cord. This atrophic affection develops just opposite to that of chronic anterior poliomyelitis. It is commonly a disease of males in middle life. Syphilis, rheumatism and lead poisoning predispose. It sometimes follows cold, wet, exposure, traumatism, mental worries, overuse of certain muscles, or prolonged emotional excitement. Hereditary influences are present in some cases. In all cases **lesions** are detected in the **vertebrae** and **ribs**, corresponding to the innervation of the diseased areas. Very likely these lesions are the starting point of the disease, by impairing nutrition to the motor cells of the anterior cornu, and thus resulting in atrophy.

Pathologically, the muscles are wasted, the fibers undergo fatty degeneration and there is an overgrowth of connective tissue. The peripheral motor fibers are degenerated. The anterior nerve roots leading to the horns are atrophied. The large ganglion cells of the anterior horns are atrophied, or even entirely removed. The neuroglial tissue is increased. There is sclerosis of the anterior and lateral pyramidal tracts of the cord in the majority of cases. (See Amyotrophic Lateral Sclerosis). The pyramidal tracts have been found degenerated through the pons and internal capsule, even up to the motor cortex. When bulbar symptoms are present, there is degeneration of the motor nuclei of the medulla. The posterior columns are not involved.

Symptoms.—Irregular pains, numbness or exhaustion are usually felt in the region that is soon to become wasted. The upper extremities are first affected. The muscles of the ball of the thumb waste first, then the interossei. From atrophy of the interossei and lumbricales and contraction of the long extensor and flexor muscles, the deformity known as "claw hand" results. The wasting creeps up from the forearm, arm and shoulder. The muscles of the trunk are gradually affected. The muscles of the lower extremity may escape entirely. The platysma myoides does not waste and is often hypertrophied. The face muscles are attacked late or not at all. The affected muscles often twitch. Deformities and contractures develop, notably lordosis. Sensation is not impaired although the patient may complain of numbness and coldness. The bladder and rectum are not affected, but sexual power may be lost. The paralysis is flaccid and the reflexes absent in the so-called **atonic**

cases. In **atonic** atrophy there is more or less spasm, the reflexes are greatly increased, there are often contractures and the wasting is usually trifling.

Diagnosis.—Differential diagnosis has to be made from syringomyelia, chronic anterior poliomyelitis, lead palsy and muscular dystrophies.

Prognosis.—The prognosis of progressive muscular atrophy is not favorable, although a number of cases have been greatly helped by an extended course of treatment.

Treatment.—The treatment consists of a thorough, stimulating treatment of the innervation of the affected regions, with manipulation of the muscles and parts diseased. **Correction** of the **lesions** to the **vertebrae** and **ribs**, which are involving the innervation to the diseased tissues, is of primary importance. A cure cannot be expected when degeneration of the nerve centers has occurred; still, the progress of the disease may be checked in many cases, and the patient occasionally gain considerable strength. When atrophy starts in the muscles of the ball of the thumb, the lesion is to the median nerve, and derangements of the cervical vertebræ, from the fifth to the seventh, may be found. Attention to the general health is important. Outdoor life is preferable and gymnastic exercises are of value, but do not overtax the strength.

Bulbar Paralysis

(LABIOGLOSSOLARYNGEAL PARALYSIS)

A progressive atrophy and paralysis, invading the lips, tongue, pharynx and larynx, due to involvement (sclerosis) of the motor nuclei of the medulla oblongata that supply these tissues. It is rarely primary, more **frequently secondary** to tabes, amyotrophic lateral sclerosis and diseases involving the motor nuclei of the medulla. Diphtheria, syphilis and lead poisoning are said to predispose. **Osteopathic lesions** of the upper cervical are also important factors in many cases. Halbert says: "The nuclei of the hypoglossal, the spinal accessory, the facial and the motor part of the trifacial nerves suffer most decidedly from the sclerotic degeneration. The nerve trunks and the muscles which they supply gradually show the effects of a similar degeneration."

The **acute form** results from hemorrhage, embolism or inflammatory softening. The onset is usually sudden. The speech is difficult or entirely lost. There are dribbling of saliva, difficult swallowing, flabbiness and flaccidity of the lips and frequent choking spells occur. These cases may prove rapidly fatal.

The **chronic form** may result from progressive muscular atrophy, insular sclerosis, amyotrophic lateral sclerosis, acute ascending paralysis or chronic poliomyelitis. The paralysis starts in the tongue, the first symptom being a slight defect in the speech. When the lips become involved, the patient cannot whistle and speech is rendered still more difficult. The lips are prominent and the lower one drops. The saliva is increased in amount and there is drooling. Mastication of the food becomes difficult. The tongue becomes atrophied and the mucous membrane wrinkled. Fibrillary tremors of the lips and tongue are present. Sensory symptoms are not present. Taste is normal. Paralysis of the larynx is not so pronounced as of the other parts.

Diagnosis.—This is generally easy as the symptoms are well marked. The **prognosis** is unfavorable.

Treatment.—Little can be done in the majority of cases. Only in those cases where the paralysis is caused by **cervical lesions** can much hope be given. Derangements of the cervical vertebræ, especially the atlas and axis, occasionally influence the circulation in the medulla to such an extent that the motor nuclei are greatly involved. The subluxated vertebræ may interfere with the blood-vessels directly or through the vasomotor and trophic nerves. When the onset is not abrupt, the prognosis is more favorable. When deglutition is impaired, the stomach tube should be used in feeding the patient to prevent the food passing into the trachea.

ORTHOPEDIC SURGERY

By H. S. HAIN

Orthopedic surgery deals with the mechanical or surgical prevention and correction of all deformities, especially those of children. It is not alone justifiable, but imperative, that orthopedic surgery be given a prominent position in any up-to-date text on the Principles and Practice of Osteopathy. The justification is threefold: though orthopedics was practiced to a limited extent before the Science of Osteopathy was developed, it has always been considered to be outside the realms of true surgery, in that it is practically bloodless, and those engaged in such practice have sought to establish it upon a platform of its own.

The basis of the practice of orthopedic surgery and osteopathy is similar, if not identical, in that it deals almost entirely with bony abnormalities. It is recognized by the whole osteopathic profession, and unconsciously by some adherents of medical science, that the maintenance and restoration of normal function are alike dependent on a force inherent in bioplasm and that function perverted beyond the limits of self-adjustment, is dependent upon a condition of structure perverted beyond those limits. This, then is the platform upon which the two sciences of osteopathy and orthopedic surgery are erected.

The technique of osteopathic practice consists of passive manipulative measures, designed to render to the organism such aid as will enable it to overcome or adapt itself to the disturbed structure; and does not seek, in itself, the aid of any instrument, mechanical appliance or plaster of Paris cast.

Surely it is but a short step from our osteopathic therapeutics to a system of therapeutics where we find all sorts of mechanical and plaster of paris appliances, etc., to help our passive manipulation in rendering to the human organism such aid as will enable it to overcome or adapt itself to a disturbed structure. This latter, of course, is the modern science of orthopedic surgery, and because of the shortness of this step, I insist that it is one of the most valuable adjuncts of the science of osteopathy. It is frequently necessary for the osteopathic practitioner to take this step as conditions are met with that have progressed beyond the possibilities of passive manipulations and again other conditions of perverted structure can be much more quickly reduced by the aid of each.

It is then indisputable that the therapist who approaches disease from the osteopathic standpoint, above enunciated, is far more competent

to deal with the mechanical problems of orthopedic surgery than any other known therapist. Secondly, in many conditions originally treated by orthopedic methods, subsequent ordinary osteopathic manipulations obtain a much more satisfactory and more lasting result than if it is withheld. Thirdly, in order to avoid possible error, it is of extreme importance that all osteopathic practitioners be particularly familiar with the conditions hereinafter described, more especially tubercular conditions of the spine, bones and joints, primary spinal curvatures and others.

It is reasonable and furthermore true that osteopathic physicians are confronted in practice with an unusually large percentage of cases indicated above, and the early recognition of such conditions is of fundamental importance in order that osteopathic manipulations be withheld and supplemented or replaced by orthopedic methods.

Space of course will not permit of the entire discussion of this vast subject but the most important and serious conditions met with in general practice are fully discussed in the following pages of this chapter.

Perhaps the commonest condition coming under this line of therapeutics, and one in which we, as osteopaths, are most vitally interested is rotary lateral curvature of the spine. From my personal observation and from experiences of some of the most prominent members of our profession, I am led to believe that this is one of our most difficult lesions to overcome osteopathically, hence my desire to go further into this condition than most of us might expect. I had opportunity to obtain personally some very valuable information from Dr. Joachim Stahl in the King's Charity Hospital in Berlin, and to him I am deeply grateful for many of the ideas of treatment presented in the following article. I believe that I have an accurate conception of the pathological condition that exists in connection with this deformity, and I believe that my treatment of it has been more successful than any that I have seen under other methods, in that I have gotten most excellent results, in selected cases, in a comparatively short time, entirely because osteopathic manipulations and exercises were used in connection with the modified Abbott method.

Scoliosis or Rotary Lateral Curvature

Scoliosis or Lateral Curvature of the Spine is a deformity where the spine is deviated in whole or in part to one or the other side of the median line, which deviation is accompanied by an element of rotation. Though usually considered as a spinal deformity its **effects** are obvious outside the spinal area in so much as it will cause deformity of the pel-

vis, legs, ribs, sternum, scapulae, and in severe cases, of the thoracic and abdominal viscera.

Curvatures of the spine are the result of one of two distinct factors: first where there is a primary disease of the bone causing more or less destruction of the bone and spinal articulations, and resulting in permanent spinal curvature. The most common example of this condition is seen in the angular curvature of Pott's disease. **Rickets** is usually responsible for a general long posterior curvature of the whole spine, as is osteomalacia with the superimposition of some lateral deviation. Further, any type of inflammation or trauma is capable of producing curvatures of various types. Second, where there is no primary disease of the bone, joints, or ligaments, and where the curvature is due to external forces acting constantly or at frequently recurring intervals on the spine.

Scoliosis or lateral curvature belongs to the second class. It is unfortunately necessary to further subdivide scoliosis into two classes; one where the curvature is a position permanently maintained but capable of being reproduced by extreme physiological movement of a normal spine, and secondly, a position which no normal spine can assume and which necessarily implies a change in the normal shape of the bones and intervertebral discs. The first may be described as a functional or postural lateral curvature, and the second as an organic or structural lateral curvature. Further, I might say that the first type may progress until it becomes the organic type.

Pathology.—In scoliosis the spine undergoes not only curvature or lateral deviation but also rotation of the vertebral bodies which you will note always takes place towards the convexity of the curve.

Changes in the Individual Vertebrae.—The bodies may be either wedge shaped or lozenge shaped. In wedge shaped vertebrae, the bodies are compressed on the concave side and extended on the convex side, the intervertebral discs being atrophied on the shortened side. In the lozenge shaped type, the change in the bodies is most marked at the junction of the opposite curves, and is thus more commonly observed in compound curvatures. The pedicles are directed more antero-posteriorly on the convex side and more transversely on the concave side. The transverse processes on the convex side are more antero-posterior than normal, causing the vertical furrow between them and the spine to be narrower on this side. The spines point towards the concavity in structural curvatures and toward the convexity in the functional type. The vertebral foramen is rounded in the convexity and pointed in the

concavity. The edge of the anterior common ligament toward the convexity is greatly thinned while it has a well marked edge on the concave border. A fibrous degeneration occurs in the muscles on the convexity owing to stretching, while atrophy from disuse takes place in those on the concave side.

Associated changes in the Viscera.—The **dorso-lumbar** curvature decrease in the volume of the lower thorax on the dorso-convex side tends to cause pleural adhesions with obliteration of the pleural sac and consequent collapse. Tuberculosis of the **lung** is common in patients who suffer from scoliosis. The **heart** is often overworked but the above lessening of the pulmonary area in turn results in hypertrophy and dilatation of the right ventricle and subsequent general venous stasis. The **kidney** on the convex side is compressed, and as a result degenerative changes are prone to occur. The **spleen** is frequently displaced upward and is liable to pathological changes. Organs such as the stomach, transverse colon, esophagus and trachea are frequently displaced owing to the bony deformity and are thereby more prone to pathological change.

Etiology.—The essential factor in the production of scoliosis is spinal insufficiency, which includes spinal muscles and ligaments as well as the bones. In many instances, however, the following factors have an important augmenting or predisposing effect.

1. Occupational Deformity.—Primarily under this classification, I have found faulty positions adopted by school children as being the most comfortable, to be perhaps most important. Occupations such as those of nurse-maids, hod carriers, or stone cutters, are apt to induce scoliosis.

2. Diseases of the Central Nervous System.—Unilateral weakness or paralysis of the muscles of the trunk are common causes of scoliosis. Anterior poliomyelitis plays a particularly important part as it may induce deformity by distortion of the lower extremity or by any inequality in the length of the limbs due to retardation of growth, as well as inducing general weakness of the muscles of the trunk. Other nervous disorders that should be considered are spastic paralysis, locomotor ataxia, syringomyelia and Friedreich's ataxia.

3. Incidental Deformity.—Scoliosis may be caused by direct injury or by fracture, Pott's Disease, or organic affections of the spine. Marked deformity caused by Sciatica or lumbar neuritis, if persistent may finally induce permanent deformity.

4. Deformities Due to Diseases of the Chest.—In **emphyema** or **pleurisy** one side of the chest is retracted and it will be noticed that the curvature occurs toward the healthy side. Chronic pulmonary tuberculosis producing fibrosis of the lung gives the same result as emphyema and pleurisy.

5. Deformity due to obliquity of the pelvis.—This type may be due to any inequality of the limbs, such as equinus of the foot. Congenital dislocation of the hip may play a part while one naturally lays stress on pelvic and lower lumbar lesions.

6. Deformity due to Distortion of Other Parts.—Unequal visions, unequal hearing, and torticollis by causing malposition are etiological factors especially in school children. The loss of an arm will tend to cause an asymmetrical position of the trunk.

7. Congenital Deformity.—Congenital scoliosis occurs, but is usually associated with other congenital deformities of the spine, such as the reduction or increase of the vertebræ, cervical rib, elevation of the scapula, etc. The deformity is usually not apparent until later years, though it may occur at birth.

8. Spinal Lesions.—Any osteopathic lesion predisposes to curvature because it interferes with the nerve supply and tonicity of the spinal muscles and could readily cause the faulty position.

Functional or Postural Lateral Curvature

This is a condition where there is a gradual curve to one side unaccompanied by any marked rotation. The maximum deviation may be no more than one inch and a half from the middle line, which point is generally found about the tenth dorsal vertebra. In the vast majority of cases deviation is to the left and in such the following alterations will be noticed: a general convex curve to the left; elevation, and anterior displacement of the left shoulder; posterior displacement of the right shoulder; in extension, the right side of the back will be higher than the left and in addition some torsion to the concave side, which is easily understood if one recalls the exact changes that take place during side movement of the normal spine. It is important to remember that functional scoliosis disappears when the patient is suspended or assumes the recumbent position.

Organic or Structural Scoliosis

This term is applied to cases where definite change has taken place in the vertebræ. Organic curves may be simple when the deviation is unaccompanied by any compensatory curve, or compound when a com-

pensatory curve is present. We shall consider the deformities as they present themselves in the various regions of the spine.

Cervico-Dorsal Curvature.—This condition is comparatively rare and according to Lovett occurs in only three and six tenths per cent of cases. The head is slightly deviated towards the concave side, the shoulder on the concave side is lowered, while on the opposite side or the side of the convexity it is naturally at a higher level. The angles of the upper ribs are prominent due to the co-existing rotation.

The Dorsal Curvature.—The shoulder is raised on the convex side, and the rotation of the vertebræ is very marked, causing a very definite projection of the angles of the ribs on the convexity. This rotation also projects the scapula backwards on the convex side. On the concave side the scapula is flat and sunken, and the inferior angle rotated inwards and at a higher level than the opposite side. Viewed from the front the thorax may not be displaced at all, or it may be displaced toward the convex side, and if the latter is the case it is, of course more prominent on the concave side. In severe cases the lower end of the sternum is deviated towards the convexity and you will find that usually the arm hangs further from the convex side than from the opposite one.

The Lumbar Curvature.—Here we find the trunk displaced toward the side of the convexity, and the waist retracted on the opposite side. The difference in the level of the hips is the most prominent deformity in this region, and it will be found that the hips are raised on the concave side. Rotation in this region is much less evident than in the dorsal region, but can be demonstrated by a fullness on the convex side of the curve, due to the projection of the transverse processes.

Dorso-Lumbar Curvatures.—This condition is similar to a certain extent, to a severe functional scoliosis. The findings observed in the last two regions above described will naturally be present in this type of curvature. It is not so frequently associated with compensatory curves as in the other types described.

Compound Structural Curves.—The appearance in this type of scoliosis will, of course, be a combination of those described above according to the types of curvature in combination, that is to say right dorsal and left lumbar, etc. If one type predominates the appearance will be chiefly that found in that particular type of curvature. The relative frequency of the common type, as given by Schalltless, in eleven hundred and thirty seven cases is as follows; functional scoliosis, 15.39%; lumbar, 11.7%; dorsal, 19%; dorso-lumbar, 20%; cervico-dorsal, 3.6%; compound, 30%.

Diagnosis.—To the osteopathic physician the diagnosis of scoliosis is not difficult. Let me caution you that true scoliosis must be distinguished from the lateral curvatures caused by Pott's disease. Vertebral rotation, the absence of pain, the extreme rigidity, the characteristic appearance of the ribs and thorax should, however, make the diagnosis of scoliosis easy.

Treatment.—In general the treatment of scoliosis is difficult to present, because every case is considerably different, and the amount of correcting force used in any form is almost entirely a matter of judgment, as is also the time when corrective pressure should be discontinued. Continual practice in the treatment of these conditions is most essential to your success with them. I have had most gratifying results in a comparatively short time simply because I used osteopathic treatment and exercises along with a modified Abbott method.

Functional or False Scoliosis

The functional or false scoliosis might be regarded as a habitual inability to stand correctly, simply a postural malposition and lack of muscle tone without marked structural change, which is maintained for a considerable length of time or where the position is repeated several times daily. The treatment of selected types of this deformity is most successful and may well be divided into three procedures: first, the substitution of a correct attitude for the faulty one, that is careful investigation should be made to ascertain the condition which might be the cause of the incorrect position such as poor school desks which might cause the child to reach either up or down to write, poorly fitting clothing which causes a pulling on the shoulder, eye strain which would cause tilting or twisting of the neck, congenital shortening of one limb or too rapid growth, should all be looked for and removed; second, regular osteopathic manipulation, at least three times per week to increase the tonicity of the already weakened spinal muscles and aid correction, are highly essential and shortens the time required for a complete cure; third, supervised gymnastic exercises of various kinds are very beneficial to develop and bring the musculature back to normal. Such simple exercises as crawling on the hands and knees in a small circle towards the side of the convexity, and the hanging from a horizontal bar by the arm on the side of the concavity will prove to be helpful. Some authors recommend the regular army setting up exercises for some cases or a frame by means of which the hips are fixed, and rotating and side bending exercises of the head and trunk given. These last two exercises are indeed very rea-

sonable procedures but I have found them unnecessary mainly because I used osteopathic manipulations instead.

In advising and supervising exercises it is best to have the patient's back bared so that the effect of each movement can be noticed and the exercises directed accordingly. Care and judgment should be used as to the number and severity of the exercises and would depend of course on the vigor of the child. Treatment should continue until the condition has been overcome, and the patient should be under observation for a couple of months afterwards so that any recurrence of the deformity would be noticed and attended.

Organic or Structural Scoliosis

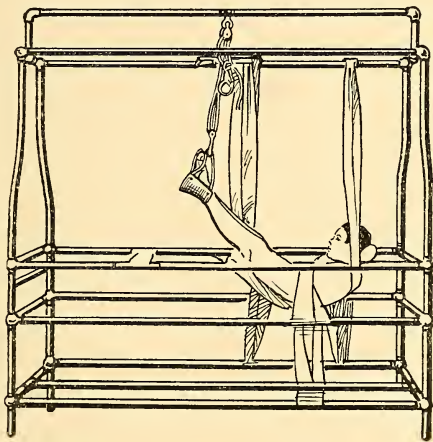
The treatment of organic or structural scoliosis is more complicated for it must be remembered there are two elements of the deformity demanding correction; one, the lateral curve to be corrected by a side force, and the other, the rotation of the vertebræ to be corrected by a twisting force. I find both osteopathic manipulation and gymnastic exercises are of great value in the correction of this deformity as they help to loosen the curve and develop the musculature but used alone good results can rarely be obtained especially in obstinate curvatures. I believe that I have improved nutrition and probably prevented further deformity by treatments and exercises, but I am quite positive that it is not possible to correct an organic scoliosis without the forcible correction used in the Abbott method.

As the details of treatment are tedious to follow, we will take for example a case of right dorsal curvature presenting a marked hump deformity, with a compensatory curve to the left in the lumbar region, as this is the most common type. I might say here that whether or not a compensatory curve is present, makes no difference, as treatment is directed entirely to the primary curve on the assumption that overcorrection of it will cause a secondary curve to disappear by compensation.

The patient is prepared by putting on a snug fitting undershirt and sewing pads of saddler's felt over all bony prominences, especially the crest of the ileum and anterior superior spine. Sometimes I take a piece of felt of four or five inches wide and long enough to go around the entire pelvis, just high enough to cover the brim, and fasten it in front with adhesive. Next I make a bunch of pads two or three inches in thickness and large enough to fill up the concavity of the left side, and first sew them together, and then with a few stitches fasten them to the undershirt thereby filling up the space on the concave side. The edges

of the pads should, of course, be trimmed down to conform with the general contour of the body, the main thickness being in the middle. I then sew a single pad on the right side of the thorax in front and a little to the right side.

The patient is now ready for the Abbott frame and is placed on a canvas hammock about twelve inches wide, which is cut on the bias so the right side is three inches shorter than the left. The hammock can be adjusted to the desired degree of flexion by a ratchet at the foot of the regular Abbott frame. The limbs of the patient should be elevated to increase the flexion as this has a tendency to unlock the articulation and thereby help in overcoming the rotation. Next a canvas bandage four in-



Patient suspended on canvas hammock in regular Abbott frame ready to apply cast for a right dorsal curvature. Notice manner of applying the correcting canvas straps.

ches wide is passed around the patient under the axilla of the concave side and fastened to the frame on the opposite side, and another one is placed around the pelvis and fastened to the same side of the frame, both on a level with the body plane. A third bandage is next placed around the point of greatest convexity and fastened to the opposite side of the frame in such a way that it can be tightened and a direct pull be made on the curve. Before tightening the last bandage the left arm and shoulder should be brought up high beside the face and pulled backward toward

canvas bandage which was left around the convexity, while pads are inserted so that the greatest pressure is exerted on the angle of the ribs to further overcome the rotation and decrease the lateral deformity. Also heavy felt pad may be inserted over the bulging ribs in front of the left side to push them back. Care should be taken that too much pressure is not brought to bear on the side of the convexity because if more pressure is exerted here than on the angles of the ribs, it will tend to increase rather than decrease.

Casts should be worn for different periods, some being changed in a month while others can be worn for three months. It is entirely a matter of judgment. My best results have been secured by only slightly correcting the curvature at the time the cast was applied, and relying more on the proper insertion of the pads. Often at the end of a month or six weeks, in selected cases, I have split the cast down the front and removed it by springing it apart, and administered osteopathic manipulations to the spine freely in all directions, thoroughly loosening up the muscles. Then I replace the cast and hold it together in front with mole-skin adhesive and insert the pads as before. I repeat this procedure three times per week for another month, together with daily exercises each morning and evening of drawing the left shoulder up and forward while in the cast to develop the muscles of the left shoulder girdle. The treatments and exercises certainly do build up the spinal muscles for it must be realized that they have suffered in nutrition to a great extent as a result of wearing the cast. Next the cast can be worn during the day and removed at night, and gradually it can be left off several hours at a time. If no bad results occur it can be left off for longer periods until finally its use can be discontinued. However, the patient should still be under observation once a week for a couple of months to determine any recurrence of the deformity. The resumption of active corrective treatment, or increasing relaxation in gymnastic work, will, of course, depend upon the progress of the case.

In the more obstinate cases, casts should be applied as long as further correction can be obtained. The procedure is entirely the same, only the time required for correction is longer, sometimes a year or year and a half, and when over-correction has been maintained, it is better to use a removable jacket made of celluloid or light stiffened leather, with large windows cut over the region where pressure is to be avoided, than the removable cast described above.

In closing let me say that this method of correcting lateral curvature is best adapted to patients during their growing period and though it

may be employed in older cases you will usually be disappointed in the final result. The only reason I can see for treating older cases is purely mercenary.

Congenital Dislocation of the Hip

Unilateral

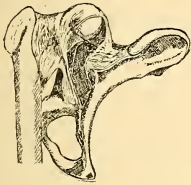
Undoubtedly as far back as 1829, the actual recognition of this condition was due to the pathological research of a French surgeon Dupuytren, who described this deformity with great accuracy and insisted that there was no possible chance of correction. From then on until 1886 nothing was done by medical science to overcome the deformity, though it is claimed some were made. It was in this year that the famous Bavarian surgeon, Hoffa, gave to the medical profession the results of his successful attempts at reduction by opening the hip joint from behind and enlarging the acetabulum to a size sufficient to hold the head of the femur.

Orthopedic surgery has to thank the irritating effects on the skin, of antiseptics necessary in preparing his hands for ordinary surgery, as it was due to this triviality that Lorenz, a promising surgeon of Vienna, transferred his energies to the field of bloodless surgery and gave to us the most valuable early work and present day technique in the bloodless reduction of congenital dislocation of the hip.

The name, of course, is applied to a congenital deformity which involves one or both hip joints, resulting in lameness, due to a misplacement of the head of the femur from the acetabulum. Of all congenital dislocations the hip joint is by far the most common and most important. The misplacement is far more often unilateral than bilateral and far more frequent in females than in males, the cause for the latter probably being the difference which exists in aspect and position of the acetabulum as well as the disproportionate laxity of the capsule in the two sexes. It must be remembered that normally at birth, the acetabulum covers only about one-third of the head of the femur, and our most accepted theory as to the cause of this deformity, is a defective development of the acetabulum or its posterior margin, which may be primary or secondary to an abnormally prolonged fixation of the limb in a position of flexion or adduction while in utero. At birth it is quite probable that the dislocation is a subluxation only, which becomes complete by muscular action and the use of the limb in standing and walking.

The pathology of this disease is clearly established, and varies, of course, with the age of the patient in strain and friction to which the

misplaced parts have been subjected. In children over two and one-half years of age the acetabulum is usually shallow and small, and filled with a deposit of fat and fibrous tissue. It is covered with normal hyaline cartilage and nearly always the ligamentum teres is present, but is so badly stretched and ribbon-like that ultimately the artery accompanying it fails to function, resulting in a malformation of the head of the femur. The capsular ligament is elongated and thickened to accommodate the upper displacement of the femur, and the anterior wall of it is stretched tight across the acetabulum like an hour glass. The interior of the capsule is always partly lined with synovial membrane. Usually a secondary acetabulum is found upon the ileum, formed by the direct pressure of the head of the femur through the capsule and the re-

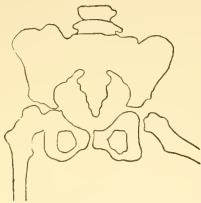


Typical congenital dislocation of the hip, showing the "hour glass" constriction of the capsular ligament.

sult of irritation of the periosteum of the ileum, but it is as a rule, not deep enough to form a secure support for the head of the bone. The neck of the femur is usually shorter than normal and the upper extremity of the bone is somewhat atrophied. The pelvis is usually slightly atrophied on the affected side, and a lateral inclination of the spine may be present. The long muscles of the thigh are shortened; while those attached to the pelvis and trochanter are changed in direction and are usually lengthened.

Symptoms.—As a rule congenital dislocation of the hip is not accompanied by the defective development or deformity elsewhere, and the symptoms are so diagnostic that there is little difficulty in recognizing this condition even without the X-ray which is, of course, a positive diagnosis.

Rarely does the displacement attract attention until the child begins to walk. Often the child does not walk as early as it should. Sometimes it may be delayed until the eighteenth month or second year and then it walks with a limp which becomes more pronounced as the child grows older until at the fourth or fifth year it is very decided. The limp is peculiar and its character is explained by its cause; for the shortened limb, owing to the elasticity of the capsule, becomes still shorter when the weight is borne upon it, thus causing a peculiar lunge of the body towards the short side like the normal motion of walking downstairs. In compensation, of course, the pelvis is tilted towards the short limb and its inclination is thereby increased, so that the anterior superior spine



Outline of a radiograph following reduction and removal of the first cast in unilateral dislocation of the hip. Notice the head in the socket and the thigh still flexed and abducted.

lies at a lower level and in advance of the opposite side. Usually the affected limb is about an inch shorter than the sound one, and in adult life it is considerably more. The range of abduction is much diminished, but flexion, extension and adduction are quite normal, and the trochanter will be found elevated about an inch above Nelaton's line. If the thigh be flexed and adducted to its extreme limit, the neck and head of the femur can be easily distinguished moving under the gluteal muscles when the limb is rotated, or the head can usually be readily palpated in front when the limb is extended. Then, too, by fixing the pelvis and using traction and upward pressure on the

limb, the abnormal mobility or telescopic motion is easily demonstrated and this, I might add, is a very important test.

Rarely do we find a unilateral anterior dislocation, in which the head of the bone lies beneath the anterior superior spine, but when this position is present, the symptoms are much less marked than in the ordinary form because the relation of the pelvis to the femur is more nearly normal. The limp and the shortening of the limb are less noticeable because the tissues attached to the anterior superior spine form a relatively secure support.

The X-ray, of course, makes the diagnosis complete. Even though the clinical diagnosis is certain, a radiograph is indispensable in every case, particularly for the purpose of ascertaining the exact position of the head and condition of the acetabulum and femur. The acetabulum is usually shallow and poorly developed, more particularly the iliac portion of its rim. After the reduction of the dislocation, an X-ray picture should always be taken within the first few weeks, and before the plaster of paris cast has been removed, to ascertain whether the head of the femur is still in place.

As to bilateral dislocation of the hip, the pathology, of course, is the same as in the unilateral type. The shortening of the limbs is as a



Outline of the same case following removal of the second cast. The head of the femur is firmly fixed in the acetabulum and the position of the limb is nearly normal.

rule equal or nearly so, and when both femurs are displaced backward, the pelvis is tilted forward thus presenting a marked lumbar lordosis and protruding abdomen. The pelvis seems to be abnormally wide, both buttocks are flattened and the thighs are separated by a considerable space. The characteristic limp in this condition is an exaggerated waddle, often spoken of as "sailor gait." Again in this condition rarely do we find an anterior dislocation, but when such is the case, the entire body is swayed entirely backward, though the lumbar lordosis is not increased, in fact usually presents a peculiarly flattened appearance. Other symptoms differ only in a slight degree from those of the ordinary posterior displacement. The physical signs are the same as the unilateral displacement and are even more readily recognized by the peculiar appearance and distinctive gait of the patient. The swaggering gait of lumbar Pott's Disease is somewhat similar, but this is an acquired clinical condition of the spine in which the hip joints are normal in appearance and nearly so in function.

Before taking up the usual procedure for the correction of congenital dislocation of the hip, it might be interesting to touch on several cases of this deformity in young children that I have reduced without an anesthetic. If future experience proves as successful as these cases it will entirely revolutionize the treatment of this condition especially in children under twenty months of age. To begin with, these children had just started to walk and it must be remembered that at this stage the acetabula are nearly normal and there has been no muscular or ligamentous contraction because very little weight has been borne on the limb.

First the pelvis is held fixed by the assistant, and the thighs completely flexed on the abdomen. Next firm pressure is made on the knee to force the head of the femur beneath the acetabulum and as the limb is abducted in the flexed position, the head is raised into the acetabulum with the thumb of the operator's other hand. The whole procedure takes but a moment's time and the child should be placed at once upon the floor and allowed to walk. Time will tell if the reduction has been successful, and if failure of retention develops, the Lorenz method followed by plaster of Paris fixation can still be used. I should always recommend the trial of this method in children who have walked not longer than six months, before resorting to the following Lorenz treatment.

Treatment by the Lorenz Operation.—This treatment is based on the fact that there is normally present an acetabulum of sufficient size and capacity to retain the head of the femur, providing the limb can be fixed in a favorable attitude, and as soon as possible weight borne

upon it to deepen the rudimentary acetabulum. The typical operation of today is best divided into four distinct steps; first, to overcome the resistance of the tissues surrounding the joint; second, to reduce the dislocation, or rather to force the head of the femur over the posterior border of the acetabulum; third, to increase the security of the articulation by stretching the anterior border of the capsule; fourth, to fix the parts in a plaster of Paris bandage.

The child is completely anesthetized, and an assistant firmly fixes the pelvis on the table with his hand. The operator first flexes the thigh to a right angle with the body and forcibly abducts, at the same time kneading and stretching the tense adductor muscles and if necessary rupturing the adductor tendons in order to bring the limb down to the plane with the body. Next to overcome the contraction of the posterior tissues, the limb fully extended is flexed upon the trunk and gradually forced downward until the toes touch the patient's face. To overcome the resistance of the tissues on the front of the joint, it is best to move the patient to the edge of the table and forcibly extend the thigh downward behind the plane of the body. It is also well to apply direct traction in the line of the body. This preliminary stretching is absolutely necessary, because all the tissues about the joint are so shortened, and it will now be noted that with slight traction the trochanter can be drawn down to Nelaton's line.

Next reduction is attempted by grasping the limb with one hand at the knee and strongly abducting it while the palm of the other hand is placed on the anterior spine of the ilium with the thumb placed beneath the great trochanter to act as fulcrum. As the limb is gradually forced downward to and behind the body plane, the head of the femur is forced upward until it finally slips over the posterior and inferior border of the acetabulum. In the more resistant cases a padded wedge-shaped block placed behind the trochanter will be an aid in pushing the head forward and upward while the patient's knee is forced downward. A successful reduction is usually accompanied by a distinct jar and audible thud, and it would be observed that the tension upon the ham string muscles causes fixed flexion of the leg. After reduction has been made, the limb should be brought down carefully into a straight position to test the security of the re-position. If dislocation appears during this manipulation, the tissues must be still further stretched and the displacement further reduced. If displacement occurs readily due to a shallowness of the acetabulum the prognosis is not so good as where the stability remains when the limb is brought down into a straight



Patient in position for the first cast in a left unilateral dislocation. The thigh should be a little past a right angle in relation to the trunk, with about 80° abduction.

position, and one must be more particular in the fixation of it. I have also observed that the more difficult the reduction the more stable the end results. The easy replacements are usually just as easily displaced. Sometimes the head slips into the socket quietly without the distinct jar or thud but the results in these cases are just as good provided they are properly cast.

The application of the plaster spica is by far the most important part of the treatment, as the reduction is usually quite easily accomplished in children under six years of age. If

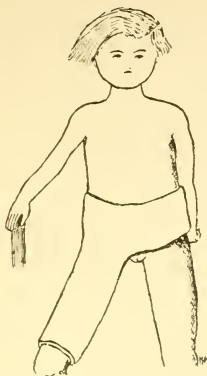
the cast is improperly applied, the hip will slip out of the socket and the case is a failure. A pair of soft knitted cotton drawers are put on and the patient is placed upon a pelvic rest with the limb held in the position of greatest stability at a right angle with the trunk, or even slightly more and about eighty degrees abduction. In a case where the socket is very shallow, the position to be cast should be about one hundred degrees flexion, and in abduction the limb should lie slightly behind the plane of the body to secure the best results.

The limb and pelvis are covered with ordinary absorbent cotton which is held in place with a roller gauze bandage. A snug fitting plaster of Paris cast is now applied around the pelvis and well down over the knee. I leave this over the knee for five or six days or until the child ceases to be fretful, then I cut it away just back of the knee joint to permit motion there. The ends of the drawers are drawn back smoothly over the cast and are sewed to each other. For about a week following the operation the adductor region is swollen and discolored and more or less painful due to rupturing and stretching of those tendons. After this discomfort has passed away, walking is encouraged on the theory that the weight bearing and the stimulation of functional activity will increase the stability of the joint by deepening the acetabulum.

The first cast should remain from three to six months according to the stability of the joint at the time of reduction. If in young children the cast becomes offensive, it must be changed as often as is necessary. When



Correct position and proper application of cast for double congenital dislocation of the hips.



Proper position of the limb in the second cast for unilateral dislocation.

the first cast is removed, the limb is pulled down to about thirty degrees abduction and the same amount of flexion, without an anesthetic, and a second cast is applied, which extends only to the knee, to be worn from three to six months longer. After removal of second cast, the child is permitted to get about carefully. The limb will be everted and slightly flexed, which position invariably causes much concern among the relatives of the patient, but this abnormal condition disappears after a few months' time. Sometimes for even a year following removal of the second cast there will also be a noticeable hitch in the walk of the child, but this, too, disappears and in the course of two years' time one could never tell that such an operation had been performed.

Massage of the posterior and lateral muscles of the hip always helps considerably towards the relief of any stiffness or lameness.

Reduction by Open Incision

In the more resistant older cases, where manipulative reduction has failed, reduction by incision can be employed with success, but this procedure requires the exercise of care in order to do as little injury to the muscles as possible. A crucial incision of the capsule is made and the capsular constriction and ilio-psoas tendon divided. With a little traction, the head of the femur slips easily into its socket. The capsule is stretched firmly around the neck and the incision into the capsule is then closed by suture, and the limb fixed in a plaster of Paris spica in the fully abducted position. The operation should of course be done under the strictest asepsis.

Talipes or Club Foot

The word talipes signifies some deformity of the foot and is quite common in orthopedic practice, being found in nearly ten per cent of the cases coming under this branch of the science. Club foot may be classified into two types—the congenital and the acquired. The congenital type is the most common and is due probably to abnormal intrauterine pressure or to a perversion of normal intrauterine development.

The acquired type is due usually to injury or infantile paralysis, but either joint disease or cerebral paralysis may be the cause. The deformity presents six different forms with most characteristic clinical pictures which, with the exception of talipes planus I have taken up in the order of frequency.

Talipes Equinovarus is usually congenital and is the most common type. It is characterized by inversion and torsion of the foot with elevation of the heel. The weight is borne on the outer side of the foot and in extreme cases upon the dorsum as well. Calluses are always present which are red and painful upon the point where the greatest



Illustrating the more common types of talipes. A combination of any may be present.

weight is borne. The most common method of treating this condition is to divide the tendo Achilles at a level with the malleoli. The operation should be done aseptically and under complete anesthesia. As an assistant raises the end of the foot so as to stretch the tendo Achilles the surgeon enters the knife parallel to the border of the tendon through the skin and tendon sheath into the tendon itself. Next with a tenotome inserted into the incision and turned at right angles to the tendon, the tendon is divided first on one half then on the other. Care should be taken to disturb the tendon sheath as little as possible for it serves an important purpose in repair. When the division is complete as indicated by the separation of the divided ends, the tenotome is withdrawn and the minute opening in the skin, from which there is only slight bleeding,

is covered with aseptic gauze. The foot is forced into dorsal flexion and if in severe cases the deformity is not then corrected, the tendons on the outer side of the foot may be shortened, while those on the inner side may be lengthened in the same manner as the tendo Achilles. A plaster of Paris cast is then applied well up to the knee with the foot in the over corrected position, care being taken that no undue pressure is brought upon the seat of operation, as this might interfere with the effusion of plastic material. Personally I believe that functional use of the limb and foot stimulate repair, and I always encourage the patient to stand and walk after the discomfort of the operation has passed. At the end of four weeks the space between the two cut ends will be filled with new material and the cast can be removed, and in another month the splice, which is somewhat larger and thicker than normal, should be strong enough for use. In the course of a year the lengthened tendon is perfectly normal.

Talipes Equinus.—In this type the patient walks on his toes with the heel highly elevated, in the same position as the horse, and it will be noticed that the foot has no dorsal flexion whatsoever. Infantile paralysis affecting the anterior muscles of the leg is usually the cause of this condition, though sometimes shortening of the leg following knee joint disease, or fracture may lead to an adaptive equinus which serves to make the limb of equal length for walking. This type is by far the easiest to remedy, and the results following operations are perfect. A simple division of the tendo Achilles is made under anesthesia and a cast applied as above, in a position of exaggerated dorsal flexion. Functional use of the limb after the cast has been removed overcomes any stiffness that might occur and perfect results are obtained in a short time, compared with the other types.

Talipes Calcaneous.—This is a condition in which the foot is held in a position of dorsal flexion. The patient walks on the heel with an inelastic gait because the spring of the foot is absent and the whole weight is borne upon the os calcis. The best procedure in this type is manipulative treatment into a position of plantar flexion to overcome the contraction of the anterior muscles of the foot and leg, and bring about contraction and shortening of the posterior muscles. A tenotomy of the anterior tendons or an anesthetic is rarely indicated, though in severe cases, a series of casts holding the foot in position of plantar flexion may be necessary to secure good results. I have found it a help to have a shoe with a heel prolonged backward, or a steel splint laced to the leg to prevent the foot from upward motion.

Talipes Valgus.—This is a very uncommon type of deformity, characterized by eversion of the foot. The patient walks on the inside of the foot and, as a rule, experiences very little trouble. I find a manipulative treatment is best for this condition, aided by braces.

Talipes Cavus.—This form is sometimes called "**hollow foot**" and is very uncommon in this country. It is characterized by a markedly high arch sometimes as in Chinese women to the extent that the anterior part of the foot is approximated to the heel. The plantar fascia is badly contracted and one can distinctly palpate the bands beneath the skin. This condition is practically the same as the ordinary so-called "**contracted foot**" except that it is much more exaggerated. The ordinary high arch of today is usually the result of wearing too short a shoe, and if painful, long last shoes, aided by manipulations, will usually correct the trouble. In severe cases of contracted foot the plantar fascia may be divided, under anesthesia and the arch brought down and put in a cast, though this procedure is not very successful. In case it is done the patient should be made to walk in two or three weeks, as this helps materially to overcome the deformity and hasten repair of the fascia.

Talipes Planus.—This condition is commonly known as "**flat foot**" and is taken up in another part of this text. However, it is one of the classifications of "club foot" and is far the most common type.

Prognosis.—These conditions never correct themselves and if uncorrected usually get worse and the more severe types certainly become obstinate malformations. In general the tendency to relapse is strong, though if properly treated the results are excellent. In infantile cases the time required for correction is relatively short, but retentive appliances are needed for a longer time. The older the cases and larger the foot the more difficult, of course, the correction, but usually there is less danger of relapse. A perfect correction, that is when the gait and attitude are normal, will never relapse. I find it better to leave the fixation appliance on too long than not long enough. Never remove a cast under four weeks except in the cavus type, then apply a brace such as can be obtained from any supply house for any type of case, for from one to three months longer. The tendons involved in these conditions are so apparent that it is almost impossible to make a mistake in the division of them. About the only precaution necessary is to be assured that the tendon itself is completely divided, but that the tendon sheath is only slightly disturbed.

Tuberculous Disease of the Bones and Joints

Perhaps no bony lesion has caused so much difference of opinion in this profession as tubercular conditions of the spine, bones and joints and I wish it understood that in the following discussion, it is not my desire to reopen the argument. My observations have been of cases treated both osteopathically and by fixation, in private practice and institutional work. And I have come to the conclusion that the fixation method of treatment is absolutely always indicated. In general the pathology and etiology of all tubercular bone conditions is the same. It begins as a tubercular infection of the spongy tissue of the epiphysis, the first change being a local hyperemia of the portion involved, followed by one of three courses: the diseased focus being absorbed and a spontaneous cure resulting; it may extend to the periphery of the bone and break through the periostum and empty itself there by abscess formation; or most commonly it may extend to the joint, which becomes involved through attendant injury. Repair is brought about by the formation of fibrous tissue probably arising from the layer of non-tuberculus granulation tissue which grows in and replaces the tuberculous tissue. Also the replacing material may become calcified and encapsulated. A fibrous or bony ankylosis may result from this process of repair.

The vulnerability of growing bone accounts for the frequency of tubercular bone disease in children as compared with adult life. Injury not only causes a local predisposition to the disease, but it favors its progress when it is once established. About seven-eighths of the cases of this trouble occur under fourteen years of age, more especially when the vertebrae or hip-joint are involved. The knee and ankle joints as well as the elbow and shoulder joints are more often diseased in later life. While the inherited predisposition is very direct and positive in twenty-five percent of the cases, the acquired predisposition is of most importance since it includes lessened vitality due to poor food and imperfect hygienic surroundings. As to the distribution of the disease the vertebrae are most commonly affected, followed closely by the hip and knee joints, and then in the order of frequency the ankle, elbow, shoulder and wrist joints.

Tubercular Disease of the Spine

This condition is commonly called **Pott's Disease** or **Caries**. It is a chronic destructive process of the bodies of the vertebrae. The spine bends at the weakest point and the compression and collapse of the affected parts cause the characteristic posterior angular projection at the seat of the disease. If one vertebral body is destroyed, the projec-

tion will be sharp; if several are involved it will be less angular and if one side breaks down before the other, there may be a lateral as well as posterior distortion. The size of the deformity and its effect upon the patient depend upon its situation; that is, if either end of the spine is involved the angular projection is slight because the area of the spine directly involved in the deformity is small compared with that which is free from the disease. If the middle of the spine is affected, the deformity is great, because the entire spinal column may enter into the angular projection. In the latter area the internal organs are compressed and, of course, the effect upon the vital organisms of the body is disastrous.

Pathology.—The first indication of tubercular disease of the spine is usually found in the anterior part of a vertebral body just beneath the fibro-periosteal layer of the anterior longitudinal ligament. From this point the foci may advance along the front of the spine following the course of the blood vessels and invading the adjacent vertebral bodies. The destruction may begin in the interior of the body itself, more often in several minute foci near the upper or lower epiphysis, which coalesce gradually enlarge and form a cavity surrounded, for a time, by unbroken cortical substances which finally collapse under the pressure of the weight above. The intervertebral discs seem to offer some resistance to the extension of the disease from one vertebra to another but once the bone is destroyed on either side, they too quickly disintegrate and disappear. Pedicles and articulations which come into direct contact with the disease may become involved. Originally the disease is confined to one or two adjacent vertebrae and may extend in either direction, and the final area of deformity and rigidity shows that from three to six bodies may be involved before a cure is established. The infected granulations advance rapidly with the usual retrograde change of shape and structure to a cheesy degeneration and frequently liquifaction and abscess formation may follow.

Symptoms of Pott's Disease.—There are three main symptoms of Pott's disease, namely the peculiarity of attitude and gait, limitation of motion or muscular stiffness and the pain and referred pains. In the cervical region, the chin is held somewhat raised and the patient may have somewhat the same appearance as in wry-neck. In the mid-dorsal region one will always find an elevation of the shoulder besides the deformity. In the lumbar region, the patient nearly always leans backward and has a sort of sidling gait or waddle due to the contraction of the psoas and iliacus muscles. The patient in walking, stooping, or lying down most carefully guards the spine against any jar or motion,

and always assumes attitudes which will relieve the strain on the involved vertebrae. There is always present an unnatural mode of standing or walking, especially when the dorsal and lumbar regions are involved, as the patient walks more on his toes and with the knees slightly bent, because in this posture all possible strain of the step may be brought into play to diminish jarring of the spine. The child becomes tired very easily and lies down or rests on the arms of a chair or seat. The pain rarely occurs in the back, but is usually referred to the peripheral end of the nerves and is thus felt in the chest, abdomen or limbs. The abdominal pain passes sometimes as a stomach ache and often times in the limbs, as rheumatism or "growing pains". I have noticed also a peculiar grunting respiration and sometimes cough especially when the mid-dorsal region is involved. Muscular stiffness is always present, all mobility being lost. The temperature is not at all diagnostic, though sometimes in the afternoon it will be one or two degrees higher than normal and does occur independently of abscesses. About the only complication that occurs is paralysis or abscess formations. Paralysis is given as a frequent complication, though I have never seen it. It is usually flacid and bilateral and may exist from a mere muscular weakness to a complete loss of power. It is certainly uncommon under proper treatment, and the prognosis is favorable. Abscesses, though a very distressing complication, are very uncommon in my experience and are certainly an evidence of improper or incomplete treatment. They may subside in any region and be absorbed without detriment to the patient, though if they increase in size there is no tendency towards absorption. It is best to incise them and secure complete drainage. It is hard, of course, to do this on account of the depth. Abscesses occur always in close proximity to the disease.

Treatment.—Some authors recommend a brace for the treatment of this condition, while others recommend a frame to which the patient is strapped, and rest in bed. I have found nothing that gets results like a plaster of Paris jacket applied with the patient suspended by the neck and shoulders. I make no attempt at correction of the deformity present other than the traction of the weight of the body at the time the cast is applied. The spine is, of course, fully extended by this and any undue pressure on the cord relieved. The cast should extend over the shoulders and well down over the pelvis and sacrum. If the disease is in the neck the cast should include the head as well. A large window is cut in front and one must be cut over the involved area of the spine behind. Ordinary absorbent cotton is used for pad-

ding with, of course, extra padding over all bony prominences. From two to five years' time is required for a complete recovery. The X-ray is invaluable in diagnosing this trouble, and each time a cast is removed to see how much progress has been made. The casts should be changed as often as they become soiled.

Tuberculosis of the Hip

This is a chronic tubercular condition of the head of the femur or of the acetabulum commonly known as **hip-joint disease**.

Pathology.—Primarily the head of the femur is the seat of the disease, the epiphysis being attacked in seventy-five per cent of the cases and the acetabulum in twenty-five per cent. The irritated pelvic femoral muscles which are in a state of chronic contraction crowd the head of the femur against the upper and back border of the acetabulum. Under this continual pressure, absorption of that portion of the rim takes place with actual enlargement of the acetabulum from below upwards. This is spoken of "migration of the acetabulum" and is one cause for the shortening of the limb. Changes in the head of the femur are the result of inflammation and pressure. Partial destruction of the head also helps shortening of the limb and elevation of the trochanter above its proper level the same as the wearing away of the acetabulum. The synovial membrane is found to be reddened and thickened and granulation tissue is present, and usually the cartilage is gone from the head of the femur. Rarely does perforation of the floor of the acetabulum take place, but if such is the case a dense wall of fibrous tissue and thickened periosteum shuts off the head of the femur from the pelvic cavity. A natural cure results in two ways,—by absorption or calcification of the tubercular tissue, or by the evacuation and discharge by an external opening. This latter suppuration seems to be nature's effort to eliminate the disease, and when a cure is established this way it is usually characterized by mal-positions and shortening of the limb, and, of course, an ankylosed joint.

Early Symptoms.—The most characteristic symptoms of the disease are the 'night cries', stiffness and limping, shortening of the leg, atrophy of the muscles of the hip, leg, and thigh, and the unconscious protection of the joint. A referred pain is usually present to the inside and front of the thigh near the knee or directly at the knee joint itself, due to the intimate relations and anastomosis of sciatic, obturator, and anterior crural nerves.

Diagnosis.—The chief diagnostic sign is muscular spasms or the

presence of stiffness of the joints and limitations of its proper arc of motion, due to the tonic contraction of the muscles controlling the joint. If there is no limitation of motion it is almost safe to say there is no hip-joint disease. The lameness may be intermittent. The attitudes or abnormal positions of the diseased limb are caused by the action of muscles holding the limb stiffly in a distorted position. The pelvis is usually tilted and always one will find the patient assuming attitudes which will favor the diseased limb. Atrophy is very significant and a comparison of the two limbs should be made by measuring at the middle of the thigh and the middle of the calf. Nearly always one will find a deep thickening over the front of the hip joint and behind the trochanter.

Physical Examination.—1. Observe the general condition of the patient.

2. Note the attitude in standing.

3. Note character of the limp.

4. Note shortening of the limb.

5. Remove the clothing and lay patient on the back.

6. Test the function of the groin. Always begin on the sound side for comparison in order that the patient may become accustomed to the manipulation before the limb suspected of disease is tested. Tuberculosis in a joint is always accompanied by muscular spasms that positively limit motion in every direction, while in other affections only one or more limitations are observed, but never in all directions. Compare closely the motions of the sound and affected limbs while the patient is on the back. Turn patient on face and test for extension by holding pelvis flat on table with one hand and gently elevating thigh with the other. The normal range in a child is about twenty degrees backward from the line of the body and limitation of this range is perhaps the earliest indication of hip-joint disease. It is due to psoas contraction. If this range of motion is unrestricted hip disease can be practically excluded.

The X-ray completes the diagnosis when used with a thorough knowledge of the physical signs. It must be remembered that in early life a larger part of the extremity of the femur is cartilaginous and does not show well in a radiograph. The X-ray picture shows clearly the destructive effect of the disease on the femur and acetabulum and gives a clear conception of the actual condition of the joint.

Treatment.—The object of treatment of this condition is three-fold: first, to relieve the pain that depresses the vitality of the patient; second, to relieve the muscular spasms that induce distortion of the limb

and which stimulates the destructive process by increasing pressure and friction of the diseased surfaces of the opposing bones; third, to correct and prevent deformity by lessening pressure and by restraining motion, thereby keeping the femur from upward displacement.

Rest and protection are the two cardinal features of treatment of this condition. Sunshine, fresh air and good nutritious diet are very important.

Complete rest of the joint offers the most favorable opportunity for nature to repair this disease. The recumbent period of the treatment necessitates rest in bed for the reduction of the deformity and subsidence of acute symptoms. By the aid of traction, which is applied to the length of the legs by means of a Buck's extension. As much weight should be applied as can be borne without discomfort to the patient.

As soon as the deformity and acute symptoms have subsided, the ambulatory treatment should be substituted to keep up the general health of the patient. This merely consists of the application of a long plaster of Paris spica of the hip which should reach well up to the thorax and extend down and include the foot. All bony prominences should be well padded, and a moderate amount of traction with about twenty degrees abduction should be used while applying the plaster bandage. Though various forms of apparatus have been devised for fixation and traction, I believe that the plaster of Paris spica is far the most effective and should always be used, changing the cast as often as it becomes soiled. Locomotion is possible with crutches providing the shoe on the well side is stilted by an iron patten which is high enough to allow the casted limb to clear the floor.

The earlier treatment is begun, the better the outlook. Recovery with perfect motion occurs in about twenty-five percent of hospital cases; fifty per cent will obtain useful motion and the other twenty-five per cent will obtain practical fixation, but it must be remembered that results will range entirely according to the thoroughness of treatment, the severity of the disease in the individual case, and the natural resistance of the child. In general, the hip should be fixed as long as it is sensitive, it should be protected and distracted as long as there is muscular spasm, and protected until the congested and inflamed bone of the epiphysis is replaced by firm healthy bone.

Tuberculosis of the Knee Joint

Tuberculous disease of the knee is next to the hip in frequency. It is a chronic destructive process of the epiphysis of the femur or tibia, or

it may start in the patella, head of the fibula, or primarily in the synovial membrane of the knee joint. The condition presents two distinct types; one, the adult type beginning as a chronic synovitis, of which the early symptoms are subacute; and the other, the childhood or most common class, in which the symptoms of pain, muscular spasms and deformity seem to indicate clearly a primary disease of the bone.

Symptoms.—This disease is commonly known as “white swelling” and the symptoms as a rule are quite characteristic. The affection begins with a limp and limitation of motion, and is usually slow in progress with periods of severe pain. There is usually much swelling and this together with the distortion of the limb by muscular spasm and atrophy of the muscles both above and below the joint, gives a most characteristic knock-kneed appearance. The affected limb is usually longer at first, owing to the congestion of the epiphesis of the knee. Local heat is always present in the more acute stages and the lameness is usually a constant symptom. The differential diagnosis from other joint troubles is easy because of the slow insidious onset.

Treatment.—Like other tubercular bone conditions the fixation treatment is best. Rest in bed with a Buck’s extension to overcome the deformity and the local application of hot packs until the acute symptoms have subsided, is the best preliminary treatment of this condition. Five- to ten-second exposures to the X-ray each day for ten days seems to relieve the pain and in most instances causes less marked infiltration of tissues.

When the acute stage has subsided, the ambulatory treatment by fixation in a plaster of Paris cast extending from the groin to the ankle, with about 10 degrees flexion, is most efficient.

The patient is allowed to walk about with the aid of crutches, having the shoe on the sound side stilted enough so that the diseased limb clears the floor. The functional results after conservative treatment are in the average case excellent, that is providing proper treatment is begun at an early stage. Useful motion is obtained in fifty per cent of these cases, perfect motion is restored in twenty-five per cent, and complete rigidity results in the other twenty-five per cent of cases.

Any chronic, painful inflammation confined to a single joint, in which motion is limited by muscular spasm, and in which there is a tendency towards deformity, is almost always tubercular in character.

The Plaster of Paris Bandage

The plaster of Paris bandage was perhaps first applied by Kluge of Berlin in 1829, but to the Dutch physicians Mathysen and Vander Loo belongs the credit of the modern bandage.

It is imperative to give, in this chapter, a detailed and complete description of what constitutes a properly made plaster of Paris bandage and the application of it, in order that the general practitioner may become familiar with its use. Even though one cares not to treat the conditions heretofore enumerated, I have found that for fractures of almost every bone in the body requiring immobilization, the plaster bandage properly applied is far superior and rather to be preferred to any other form of splints.

It has been used very little in the past in private practice because the ordinary commercial bandage found in any supply house does not come up to requirements, in that it is usually air slaked or the plaster has been shaken from it by the time it is received. Then too the mesh is too closely woven and the plaster lies on the bandage instead of in the meshes and there is, in consequence, an excess of plaster; also as a rule the bandages are rolled so tightly that the water does not reach the deeper layers.

The ordinary plaster of Paris bandage made in your own office can always be successfully applied because the right quantity of plaster can be incorporated in the bandage and it can readily be made into the desired widths. The plaster of Paris to be used should be of the superior quality used by dentists and should be of the quick setting kind. It can be procured at almost any drug store but the surest place for quality will be your dentist.

Absolutely, the only kind of gauze to be successfully used is white crinoline of the ordinary variety used by dressmakers and obtainable at any dry goods store in twenty-four yard bolts. It is especially desirable to get a kind not too rich in starch or dextrin and of a mesh running about one hundred holes to the square inch.

The bandages should be made in six yard lengths, and of widths ranging from three to five inches according to the part that is to be cast; for instance the three inch widths are most suitable for casts for the extremities, while the larger ones serve best for conditions of the spine. After the length had been measured and cut the desired widths can be torn the full length without trouble. The edge of the crinoline nearly always frays out and naturally will become so entangled as to prevent

rolling in the plaster or as to hinder the free unrolling of the bandage when applying it. To prevent this, three threads should be plucked from each side of each strip before starting to roll in the plaster.

A hard surface of, at least, two feet in width should be used on which to roll in the plaster. Starting at one end, a handful of plaster of Paris is rubbed into the crinoline with the palmar surface of the hand, bearing down hard, so that all excessive plaster passes to either edge of the bandage. No more plaster should be rubbed into the crinoline than the meshes will hold, and as each successive yard is incorporated with the necessary amount of plaster, it is loosely rolled in such manner that in the center of the bandage there is a hollow cylinder of the thickness of the index finger, and the concentric layers are easily movable on one another. This manner of rolling permits of the rapid and uniform spread of water through the bandage when it is to be applied, and prevents parts of the bandage from being insufficiently moistened.

The general practitioner should always keep on hand about a dozen completed bandages that he is most accustomed to using in his daily practice. These should be corded as it were, to prevent unrolling, in an air tight container, either of glass or tin in the bottom of which is placed a small quantity of plaster of Paris, and should always be kept in a dry place. I have never found either a nurse or an office girl who could not make these bandages successfully so that in the future there is no excuse for a practitioner not using this superior form of splints.

The Immediate Use of the Bandage

While plaster of Paris is in no way harmful to either garments or surroundings, both the operator and the assistants should be properly gowned and the floor covered with newspapers to prevent unnecessary soiling. It should be borne in mind that if a properly made bandage is used, which is squeezed to the extent of ridding it of an excess of water, very few drippings will be scattered and the whole procedure of the application of the plaster differs in no way from simple roller bandaging.

The number of bandages intended for use should be taken from the container and placed in a pan near the pail holding the water, in which they are to be immersed, in a position in relation to the pail that will guard against water being splashed upon the dry bandages, which would render them unfit for subsequent use. Water as hot as the hand will tolerate, as opposed to cold, facilitates setting. I do not recommend any chemicals to hasten setting, because a properly made bandage, prepared as above, of quick setting plaster sets in remarkably fast time.

The area to be cast should be encased in ordinary absorbent cotton of the thickness in which it comes rolled, putting an extra pad over all marked bony prominences, and a roller gauze bandage applied to hold it in place and snug to the part. Under no consideration do I advise the use of flannel bandage or the ordinary sheet wadding cotton that are recommended by some authors, because padding with these materials is always conducive to applying a cast far too tightly, especially in fractures where the swelling increases after application thereby causing constriction of the limb and interference with circulation. The regular absorbent cotton as padding beneath a cast is always best for it is almost impossible to apply a cast too tightly when it is used.

The bandage should be completely submerged on its side, and should remain so until the bubbles cease to come off, which time takes place most readily in the properly rolled dressing. When the bubbling has ceased, the bandage is lifted out of the pail and squeezed with the hands merely to free it of the excessive water, the end is found and handed to the operator ready to apply. No undue traction should be made in applying the successive turns of the bandage, though it must be remembered the cast should fit snugly to the part, and the ordinary rules of simple roller bandaging followed, except that the reverse spirals are unnecessary. The assistant should constantly rub the layers as they are applied by the operator, as this not only helps the cast to fit more snugly, but also makes the rough edges of the bandage adhere more firmly to the layer beneath, thereby making a smoother cast.

As a rule there need be no dread of an increased swelling beneath the bandage because usually several hours have elapsed after the injury before the physician has arrived and made preparations to apply the plaster. Indeed, one of the best means of limiting swelling after a fracture is the prompt application of a plaster of Paris bandage. If there is any concern that the cast is too tight, while the plaster is still soft it can be easily cut through the entire length with a knife, and thus relieve the pressure existing. Also it is a good plan to cut a window or opening over the sight of injury, which would in no way harm the object of the cast and would allow a gentle massage to the part. A neat finish may be given to the edges of a plaster cast by turning over the ends of the cotton, in cuff-like fashion and held in the grasp of the last few turns of the plaster at either end.

On clothing you will find it best to allow the plaster to dry before removing, while on furniture or the hands it is readily removed by washing off in warm water. The water in which the bandages were immersed

contains, of course, considerable plaster, and under no circumstances should this be emptied into a sink or waste pipe for it will certainly demand the services of a plumber. The water may be poured out on the ground and the paste shaken into a refuse barrel or ash pile. The best way to remove a cast is to moisten it with water or vinegar along the path of the knife. I might add that all patients are in constant fear of being cut either while you are trimming, cutting windows, or removing the cast, but because of the cotton padding underneath you will find that it is almost an impossibility. Care, of course, should be taken that the knife does not slip in any of these procedures and come in contact with the unprotected parts.

In general, for fractures of the extremities it is best to apply the plaster with the patient in the recumbent position to secure complete muscular relaxation, and the part to be cast should be supported by an assistant. It is also a general rule that in fractures of the shaft of the long bones, especially of the lower extremities, the plaster bandage should be applied to include the adjacent articulation and extend well beyond the joints.

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