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OUTLINES

OF THE

PRINCIPLES AND PRACTICE

ADOPTED IN

The Orthopædic Institution

OF

BROOKLYN,

BY

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1854.

PRINCIPLES AND PRACTICE

OF THE

ORTHOPHONIC

TO THE

MEDICAL PROFESSION

OF THE

UNITED STATES,

THESE PAGES ARE MOST RESPECTFULLY

DEDICATED

BY

THE AUTHORS.

PREFACE.

The private residences of patients afflicted with deformities of the body rarely afford those accommodations and advantages indispensably required for the successful treatment of such complaints. Gymnastic and orthopædic apparatus are, in general, too expensive for the means of single individuals besides involving difficulties in respect to their erection and proper management. Again, prompt and attentive nursing is absolutely requisite for the attainment of favorable results in any medical treatment, and especially so in orthopædy, where every thing depends on the strict and minute execution of a certain curative plan. That competent nurses are more likely to be found in orthopædic institutions, where daily opportunities are offered for their effectual training, there can be no doubt. Finally, it is essential, on the part of the surgeon, in orthopædic treatment, that he should be a thoroughly educated medical man, and be besides in the possession of special knowledge, practical experience and dexterity in orthopædic surgery; and but few medical practitioners can have met with the opportunity of acquiring this special knowledge, in the course of their scientific pursuits.

These, in short, are the indisputable advantages of large institutions in reference of orthopædic treatment.

After careful consideration and full estimation of the difficulties necessarily attendant on an enterprise of this description, Drs. Bauer and Barthelmess have undertaken to establish an orthopædic institution, which shall embrace all those advantages hardly procurable by even the most wealthy patient at his private house. The writers confidently trust that their establishment, calculated to meet a public necessity, will therefore find a ready support both from the profession and the public at large, and to their patronage it is recommended.

The principal requisites for the prosperity of an orthopædic institution, are approval and co-operation on the part of the medical profession, and these the writers confidently trust they shall deserve and acquire.

The previous experience of Drs. BAUER and BARTHELMESS, at the Medical Colleges and Hospitals, both of Germany and England, and their literary productions, will be a guarantee of their competency for the task they have undertaken.

The orthopædic institution will be based upon a strictly scientific plan, and the proprietors will avail themselves of all those auxiliary means which the advancement of modern surgery affords. All mystery is repudiated in the institution, and the members of the profession are respectfully informed that it is open to their inspection at all times.

The authors would feel particularly obliged to the medical attendants of patients entrusted to their care for any information as to the cause and development of their respective deformities.

To medical students a rare opportunity will be afforded of studying the nature of deformities, and acquainting themselves with the means and rules for their effectual treatment. To further this object, the proprietors hereby invite them to attend the Dispensary of the Institution on Tuesdays and Fridays, from 3 to 6 o'clock P. M., when clinical lectures and instructions will be delivered gratuitously by the authors, who will also consider it their duty to publish to the profession an annual report of the results attained in the institution by their orthopædic practice.

As the writers may not be generally known to their medical brethren in this part of the world, they deem it but right to lay before them a *general* summary of their opinions and the means they adopt as part of their curative plan, as it is impossible, in a pamphlet of this nature, to specialize minutely the different modes of treatment required in various cases.

As is well known to the profession, deformities are the results of various and very often even contrasting causes; the same differences must, necessarily, exist in the choice of remedies for their effectual removal, and it is therefore obvious that a uniform plan of treatment

is only adopted by men utterly ignorant of the real nature of these complaints.

In the position that orthopædic surgery at present occupies, it is easily perceptible that the medical profession at large has not given to this important branch the attention it deserves, thus leaving it in the hands of empirics and medical impostors, who, of course, are more governed by love of lucre than by devotion to science or the afflicted. The consequence of this has been the establishment of mere abstract theories, on the part of really qualified medical men, and of ineffectual torture and empirical treatment at the hands of quacks; while the combination of sound theory and rational practice only can produce beneficial results. That this is the only safe and effectual plan of serving science and suffering humanity, may be adduced from the great results attained by some few eminent medical men in Europe, who have devoted their whole time and attention to orthopædic surgery. But the material advancement of orthopædy during the last decennium, important and considerable as it may appear, is by no means so extensive as to have rendered orthopædic treatment infallible; on the contrary, there still remain some deformities which are the very "noli me tangere" of the surgeon. In many instances he may be limited to a mere mechanical support or an amendment of the greatly distorted form of the body.

With the clearer and more thorough understanding of the nature of deformities, however, the curative resources of orthopædic surgery will greatly augment, and science and practice become more perfect and effectual. Who could have anticipated the rapid and amazing progress of surgery at large during the period of the last 25 years, and who can foresee what the next like period may hold in its lap? We may hope for the best, and meanwhile contribute as much as we ourselves, by individual attainment, labor and opportunity can afford.

OUTLINES, &c.

A considerable series of deformities may be safely traced to material alteration within the great nervous centres, and may manifest themselves either as increased or diminished innervation. The former will show itself in the muscles by more vigorous contraction, the latter is identical with the partial or total loss of muscular power, constituting paralysis. If the abnormally increased innervation is of mere ephemeral existence (spasmus,) it will cause but a transient deviation from the natural form, but if it is of a permanent nature, it will bring on a confirmed deformity, the patient thus becoming an object for orthopædic treatment. Increased innervation may affect a single muscle or a group of muscles, and having existed for some time, it will give rise not only to a permanent distortion of the limb, in the axis of motion of the affected muscle or group, but these latter will, by degrees, lose their bulk, become rigid, and will be converted into fibrous texture, with mere passive elasticity. The antagonist muscles are of course overpowered and unable to counteract the morbid contraction. Far different is the appearance in cases of muscular paralysis. There we find the muscles soft, flabby and by no means able to control the normal action of their antagonists, which consequently draw the limb in their respective axis of motion. While in the former case extension has to contend with great resistance and pain, and is hardly if at all to be effected by ordinary means, the surgeon may in the latter restore the normal form by mere manipulation, and may, by substituting mechanical appliances in place of the paralysed muscles, retain the limb permanently in its proper position and form.

To exemplify the diametrically opposite nature of the two conditions, namely, the increased and interrupted innervation as proximate causes of distortions, the authors need only refer to pes equinus. If this deformity is caused by active retraction, the lower part of the leg is thin, the tendo-achillis is expanded, and flexion of the foot is an im-

possibility. The patient touches the ground only with the toes or the anterior part of the sole; the heel is elevated and cannot be brought down. But if the pes equinus is caused by the normal contraction of the gastronemius and soleus muscles preponderating over the paralysed flexor antagonists, the foot may be brought to a right angle with the leg by the hand of the surgeon, and when walking the patient first places the anterior portion of the foot on the ground, then leaning forward to that side, he usually succeeds by means of the thus increased weight in pressing the heel down. The differential diagnosis of such cases is of great practical importance, for while in the former case tenotony may be deemed the principal remedy for removing the existing active retraction of the respective muscles, the same operation would, in the latter, only make bad worse.

The number of deformities originating in excessive innervation (otherwise abnormally increased reflex action) is by no means small; in fact most deformities consist in an active muscular retraction depending on this abnormal nervous influence—for instance, wry neck, club-flat foot and pes equinus, which are mostly attributable to that cause. We observe the occurrence of abnormal reflex action, however, most frequently in connection with diseases of the joints and their neighboring parts, so much so that hardly any malady of that description is totally without this complication. Thus muscular contractions accompany diseases of the shoulder, elbow, hip and knee joints, and become the source of most distressing deformities. Even the violent pains when affected joints are moved, seem to be partly dependant on the same cause. These are well known facts, and no longer questionable, though their minute pathology is still obscured.

Deformities caused by muscular paralysis are of rare occurrence, but by no means so rare as generally supposed.

Comparative anatomy and physiology of the nervous system, in connecuon with microscopic observation and experiment, has considerably advanced our knowledge on the subject, but in spite of all progress we are almost wholly in the dark in reference to neuropathology. Lamentable as is this state of things, orthopædic surgery nevertheless furnishes various agents to cure or correct distorted forms of the body, caused by either excessive or interrupted

innervation, although their modus operandi may be partially obscured. Thus we know, as a matter of fact, that gradual but permanent extension effectually counteracts and overcomes retracted and actively shortened muscles. Chloroform, moreover, proves to be a most estimable assisting agent for relaxing and extending such muscles. And where extension and chloroform fail, there the surgeon may boldly and with impunity cut the gordian knot by performing myotomy or tenotomy.

In paralytic cases the position of the orthopædic surgeon, however, is not so advantageous. The cure of paralysis is but rarely accomplished, for we know but little of the real cause of paralytic affections; and when we do discover it, it is rarely within the reach of remedies. Thus the surgeon is mostly limited to symptomatic treatment, and orthopædy can only amend the distorted form.

Another class of deformities originates in an abnormal nutritive process. The blood, as the sole medium of nutrition, can be too poor (anæmia) or may be stained with positive impurities (dyscrasia).

Anæmic blood being deficient in its normal constituents, supplies but indifferent nutrition to the organism, thus rendering it susceptible to all possible morbid influences. The bones, cartilages and ligaments especially lose their consistency, elasticity and power of resistance, and yield either simply to superincumbent weight or to prejudicial pressure or gait, thus ultimately leading to renitent deformities. This state of inefficient nutrition is rather more frequent at the age of puberty in females, in chlorosis specially; and it is not unlikely the principal cause of lateral curvatures of the spine so frequent at that period.

The state of the bones in rhachitis and osteomalacia is different. While in anæmia there exists a want of consolidation and energy in the system, a minus, so to speak, we find in rickets and mollities of the bones a considerable preponderance of animal matter over and above the calcareous salts. There is not exactly a positive want of lime, but merely a relative disproportion with the animal matter. The bones lose their hardness, turn soft, and can be made to assume any shape—thus giving rise to all possible deformities, especially in the diaphysis of cylindrical bones, and in the lower extremities where the

principal weight presses. The vertebral column is but rarely concerned in rhachitis, but is now and then deformed posteriorly, (cyphosis rhachitica.) Spinal deformities, in consequence of anæmia, are trifling objects when submitted at an early period to rational treatment; but when their long continuance has given rise to alteration in the form of the spinal vertebræ, little good is to be expected from any mode of treatment.

Some medical practitioners are of opinion that the "vis naturæ medicatrix" spontaneously corrects deformities caused by rhachitis. This is, however, a deplorable error, and by no means supported by facts. For as long as the bones are in a state of softness, they give way simply and mechanically to weight and pressure, and they may consequently be easily reformed by orthopædic treatment. If deprived of their elasticity, they cannot reassume their original form by themselves but only by the aid of mechanical appliances. But in the same ratio as the rhachitic bones regain their firmness and elasticity, their deformities will become the more firmly established, and thus placed beyond the reach of any correction whatsoever.

The series of dyscrasic affections of the bones, ultimately leading to deformities, is, unfortunately, very large. Nearly all scrofulous affections of the joints are accompanied by abnormal flexions, and the mere loss of osseous substance or the displacement of the bones seldom account for these articular deformities. They are mostly produced by morbid reflex action, and consequently of secondary origin. But now and then they may be caused by mere destruction of the bones, thus becoming, generally, incurable. Such is the case with the spinal deformities originating in caries of the vertebral bodies, as in Psoas Abscessus and Malum Pottii, and in very extensive and destructive ulcerations of the hip and knee joints. The latter cases are comparatively of rare occurrence, whereas those cases are numerous, in which the deformity is merely caused by muscular contraction.

Besides a constitutional tonic treatment, as special therapeutics prescribes, the surgeon should pay the greatest attention to the collateral symptoms in joint diseases, especially in those of an inflammatory and ulcerative character. The principal object in the treatment

of such cases is the proper placing of the affected limb as to rest, firmness and the most useful and advantageous position. This is generally a most painful operation, which has undoubtedly been dreaded by the old school. The anæsthetics, however, reduce it, for surgeon and patient, to a mere trifle.* Indeed every surgeon who has obtained some experience in the treatment of those diseases, will readily affirm that there is no better anodyne to alleviate the enormous pains of a patient than the proper placing of the affected parts. If, then, anchylosis should ensue, the limb will be comparatively useful, and this whole proceeding is, therefore, of the utmost importance.

Permanent extension, with the assistance of anæsthetics and eventually tenotomy and myotomy, have been found expedient and efficient remedies for deformities remaining after the various joint diseases; and the most astounding results have been realized by the judicious use of those means in France as well as in Germany.

The authors reserve their proofs for this assertion for the following special part of their pamphlet.

Another object of the surgeon should be the speedy termination of the articular ulceration, an object realizable by free incisions into the articular cavity, and into the tuberculous depositions within the cancellated texture. The great advantage of such a practice is cleanliness and the free elimination of the material cause and morbid product, pus, fragments of dead bones, cartilages, etc., which act in this state as foreign bodies. In fact, the infantile fear on the part of some surgeons of freely opening ulcerated joints, is totally unfounded, for the much-dreaded inflammatory reaction follows but the penetration of healthy joints, but by no means that of ulcerated ones, whose integrity is more or less destroyed, and thus have terminated their existence. Moreover, there are generally sinus leading into the articular cavity, permitting the free access of air without at the same time allowing the free exit to the discharge, which is just the great advantage of a free incision. The soundness of this practice has been proved beyond all doubt, in many instances, by John Gay and other British surgeons, and the authors had also ample opportunities to demonstrate the rationality of it by various cases.

A third class, which might be called static deformities, arises from permanent alteration in the normal equilibrium of the body. As this class principally concerns the spine—and the authors intend to explain their views more fully on this subject,—a few general remarks may suffice to direct the notice of the reader. Some physicians dispute the mechanical origin of spinal deformities, but, we believe, with very little hope of success. There are mechanical laws in full operation in the body, and are displayed by the slightest movements. Now it is a matter of fact, that the body is thrown temporarily out of its equilibrium by carrying weight on the front, the back or one side, and the same effects can be and actually are produced by the increasing or decreasing weight of either side, as is observable when hypertrophy and tumors, or atrophy and substantial loss (after amputation) take place. A different length of the lower members will also and necessarily tend to produce a deviation of the spine from its perpendicular, by mere displacement of the normal centre of gravity. For all static deformities two causal factors must be premised, first the permanency of the disturbed gravity in the body, and, secondly, a general debility of the system, which deprives the bones and cartilages especially of their normal elasticity, so that the superincumbent weight may force them to various prejudicial alterations of their respective form and size.

There are still some deformities which do not come under the three heads before enumerated; we leave them aside as not being curable or objects of orthopædic treatment: as, for instance, deformities remaining after fracture of a bone or dislocations of long standing. Other deformities may be of a more combined nature, the understanding of which, however, follows by itself from that before stated.

We hope, confidentially, that the reader will not accuse us of superficiality or too aphoristical brevity, as we do not intend, by this pamphlet, to exhaust the subject before us scientifically or practically, but to fulfil a duty to the profession in reference to the Orthopædic Institution.

Before we enter into greater length upon the special consideration of some deformities, we shall state our views on the practical usefulness and bearings of Gymnastics, the application of electricity and the

performance of tenotomy, which some orthopædic surgeons estimate as indispensable and most effectual agents in the treatment of deformities, while others point at them as superfluous if not even injurious.

Gymnastic exercises were first introduced by DELPECH, as an orthopædic remedy, and he applied them especially in lateral curvature of the spine, which he supposed to be the effects of an unequal development of the dorsal muscles. On the authority of DELPECH's commendations, gymnastic exercise came into general use both in France and Germany, while in Sweden LING founded his system of Kinesitherapy entirely upon it, and pretended to cure almost every disease in existence by gymnastics. Impartial observations tend to prove that gymnastic exercises accelerate respiration and circulation of the blood, increase the se and excretions of the body, cause a greater want of food with the subsequent improvement of assimilation and nutrition, render the innervation of the voluntary nerves more intense, promote the growth of the muscular bulk and augment the energy and physical power of the body in general, demonstrable by the dynamometer. Provided that the gymnastic exercise is performed in the open air, and that the increased expenditure of nutritive fluid is promptly replaced by food in sufficient quantity and desirable quality, it may be safely resorted to as a most excellent auxiliary remedy for certain therapeutical purposes, and certainly as an exceedingly valuable and commendable agent for the physical development and education of delicate children; gymnastic exercises, however, are too powerful a remedy to be applied in deformities without the utmost caution and the minutest discrimination of the case. It should be borne in mind that active exercise is identical with the multiplication of local weight, thus becoming directly obnoxious in those cases where the bones and the fibro cartilages are in a state of softness, and partly deprived of their elasticity and power of resistance. It should further be remembered that the surgeon has it not in his power to limit the gymnastic exercises upon single muscles, but that they generally put in action one or more, and, very often, antagonistic groups of muscles, thus including muscles which he has an interest in keeping at rest. Gymnastic exercises, discriminately chosen, especially the so called passive Gymnastics and those in the recumbent

position, may, however, often be employed with beneficial results, although it is hardly to be credited, that these exercises, by themselves, should have accomplished orthopædic cures, as has so often been asserted.

The authors have frequently observed that, in cases of flexible lateral curvature of the spine, the youthful patient, after two hours' use of moderate but general gymnastic exercise, had actually lost one inch and even more of his former height, whereby the deformity of his spine was increased proportionately; while, on the other hand, the height of the same patient increased remarkably by rolling his back over a cylindrical pillow, the arches of his spine diminishing in reverse ratio. It follows, therefore, that gymnastic exercise may be resorted to as an orthopædic remedy with the greatest benefit to the patient, provided that due attention is paid to the individuality of the case and the direct effects of the chosen exercise. By no means should a dancing master or a quack be considered a competent director of gymnastic treatment of deformities.

The curative effects of electricity are different, according to the mode of its application. A continual electric current, to the authority of Magendie and Froriep, and to the authors' experience, produces a higher temperature, a greater perspiration and redness of the skin, and tends to invigorate and to promote the material interchange in the parts concerned. Paralysis, especially, caused by rheumatic affections, has been successfully treated by Magendie and others with applications of electricity, and may be resorted to in all those deformities with benefit which depend on interrupted innervation and emaciation of the members. Friction, kneading, inunctions of stimulating ointments, essences, etc., and the electropuncture, warm bandaging, cold douch, etc., will materially aid the effects of the continual electric currents.

The electric shock concentrates its effects, principally, on the muscles, and prompts them to contract. In this shape the electricity acts like gymnastic exercise, with the advantage of directing and limiting its influence upon those muscles only which the surgeon intends to put in action. To this point the writers have given considerable attention, and have attained an experience of some practical value. With

well directed electric shocks, in cases of flexible lateral curvature of the spine, the authors have succeeded in putting the spine instantaneously straight, and, by the aid of powerful batteries, have even bent the spine into the opposite position. As a matter of fact, the electric shocks, powerful and beneficial in their effects, may cause considerable injury to the patient if misapplied and misdirected, just so as gymnastic exercise at large.

As to tenotomy or myotomy, the indications for performing these operations are strictly limited, and the cases should be conscientiously selected, before the surgeon applies himself to these operations. The introduction of tenotomy and myotomy into operative surgery is highly creditable to the genius of STROMEYER; but the misapplication of the said operation has produced as much injury as benefit to the afflicted. A short time ago a surgeon might have boasted with impunity on the number of his tenotomic operations. In our day, when the rational indications are laid down, the surgeon would injure his reputation, and show himself an ignoramus in the profession, were he to do so. The introduction of chloroform has also greatly contributed to lessen the number of tenotomic operations.

If BORELLI is correct, that the motor power of a muscle depends on the length of its fibres, any operation tending to shorten those fibres must be injurious to that power. We know, by surgical experience and anatomical observation, that the moment a muscle is divided both the divided parts retract. This is not the case with tendons—the part connected with the muscle only retracts. This space between the retracted parts is subsequently filled up with fibrous tissue. Thus the muscular bulk becomes shortened, to the extent of the intermediate substance, and the motor power reduced in the same ratio.

On the other hand, deformities are complicated with congenital disease or accidental malformation of bones, abnormal state and displacement of the ligaments, with fibrous adhesions and cicatrices: it is thus apparent, that gradual extension and the subsequent orthopædic treatment is the principal part of the cure, while tenotomy is merely an auxiliary agent to remove the muscular portion of the deformity. If, however, gradual extension and the occasional use of anæstetics have proved ineffectual, which is always the case with muscular contractions

of long duration, the muscles being disorganised, partly converted into fibrous tissue, thus having lost their vital expansibility, and being reduced to mere elasticity of their tissue, then tenotomy becomes indispensable, and should be performed without regard to the motor power of the muscles concerned.

Beyond these defined cases, tenotomy is unnecessary, irrational and injurious, and cannot be too severely censured.

WRY NECK—Caput Obstipum.

This deformity is mostly of congenital origin, and results, in the majority of cases, from active retraction of one of the sterno-cleido-mastoid muscles. The same muscle on both sides is seldom shortened, but when that occurs the head is bent forward, the chin approaching the sternum, and the cervical vertebræ are consequently projected posteriorly. Wry neck can also be the consequence of inflammation and suppuration of the scalenic and some other cervical muscles. Even extensive burns, and subsequent cicatrization, with material shortening of the integuments, have been the proximate cause of caput obstipum. The diagnosis is simple, and requires no explanation. As to treatment, it must be remarked that mechanical appliances meet with some difficulty. It might, therefore, be not worth while to try them in simple cases. The subcutaneous dividing of the tendon of the sterno-cleido-mastoid muscles in their sterno-clavicular portions, and the subsequent use of a piece of pasteboard round the neck, (Dieffenbach,) answers the purpose.

The scalenic and other muscles, when in a state of permanent contraction, may be also subcutaneously divided, and the extension effected by pasteboard: however, proper attention should be paid to the course of the various vessels and nerves which might cross the line of operation. It deserves to be mentioned, that gradual extension has been successfully applied in wry neck produced by most extensive burns; and Dr. Bauer has witnessed, in the Royal Orthopædic Hospital in London, a case in which mechanical treatment effected a perfect cure of a most distressing deformity within the space of one year. The mechanical treatment in these and similar cases deserves, therefore, the attention of the pro-

fession, and can be rendered still more effectual by the subcutaneous or transversal division of the cicatrix.

DEFORMITIES OF THE SPINE.

The spinal column can deviate from its perpendicular posterially, anterially, or laterally.

Posterior Curvature—*Cyphosis.*

In some countries, especially in the United States, posterior curvature is of frequent occurrence, and is the cause not only of the most distressing deformities of the body, but also the source of numerous secondary complaints.

Amongst the various species of posterior curvature, there are two forms which especially deserve the attention of the orthopædic surgeon. One of them occurs in apparently quite healthy, well organized and developed children. There is neither any trace of dyscrasy nor of any inflammation of the vertebræ; all collateral symptoms are to be traced to the displacement of, and the pressure upon the spinal cord and the intervertebral nerves.

As the patient generally survives the immediate effects of the deformity, and as the organism becomes gradually habituated to this state of the spinal column, there is but little opportunity for observing anatomically the primitive state of the spine in this species of posterior deformity. If, however, we critically analyze the symptoms, the means of the healing process, and the effects of a judicious treatment, we must necessarily come to the conclusion, that an infiltration and consequent softening of the intervertebral fibro-cartilages, with the subsequent loss of their elasticity and form, is the proximate cause, and that the bodies of the vertebræ but secondarily participate in the deformity, and assume, by constant mal-position, that wedgelike form which we find in post mortem examinations of persons who have died with this kind of spinal curvature. It is easily comprehended that, as long as there exists flexibility in the distorted part of the spine, the deformity will increase or decrease according to circumstances.

The authors thankfully acknowledge the reception of a most

important pathological specimen from Dr. SAYRE, fully corroborating the views set forth by them. The said specimen consists of the lower portion of the spine, comprising the five inferior thoracic, all lumbar vertebræ and the os sacum. Patient had died from the ultimate effects of caries of the second and third lumbar vertebræ, and consecutive destruction of the adjacent integuments.

The lower surface of the second lumbar vertebre is more superficially, the superior surface of the third, however, more substantially disintegrated by caries. The corresponding intervertebral cartilage is almost entirely gone. Besides a small carious excavation on the lower margin of the eleventh thoracic vertebral body, surrounded by eburnated dense osseous tissue, into which the pareurhyma of the cartilage enters, there is no other caries perceptible. But all intervertebral cartilages, the first of course excepted, are mollified, apparently disorganized and of pulpous consistency, their elasticity being entirely annihilated. There is no trace of inflammation, nor are their tubercular deposits discoverable. The bones are of healthy appearance, but are engorged with lymphatic fluid; whereas the cartilages have lost their steel-color, being rather white and glassy. Under the microscope examined (Prof. Dr. ALLONZO CLARKE kindly lent us his assistance) some portions of the cartilage had retained their fibrous structure, others presented rudiments of fibres and elongated cells only, and still others were perfectly disintegrated into elongated and nucleated cells. Besides many fat and blood globuli, nothing else was observed.

It is evident that the disease had commenced with mollities of the intervertebral cartilages, and had gradually extended to the vertebral bodies, for we see but a limited extent of carious affection of the bones, while all the cartilages are involved in the softening process. It is worth mentioning that the spine is almost straight, owing to the constant recumbent position the patient had maintained during the last six months; had he not thus nutralized the superincumbent, he would most certainly have got a posterior curvature of great extent.

Nothing is more prejudicial to the effectual removal of posterior

curvature of this nature than the erect position of the patient, in which the weight of the head and superior members continually presses upon the distorted spine, thus necessarily increasing the deviation from the perpendicular. Constant horizontal position is, therefore, an indispensable necessity, with which the treatment should commence. Constructing an apparatus for the support of the spine to enabl the patient to walk in the erect position, is at least a delusion, for reasons which hardly need any comment, because, first: pressure upon the projecting parts of the spine cannot be born by the patient for any length of time, neither in the erect nor the recumbent position; for the skin over the spinous processes would excoriate, and even inflammation of the vertebræ has been observed to follow undue pressure. The practice which the authors have adopted in this species of deformity, is as follows: first, they try to ascertain whether the spine, in its deviated portion, is still flexible, which they do, generally, while the patient is under the influence of chloroform or ether, to arrest any muscular interference. A consolidated spinal deformity is beyond any orthopædic aid, but also beyond the possibility of increasing. The curability of posterior deformity depends, of course, on the degree of existent flexibility. The recumbent position is considered indispensable, and is continued until all undue flexibility has disappeared. The spine is kept perfectly at rest by a cuirasse, made of copper wire, which exactly fits to the posterior half of the trunk, and by no means interferes prejudicially with respiration and digestion. In conjunction with this instrument, the patient is horizontally suspended some hours every day, while the head and legs are used as appropriate weights for spinal extension. In the meanwhile, frictions, cold douch and bath, cod liver oil, animal food and the frequent enjoyment of fresh air, are brought into use, in order to accomplish the consolidation of the spine as speedily as possible This treatment has proved to be exceedingly beneficial and effectual in incipient, and even in advanced cases of posterior curvature of this description; and the authors have just now two instances in the Orthopædic Institution which exemplify the efficacy of this treatment, which is at the same time mild, and even pleasant to the patient.

The other form of posterior curvature is the unmistakable consequence of scrofulous or tuberculous affection, resulting in material alterations of the cancellated tissue of the vertebral bodies, inflammation and ulceration occurring within it, which form abscessus, discharging their contents at the surface. The commencement of this disease (malum pottii) is, therefore, in the cancellated portion of the spine, and the deformity evidently manifests either an alteration in the consistency *of the spinal vertebræ or a substantial destruction.* When the disease makes its first appearance, in the shape of local pains and projection of the spinous processes, it is generally advanced beyond the limits of orthopædic aid; at least the authors are at a loss to conceive any remedy to check the progress of the malady going on within the spine. Derivation up to artificial issues and actual cautery, have been and are still resorted to by some surgeons, but as daily experience shows, with but little result. The issue, of whatever description it may be, can neither eradicate the fundamental dyscrasy, nor the specific deposits formed within the cancellated tissue. The latter, on the contrary, will eliminate to the surface, and must do so for the ultimate restoration of the patient, whatever difficulties may be placed in the way of the operations of nature. On the other hand, issues must necessarily tend to enfeeble the system still more, and deprive the constitution of that power which cannot be dispensed with for the successful termination of the disease.

On this account the writers have entirely dispensed with derivation of every description, in as far as the malum pottii is concerned, and confine themselves to a treatment which is calculated to keep and build up the general system of the patient, and which allows the free and easy escape of the discharge in the shortest possible way. The methodus restorans (animal food, wine, beer, good air, quinine, iron, cod liver oil, etc.) answer the purpose, being at the same time the most successful anti-scrofulous and anti-tuberculous remedies. As a matter of course, no attempt should be made to reduce the deformity; any such attempt would necessarily tend to risk the life of the patient. Indeed, it requires but little consideration to ad-

mit that this plan is as sound as correct, just so as if an architect would straighten an arch made of wedge-like formed bricks. He will rather succeed in breaking the arch down, but not in lessening its tension. If nature succeeds in effectually healing Potts disease, she deposits around the affected portion of the spine a quantity of osseous substance which forms those natural splints which are known under the term of osteophytes, and by which the spine is perfectly anchylosed and rendered inflexible. The orthopædic surgeon should therefore co-operate with the operations of nature, by keeping the patient in the constantly recumbent position, and in an apparatus which, without causing the least pressure or inconvenience whatsoever, at the same time keeps the spine perfectly fixed, whatever movement the patient might make: and, indeed, these are the most appropriate means for preventing the increase of the spinal projection. The copper wire cuirass, which the authors have already mentioned under the last head, realizes completely the indications for the local treatment before stated; provided that the instrument is made to a cast of plaster of Paris representing the exact form of the patient. The authors, however, candidly confess that there are severe cases of Potts disease whose extent and intensity are beyond any effectual treatment of whatsoever kind it may be, and as a proof, they refer to an article from their pen in the first number of the New-York Journal, vol. x.

Anterior Curvature—*Lordosis.*

This deformity is, generally speaking, of a more consecutive nature, and accompanies the posterior curvature, mal-position of the pelvis with an increase of the angle of inclination, as it is observed in hip-joint disease, etc. The treatment is, therefore, identical with the primitive maladies, of which lordosis is but a collateral symptom.

Lateral Curvature—*Scoliosis.*

The lateral curvature has for nearly two centuries been the object of most scrupulous and conscientious inquiry, both as to its nature and treatment, and the numerous hypotheses on lateral curva-

ture, show sufficiently how much this deformity has baffled the understanding of most acute observers. It cannot be said that up to DELPECH there has been any opinion on the subject which was generally adopted by the profession, nor was there any systematic plan of treatment in existence. Some surgeons thought that the deformity was caused by primitive mal-formations of the bones; and they followed, exclusively, a mechanical treatment, which was as cruel as absurd, and inefficient in its effect. We may only refer to the numerous stretching apparatus and mechanical beds which have been invented and made use of, much to the discredit of the profession, during the last and the earlier part of this century. Other practitioners followed the other extreme, considering scoliosis to be a mere constitutional difficulty, and disavowed, consequently, all local symptoms and their treatment. There was hardly any opinion, or any treatment which was not tried against this most distressing deformity. In this period of utter orthopædic helplessness, and, perhaps, provoked by a most lamentable mal-practice, both by physicians and quacks, the talented French surgeon, DELPECH, took the subject in hand, and devoted time and labor to its elucidation. He believed that the unequal development and power of the dorsal muscles were the exclusive cause of the deformity under consideration, and recommended gymnastic exercises as the sole and most effectual remedy for its removal. DELPECH'S well deserved and well established reputation, in conjunction with his forcibly propagating that theory, could not fail to effect within the profession a general conversion, and gymnastic orthopædic institutions became numerously re-established. The bearing of DELPECH'S theory was put to a fair test, but did by no means realize the enthusiastic expectations of its adherents. Another period of despondency followed DELPECH'S suggestions, when GUERIN, so to speak, in the eleventh hour, attributed all lateral curvatures to active retraction on one side of the dorsal muscles, and suggested not only, but performed myotomy of the premised shortened muscles. A short period had elapsed, when even GUERIN laid before the Royal Academy of Medicine, in Paris, a statement on the results of his new operations, which were of course highly favorable, and asserted the accomplished cure of

many patients afflicted with scoliosis. Bouvier and other talented surgeons in France, discarded however the statements of Guerin, proving by Guerin's own cases that the said patients were rather in a worse state after the operation than before, and that at all events, no cure had been consummated. Similar unsatisfactory results followed the myotomy of dorsal muscles in Germany and England; thus it was discontinued. The merits of Guerin for the effectual treatment of lateral curvature, are however indisputably established by his introducing the counter-pressure upon the most projecting parts of the spine, as a new mode of extension. Bouvier, Malgaigne, in France, and Buehring and others in Germany, have sustained this mode of treatment, and it might be said that counter-pressure is considered in our days as the most effectual and beneficial mode of treating lateral curvature.

It would require but little exertion to show the utter fallacy of the old views; but this is beyond the object of these pages, and better left to a more complete literary enterprise. The authors believe they are doing their duty to the profession in stating their own views on the subject, and the plan of treatment which they have put into practice within the Orthopædic Institution.

As a matter of course, the authors exclude from the subject now before them all those lateral curvatures which are of a more consecutive nature,—as for instance, the curvature dependent on declivity of the pelvis, etc.,—and restrict themselves to the idiopathic form of scoliosis.

Above all it must be stated that the spine of both the fœtus and the new born child, is perfectly straight and shows no deviation from the perpendicular of the body; but when the child assumes the erect position and commences to walk, the spine, by degrees and progressing age, gets those four curvatures, namely—in the cervical and lumbar portion towards the front and in the thoracic and several towards the back, which are generally known as the physiological curves of the spine. The full comprehension of this alteration in the direction of the spine, is of greater practical use than it may appear in the first instance; for as long as the child is carried about, the weight of the head and the superior members,

as well as the weight of the large organs of respiration, circulation, and digestion, rest on the back of the child horizontally, and have no influence upon the spine whatsoever. But the moment the erect position is assumed, the weight of the various parts just enumerated, presses either vertically upon the spine, or pulls on the spine anteriorly. The spine is at that period as flexible as a piece of whalebone, and yields in the same ratio and direction of the weight annexed. Most unquestionably are those physiological curves, especially towards the back, likewise calculated to increase the capacity of those cavities which they partly enclose. But it is of great practical moment, for the comprehension of abnormal curvatures of the spine, to understand the mechanical cause by which the physiological curves are governed. According to the most minute inquiries of the brothers WEBER, physiological curves of the spine are entirely at the expense of the intervertebral fibro cartilages; for a minute comparison and measurement of the vertebral bodies show perfect parallelism of their respective surfaces, while the intervertebral cartilages assume gradually a wedge-like form, being rather compressed, and consequently thinner at the cavity, and rather expanded and thicker at the convexity of the said curves. Some orthopædic surgeons, especially Dr. BUEHRING, of Berlin, have proved, and the authors by their own experience and experiments corroberate the fact, that there are still two more physiological curves laterally in existence, and to be observed almost in all adults: one of the latter is towards the right side, in the thoracic portion of the spine, and amounts to about one or two lines from the perpendicular; the other is in the lumbar portion of the spine, and is of a lesser extent. According to BUEHRING, the greater weight of the heart in comparison with the right lung, and its continual powerful actions, account for the former, while the greater weight of the liver in comparison with the spleen, accounts for the latter. The co-existence of these two physiological curvatures is, indeed, the only and apparent cause of the frequnt occurrence of lateral curvature, to the right in the thoracic, and to the left in the lumbar portion of the spine.

Dr. BUEHRING met but with a very small fraction of thoracic cur-

vatures towards the left; and the statistic tables of the Royal Orthopædic Hospitals in London, show the proportion of 99 of the former to 647 of those to the right. These facts, augmented by the authors' own careful and minute observations, justify, therefore, the supposition that those just described physiological curves are to be considered as the principal predisposing cause of lateral curvature. This, however, *by no means, excludes* the possibility of still other causes, which on the contrary exist in considerable number, and which are of course to be ascertained, and if possible, to be removed, if the treatment is to be attended with any beneficial effect.

Another essential point in the consideration of lateral curvature, is the remote cause. Now it strikes every one who has ever given a thought to the subject in question, that lateral curvatures almost always occur in young, feeble, and anæmic individuals, especially in females at the period of puberty, and with those whose menses are not regular. It appears, therefore, as if a poor state of the blood most essentially contributes to the producing of lateral curvatures. Considering that a debilitated state of the hæmatosis is identical with an inefficient nutrition of the organism, and that an inefficient nutrition is necessarily accompanied by laxity of all the tissues, it is evident that the bones and cartilages in general must be below their normal elasticity, firmness, and power of resistance, and that they therefore yield far more to the superincumbent weight, than well supplied osseous and cartilaginous tissues would do.

Prejudicial gait, bad habits in reference to standing and sitting, carrying of weights beyond the muscular strength of the individuals, especially on the left side, as it is the case with nurses, must necessarily promote the establishment of lateral curvatures.

Another important point in reference to lateral curvature deserves the attention of the orthopædic surgeon: it is the twisting of the vertebral column on its longitudinal axis, to which Toerg, Guerin, and Buehring have first directed the attention of the profession. This twisting, or rotation of the spine, is to the reverse side of the curvature; thus we have in a given case as many rotations as lateral curvatures. And indeed the anatomical construction of the

spine, shows clearly that lateral curvature could never be accomplished unless this twisting pre-exists. We therefore find a spinal rotation not only in old, but also in recent cases of such deformities.

The most careful analysis of the symptoms attending lateral curvature, do not justify the supposition of any state of irritation or inflammation of any part of the spine. We must therefore entirely dispense with such an idea; neither are the muscles the cause of the deformity; for in sigmoid deformities, the longissimus dorsi dexter, for instance, occupies its place on the convexity of the thoracic, and on the concavity of the lumbar deformity; while, if the muscle was retracted, it could only lay on the concavity of the curvature, as pleurothotonos exemplifies it; besides, we are all aware of the negative results of myotomy. It appears rather as if the muscular parts on the convex sides were more in a state of tension and hypertrophy than those on the concave side, which becomes evident when a patient, with a flexible spine and afflicted with lateral curvature, is placed in a horizontal position, and the spine is stretched by counter-pressure. In such a case, the muscular group on the convex side relaxes in proportion as the curvature is reduced, and the muscular group on the concave side gets more extended, and consequently, projecting. For this phenomenon we have a feasible argument; for the more the insertion and attachment of a muscle are removed asunder, the more the muscle will contract to oppose the extension, and vice versa. Now it is indisputably clear, that the arch being formed by the deformity increases the distance between the two points of insertion on the convex side, and decreases it on the concave. This state has even baffled the most faithful adherents of GUERIN'S theory, and has led them to contradict one another, both as to the seat of the presumed muscular retraction, and to the myotomy performed.

The authors consider the intervertebral fibro-cartilages as the principal parts concerned in lateral curvature, and believe that the vertebral bodies are but subsequently involved—that the muscles and ligaments exercise but a subordinate influence, and may, in the treatment adopted, as well be ignored without materially affecting the results.

The authors' treatment consists principally in the following:—

1. Horizontal position:—It removes the superincumbent weight as one of the remote causes; thus facilitating the orthopædic extension, and stretching of the spine. Some orthopædic surgeons object to the recumbent position, in reference to the injurious effects upon the general health. But experience is stronger than arguments; for the authors had ample opportunity of observing the direct reverse in the orthopædic hospitals and institutions in Europe and their own, provided that good air, cleanliness, and appropriate food were abundantly allowed. They have observed that chlorotic anæmic females became blooming and strong, during the orthopædic treatment in recumbent position; they got even their regular menses, and all chlorotic symptoms disappeared.

2. Gymnastic exercises and the local application of electricity, in the shape of shocks upon the dorsal muscles, are deemed highly advantageous, but are used with the utmost caution, according to the rules which the authors have laid down at a former occasion. The application of electricity is, of course, to be made only upon those muscles which have an actual effect upon the deformity and increase the arches materially.

3. Position.—Just as the prejudicial and assumed gait and position of the body, in conjunction with a favorable state of the spine, can and do actually produce lateral curvatures, the continual antiplastic position of the patient can and does relieve the deformity, as WERNER, in his excellent work, "Grundzuege einer Wissenschaftlichen Oethopædie," has so admirably shown it.

4. Counter-pressure upon the most projecting and deviating parts of the spine, while the pelvis is firmly and immoveably placed. The apparatus of Dr. BUEHRING is, for this purpose, a most practical and effectual instrument, which is as easily applied as directed.

5. Spinal supporters, constructed on the same principle of counter-pressure, as BOUVIER, LONSDALE, BUEHRING and the authors have invented them, are to be used after the principal part of the cure has been accomplished, for the mere purpose of retaining the spine in its erect position. But it should be understood that these spinal instruments are by no means sufficient to cure a

lateral deformity, as it has been asserted and tried, to the greatest injury of the patient and to the discredit of orthopædic surgery at large. The authors firmly believe that the most perfect construction of spinal machines, in conjunction with unexceptional workmanship and the best adaptation of mechanical means, could not accomplish such an object. Far less can this be the case with spinal machines which are only calculated to raise the shoulders and ignore the spine altogether, as they are sold and applied by some quacks, and of which some specimens have been brought to the notice of the authors. If a patient, afflicted with lateral curvature, is, however, not possessed of the means and the time required for a radical cure, a well constructed spinal supporter may be resorted to with advantage for preventing the increase of the deformity.

6. Appropriate remedies, which tend to improve the hæmatosis, and the system at large, according to the individuality of the case, (cod liver oil, the preparations of iron, quinine, etc.)

The curability of lateral curvature, in general, is dependent on the degree of deformity, and flexibility of the spine. It can be safely stated that, as long as the vertebral bodies are not materially altered, the ribs have not undergone a great alteration in their shape, and the flexibility of the spine is still existent, the cure is not only to be accomplished, but even so in a comparatively short time.

It is, therefore, of the greatest importance to place such cases as early as possible under regular and systematic treatment. In no deformity is loss of time of more material consequence upon the cure than in this.

Before leaving this subject, the authors deem it their duty to dwell a little longer on the value of casts, as evidences of the increase or decrease of lateral deformities. Some persons who have assumed the orthopædic practice, have asserted that casts made of plaster of Paris and taken from the patient were the indisputable proofs of the actual state and degree of the deformity. Even some professional men, as, for instance, Guerin, have drawn the same deductions. This is, however, to speak leniently, simply erroneous and deceptive; for any flexible and well-formed spine may be

brought artificially and intentionally into a crooked state for some minutes, at all events long enough to be moulded and to serve as instrumentality for deception. The degree of actual deformity can also be increased by the position in which the patient assumes or in which he is placed. Thus it becomes evident that casts of plaster of Paris cannot be looked at as undeniable proofs for the progress or regress of lateral spinal curvatures. The authors, in moulding from their patients, have no other point in view than to get the casts for instruments and spinal supporters, to be made for their patients, with the assistance of which the fit and adaptation is by far more attained and secured. The manner in which the writers ascertain the degree of lateral curvature, is by means of an instrument invented by Dr. BUEHRING, which allows the most correct and, it may be said, mathematical measurement of the patient. A diagram may be made in half a minute by that instrument; it is, therefore, as reliable as expedient.

DEFORMITIES OF THE EXTREMITIES.

The various deformities which occur at the extremities, occupy a large part of orthopædic surgery. Most of them are the products of inflammatory process about and within the joints; they are consequently of secondary origin. Some remarks on the latter may be properly made at this place. The practice formerly adopted and followed in the treatment of inflammatory diseases of the joints, has satisfied neither surgeons nor patients; nor can it be said that it has been in strict conformity with the principles of surgery at large. There are but few works on the principles and practice of surgery, and even these few are of more recent date, in which proper attention is given to the most advantageous position in which affected joints should be placed; and that this is of material consequence every practitioner knows who has ever attended articular diseases. In reference to suppuration and ulceration of the articular cavity, it is laid down as a rule not to open joints, such an operation being slways attended with most serious and even fatal consequences, while abcessus of any other accessible part or organ should be opened as freely and as speedily as possible. We

look, also, in vain for any satisfactory solution of the origin and real nature of deformities, the constant results of these maladies. Nay, even the diagnosis of articular disease is generally based on imaginary distinctions, and but too often contradicted by post mortem examinations. Within the last few years, however, this department of surgery has been greatly enlightened by physiology, comparative pathology and by numerous experiments, and the old doctrines are gradually becoming annihilated by criticism and sound experience. The want of vitality which formerly served as a satisfactory excuse for the protracted course of articular diseases, no longer suits the skeptic palate of modern schools, nor will the want of exercise serve as a feasible argument for the origin of deformities consequent upon diseases of joints. It is also boldly asked why articular abscessus should not be opened as well as others, especially when experience affords ample opportunity for showing the fallacy of the old doctrines? With that skepticism the more thorough inquiry into the subject before us has become more general, and the results of scientific co-operation show at first sight how much this department of surgery has been clouded by fiction and unfounded hypotheses, for which no other proof is wanting than the large number of crippled and mutilated individuals in existence.

The writers claim their humble share in this scientific movement, and they unhesitatingly lay before the profession their views on this subject, which they are fully prepared to sustain when any opportunity offers itself.

First. *Diagnosis of Articular Diseases.*—Correct Diagnosis is in all diseases the indispensable basis for successful treatment, and for diseases of the joints especially. It is by no means indifferent whe her we have to contend with an inflammation with mere lymphatic or serous effusion, or with suppuration and ulceration of a joint. Nor is it without practical importance to know whether the immobility of a joint is caused by undue muscular actions, by fibrous adhesions, or by true osseous matter. It is also of great consequence to ascertain whether there is within the joint any crepitus, and whether the crepitus arises from bare bone, consequent

upon ulceration or osteo-phytes. But the ordinary means are not sufficient to substantiate a correct diagnosis, as the affected joint is, in general, so extremely painful, that the patient will not submit to minute examination. In order to avoid that pain, and to subdue all undue muscular action that might obscure the diagnosis, the authors resort to the anæsthetic inhalations of chloroform, with the best possible results. Thus they have succeeded in ascertaining the status morbi in many instances, and corrected the diagnosis of other practitioners, which appeared to be, without the services of chloroform, a direct impossibility. More than in any other joint, is this the case with the affections of the hip-joint; and it happens not unfrequently, that even eminent and justly esteemed members of the profession, are misled to premise dislocation of the femoral head, where, by the assistance of chloroform, it is clearly ascertained that undue muscular reflex action has forced the thigh bone into a position which simulated as near as possible a true dislocation upon the os ileum. In future, errors of this description are rendered impossible. The writers have very often made use of that great auxiliary without any disagreeable effect whatsoever, and they believe with Dr. Snow in London, that, provided no disease of the heart, the great arteries, the lungs or habitus apoplecticus contra-indicate its application, that the liquid is of a proper quality, and its effects are properly watched and controlled, chloroform may be resorted to with impunity, and without fear of any accident.

Second. *Placing the joint in a proper position* is the next object in the treatment of articular diseases. Indeed, nothing relieves more effectually the patient from his excessive suffering, and restores rest and comfort to him, than a good position of his affected member; moreover, it obviates the constantirritation of movement, favors the absorption of mild effusion, or the free discharge of purulent matter, allowing at the same time the formation of granulations, so desirable in cases of ulceration.

The best position to which a diseased joint should be speedily brought, is that in which its ligaments are least and equally expanded, in which the articular surfaces are in greatest contact, and in which the member will be ultimately most useful for locomotion.

If the effusion is of a mere lymphatic character, occasional passive motion* is commendable in order to prevent fibrous adhesions; whereas the joint should be kept perfectly quiet, in case of ulceration, that granulation may go on undisturbed, and anchylosis may become established. The easiest way of bringing the joint into the desirable position is under the influence of chloroform, which prevents not only pain, necessarily attendant upon such surgical proceedings, but removes at the same time all muscular resistance, which is sometimes considerable, and therefore a material obstacle.

The means of retaining the respective joints in their new position vary according to the case. In recent cases, splints made of wood, tin, leather, wire, or Dr. WELSH's patent splints, will answer the purpose; in old standing cases, mechanical contrivances, with extending power, are to be made use of.

It is comprehensible that a good position is the only and successful medium for preventing articular deformity, which would otherwise be unavoidable.

3. *Artificial Opening of Ulcerated Joints* becomes a question of great practical importance. We have already stated that the old school has pronounced its anathema on the practice of artificial opening, on grounds anything but rational and conclusive; and but few surgeons have had the boldness to disavow the old and adopt a new mode of treatment. For the purpose of substantiating the merits of both opinions, the authors feel induced to enter at some length into the controversy still pending.

The entrance of air into articular cavities is said to be attended with most dangerous reaction at the joint and its surrounding parts, followed by profuse suppuration and pyæmic fever, terminating generally fatally. BONNET attributes the rapid exhaustion of the patient to the poisonous nature of hydro sulphureted ammonia, which he has detected in the purulent matter of the penetrated joint, as well as in the urine of such patients. Many cases are on record, where perforating wounds of entirely healthy joints have

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* Of course, after the more pressing inflammatory symptoms have subsided.

healed by first intention, without difficulty, and even without the slightest inconvenience to locomotion; and although numerous experiments of opening articular cavities of animals tend to show that the free entrance of air into joints is by no means followed by any dangerous result, and the wounds almost always close spontaneously, when left undisturbed. This, however, does not contradict the fact, also firmly established by statistics, that, in the vast majority of instances, the accidental penetration of the healthy joint of a man is immediately attended by most violent inflammation and suppuration of the parts concerned, and that a rapid sinking of the vital powers terminates life, unless amputation is promptly performed.

On the other hand, it is equally confirmed that the majority of cases recover, where the purulent matter of an affected joint has spontaneously forced its way from within to without, the air at the same time freely entering the joint; no reaction, at least none with any violent and dangerous symptoms, have been observable.

Those contrasting results in apparently one and the same anatomical condition of joints may be easily explained, when we consider that in one instance there is a perfectly healthy joint, and generally a strong, or at least unimpaired constitution to contend with, while in the latter the joint has lost its integrity, the synovial membrane being ulcerated and sloughed, the articular cartilage thickened, corroded, separated in the shape of laminæ, or dissolved into exceedingly fine fibres floating like villi in the liquid; the bones disorganised, enlarged, infiltrated with morbid secretion, bare, and even in a state of necrocis: moreover, the patient emaciated, and in an anæmic or dyscracic condition.

Thus it is evident that the vulnerability of entire joints, in reference to penetrating wounds, is totally different compared with articular cavities, becoming gradually affected and destroyed under the influence of specific inflammation, and hence the fallacy of drawing inferences from one to the other. In fact, diseased joints have lost their integrity, have terminated their nature as such, and the healing process by means of adhesion, granulation, and true callus, shows clearly that it is merely to be considered as an osseous ulcer placed under mechanical difficulties as to its termination.

The preceding statement leaves no doubt that the spontaneous opening of ulcerated joints may take place without danger to the life of the patient. It remains now to show that that opening is beneficial, and contributes to a speedy recovery, provided that the opening is sufficiently large and allows of free discharge.

There is a principle in surgery—namely, that the formation and spontaneous breaking of an abscess depends on the energy of the system in general, and on the yielding of that structure, through which the formed pus has to force its way to the surface. According to this principle an abscess will be of less duration the stronger the constitution, and the softer and the more vascular the parts are which enclose that abscessus, and vice versa. Hence we meet, in general, with a most protracted development of abscess when the constitution is enfeebled or broken down, and when the matter has to force its way through fibrous tissues. This fact *principally accounts* for the long duration of the diseases of joints, the capsular ligaments being the principal obstacle to an early opening and speedy discharge of the purulent matter, it being within the articular cavity; for the fibrous tissue possesses merely elastic properties which yield but to a certain extent to extension and pressure. But large accumulation of matter within the joint, causing a considerable expansion of the capsular ligament, will gradually separate its fibres, and thus make its way to the surface. The opening thus formed will diminish in size consequent upon the elasticity of the said structure, and produce, to a certain degree, the same obstacles for the succeeding discharge. Now it is evident that the recovery of an ulcerated joint depends principally on the speedy removal of all morbid products formed within its cavity; the longer these products are detained, the more they must tend to set and keep up new inflammations, leading to more extensive destructions than the original disease had produced. Thus the total or partial retention of purulent matter within the articular cavity, perhaps mixed with fragments of sloughed cartilage, dead bones and tuberculous substance, which are of course beyond any possibility of resorption, will positively aggravate the disease and protract its termination. Due consideration of all these circumstances must

necessarily lead to the conclusion that the artificial opening of articular cavities, when in a state of suppuration and ulceration, is undoubtedly of most beneficial effect, and the result will be the more decisive the earlier and the freer the opening is effected. The profession cannot any longer be deluded by the high-sounding but thoroughly fictitious argument that decomposed matter in the joint was less obnoxious than pure air.

That practice has already been followed for some time by many eminent British (JOHN GAY, Esq.) and German surgeons with most satisfactory results; and the authors have, in the course of the last three months, opened four knee and two hip-joints, which are doing well and about to close by healthy granulation. Our talented friend, Dr. SAYRE, Surgeon of Bellevue Hospital, New York, has obtained the same excellent results by free bilateral incisions in various joints. Dr. ROSER, Prof. of Surgery, the enthusiastic advocate of resection, has lately expressed his belief to the effect, that the success obtained by partial resection of joints might be safely attributed to the freely laying open of articular cavities.

Thus far has experience decided in favor of the new practice.

It is by no means easy to determine, in any particular case, whether the opening of an articular cavity may be advantageously performed. Very often there is already an opening formed which leads into the joint, and which requires only to be enlarged and a counter opening made. To other cases circumstantial diagnosis will prompt the practice. Is the patient of scrofulous appearance, the articular affection of some standing, is there fluctuation and crepitus within the joint perceptible, and pyæmic fever manifest: the authors deem such symptoms a sufficient indication to proceed with the operation. Local baths, or injections, with a mild solution of potash or nitrate of silver, are subsequently made for the purpose of cleaning the articular cavity, and of assisting the process of cicatrization. As a matter of course, the joint is kept during the next period in an advantageous position, according to rules already laid down, and the general health is carefully attended to. If the opening should close too early, it is to be enlarged, and free issue of the matter is to be promoted, un-

til the granulation covers all parts of the joint, especially those previously ulcerated. The ultimate result of this treatment is by no means invariably a true annylosis; but, on the contrary, partial mobility of the joint thus treated, may be retained by occasional and gentle passive movements, as after partial and total resections of joints.

4. Deformities attending inflammatory diseases of joints, have been erroneously attributed to volition and to want of exercise. In the very beginning of such diseases, we do find already a remarkable tension of some muscles, generally of flexor and adductor muscles. This tension grows gradually more intense, a shortening of the muscular bulk becomes perceptible, and thus deformities become established. Volition may have its participation, but is, by no means, the sole or principal cause of muscalar retraction, for the patient has no power of preventing it, even with all his exertion of mind; and, during sleep, where the will is dormant, the deformity is retained in its full extent. The want of exercise is also a very insufficient and unsatisfactory interpretation for muscular shortening of this description; for we observed the latter, as has been stated in the earliest stages of articular diseases, when the want of exercise can not yet come into consideration. We must, therefore, look out for another proximate cause; and the authors believe to have found it in undue reflex-action of the diastaltic spinal system upon certain groups of muscles being excited by the irritation of the joint. Rest and disuse of a limb may bring on stiffness of the joint, relaxation and weakness of the muscles; but the deformities of the joints evince clearly a positive permanent action and retraction of certain muscles. This state shows a plus, an active moment, and by no means inactivity. If will, or the want of exercise, do not cause that positive retraction, it can but be produced by undue action of the involuntary diastaltic nerves, similar to that found in spasms, epilepsy, trismus, tetanus, and the whole species of neurosis. Even the violent pain which accompanies joint diseases, appears to be founded on that reflex action, and principally connected with the intense shortening of certain muscles; for the characteristic pain in the knee joint during the acute period of hip and knee joint dis-

eases, disappears when the patient is placed in a proper position, and the unduly retracted muscles perfectly extended. The authors have made the same observation in cases where the actual disease had terminated five and ten years previously; for when the patient was placed under orthopædic treatment for the purpose of removing the deformity, that pain returned most intensely at the commencement of extension, and abated with the succeeding yielding of the retracted muscles.

In the preceding pages the authors have tried to lay down their mode of practice in the local treatment of inflammatory and ulcerative diseases of the joints; they have also explained the reasons on which their practice is based. In every other respect, they resort to those remedies which the true principles and practice of surgery inculcate, and which need no specification.

The unsettled state of opinion in reference to the affections and resp. deformities of the hip-joint, render it particularly desirable for the authors to express their views on the subject; but they will restrict themselves to the practical part.

The diagnosis of the diseases of the hip joint, is one of the most difficult objects of the surgeon. The hip joint is surrounded by very thick, large and powerful muscles, which render the manual examination of the joint a matter of great difficulty; and the symptoms which have been considered as infallible guides for the correct comprehension of hip diseases, are any thing but positive. Pain, heat, swelling, fluctuation at the joint, may be attributable to many other diseases than those of the joint itself. Nor can it be said that the elongation or shortening the abduction, adduction or rotation of the affected limb, are infallible proofs of the existence of an affection within the hip joint; for SABATIER and BONNET relate cases in which not the least mal-position of the affected member was visible, and, nevertheless, they found extensive ulceration and destruction of the hip joint. On the other hand, experience has furnished numerous cases where mal-positions of leg and pelvis were present, the hip joint at the same time being perfectly healthy.

We meet with the same uncertainty in reference to the degree and development of that disease. A considerable shortening of the leg,

with some other co-existing symptoms, have been considered undeniable proofs of spontaneous dislocation of the femoral head, while the simple application of chloroform enables us to show the fallacy of such supposition. Even those crater-shaped ulcers about the hip joint, do not serve as positive symptoms of an affection of the femoral head, because they are also observed as the outlets of subfascial sinuses. Errors in reference of the diagnosis of hip joint disease may, therefore, be committed by even eminent surgeons, whose scientific and practical capacities cannot be questioned.

In no part of surgery, therefore, is the new diagnostic auxiliary of greater value and importance, than in the diagnosis of hip joint disease, and its merits cannot be highly enough estimated.

There are but two symptoms in the commencement of hip joint disease which are reliable, namely,—fixed pain within the joint, produced on rotation of the affected member, or on pressing the femoral head into the acetabulum, and the perfectly fixed position of the thigh bone with the pelvis. The latter sympton is of the greatest semiotical importance, and the authors have never found it absent in a great number of cases which have come under their observation; they have met with it when the patient has complained but few days, and it accompanies the disease throughout all its various phases. All movements which ought to be executed by the concerned limb, are made by the pelvis on the lumbar portion of the spine. If, however, the disease has advanced to ulceration of the caput femoris, or the acetabulum, crepitation will be felt when the leg is moved within the joint by the assistance of chloroform. This latter symptom is to be considered decisive. All other symptoms are merely auxiliary for the diagnosis of hip joint disease, although their co-existence must necessarily facilitate the diagnosis.

Formerly, and by some authors, the elongation and shortening of the leg, have been estimated as invariable phenomena of hip-joint disease in its second and third stage. The former was said to indicate either an enlargement of the caput femoris, or an effusion within the articular cavity; the latter a spontaneous dislocation of the head of the thigh bone upon the os ilium. This interpretation

of the said symptoms has, however, been found erroneous. Gœdichen and Bonnet have clearly proved that elongation, as well as shortening of the leg, were entirely dependent upon mal-position of the pelvis and the affected member; the elongation arising from lowering the pelvis on the morbid side, combined with projection to the front, and abnormal flexion, abduction, and outward rotation of the limb; while the shortening was caused by the reverse mal-position of both pelvis and member; the pelvis being at the same time rotated on its transverse axis, and its angle of inclination with the horizon thus considerably increased. This opinion has been corroborated by Lorinser, Buehring, Malgaigne, Bouvier, and John Bishop; and Prof. March (Albany) has, in forty museums which he has seen both in Europe and the United States, not met with one pathological specimen of hip joint disease in which the femoral head had totally left its acetabulum, and capsular ligament assuming a new position upon the dorsum ossis ilii. These inquiries, however, do not exclude the possibility of dislocation consequent upon hip joint disease, which has been observed by other surgeons whose credibility is beyond any doubt. In the latter cases, however, there was a material carious destruction of the labium acetabuli and the femoral head co-existent, which facilitated the dislocation. It appears, therefore, that the number of real dislocations in consequence of hip joint disease, amounts but to a very small fraction, and that the remaining portion shows but a mal-position of the pelvis and the affected leg. The authors have examined a considerable number of recent and old hip joint cases with the assistance of chloroform inhalations, and they never met with one single instance in which the head of the femur was dislocated, although the deformity was in some instances very great, and the shortening of the leg amounting in one case even to six inches. In examining a patient of this description, it will be seen that the transverse axis of the pelvis forms with the perpendicular of the body, an open acute angle on the affected side; further, that the pelvis on that side projects posteriorly, showing a rotation on its longitudinal axis: finally, that the angle of inclination is increased by twenty to thirty degrees—proving a rotation on its transverse

axis. Again, that the affected leg is more or less flexed, both in the hip and knee joints; that it is rotated inwardly and in a state of adduction, while the healthy leg is abducted, balancing the body in its diagonal. The spine is bent laterally and anteriorly, and the imitation of all these mal-positions of pelvis and leg produces invariably the same apparent deformities. The muscles principally concerned are the group of adductors and flexors of the thigh, especially the psoas major and iliacus, which can be felt like rods at the inner side of the leg. These reflexations in the said muscles, manifest themselves even in the earlier periods of hip joint disease, and, with very few exceptions, are constantly observable.

It is of the greatest practical importance to comprehend the true nature of those deformities which attend and follow hip joint diseases, as it not only determines the curability of them, but also the means to be employed for the alleviation of such deformities.

In reference to the treatment, the authors refer to the preceding pages. As a matter of course, they pay due attention to the constitutional and external causes. Is the case of recent date, the patient is placed in a horizontal position, the deformity is instantaneously removed under the influence of chloroform, and the leg retained in its proper position by splints, which embraces both pelvis and leg. This treatment has been found highly effectual, and speedily terminated cases which might have been otherwise greatly protracted and troublesome. Is the disease, however, more advanced and effusion present, the further treatment depends on the nature of that effusion. Does the effusion, in all probability, consist in organizable lymph, besides local derivation and mild antiphlogistic treatment, occasional passive movements are made with the leg to prevent adhesions; is, however, crepitation ascertained besides fluctuation, the authors deem themselves justified to open the joint freely. The results they have already obtained by this practice, are in every respect encouraging. The authors lately opened the hip joint of a rather enfeebled boy of seven years of age, in the presence of Dr. Sayre and other medical practitioners, and to day, (27th December,) five weeks after that operation, the wound is nearly closed up and the patient greatly improved consti-

tutionally. In old cases, the writers use gradual extension on a double inclined plane, by which they bring the leg in a diametrically reverse position to the deformity. The instrument which they have constructed for this object answers the purpose. There are now four patients in the Orthopædic Institution, the shortening of whose legs amounted to from one inch three-quarters to six inches each. After a treatment of from two to four months, the mobility of the resp. joints have not only been re-established, but the length of the affected legs has also greatly increased, and there is no doubt that the cures will be ultimately perfected. The apparatus made use of by the authors is also calculated to amend the deformity of the spine.

Four months ago, a case of a child aged four years, was brought to the Institution with apparent hip joint disease; the usual deformity and immobility of the joint, and an ulcer below and anterior to the large trochanter, with all the characteristic appearances of carious origin. The child looked pretty healthy and strong; there was no reason for premising a scrofulous diathesis: the only accountable cause was a fall, and the disease had been in existence for two years and three months. The tender father had consulted several eminent surgeons of New-York, but received but little encouragement—all being of the opinion that hip joint disease with spontaneous dislocation was in existence. The authors might have been prompted by the appearance of the deformity in forming the same opinion: minute examination showed, however, that the hip joint was entire, that the deformity was produced by muscular retraction perfectly removable by an anæsthetic. The exploration of the sore proved it to be the outlet of a sinus, extending five inches under the fascia lata. The division of that sinus was consequently performed, and an orthopædic apparatus removed the deformity effectually.

The number of patients afflicted with inflammation and resp. ulceration of the knee joint, attended by the authors during the last four months, amounts to seven. In all cases there was great pain, immobility of the joint, and a considerable retraction of the flexor muscles; two showed great swelling, fluctuation, and crepi-

tus; in two others fluctuation, to all probability caused by effusion of lymph; two cases were of recent origin, exceedingly tender both to pressure and movement; the last case was of old standing. In no case any ulcer had been formed.

The first cases were in feeble and scrofulous children of the respective ages of ten months and two and a half years. The joints were bilaterally opened; by injections the cavities kept clean; the limb firmly retained in a proper position by splints, and the general health duly attended to.

During the succeeding eight days there was a considerable reaction and fever, which, however, abated gradually. In three weeks the joints were filled with granulations extending over both faces of the bone previously ulcerated. At present the joints are fast closing up, consolidating, and becoming anchylosed in almost straight and perfectly useful positions.

The two subsequently mentioned cases were totally treated by Tincture of Todine and compression. These deformities were progressively reduced on four different occasions—not gradually, but extended at a greater angle each time—with the assistance of chloroform, and the leg retained in the new position by iron splints connected with endless screws. Although the already formed fibrous adhesions were destroyed by the extension of the leg, the reaction which followed was merely trifling, and the patients immediately afterwards commenced walking. The fluctuation has since entirely disappeared, pain and swelling are gone, and the patients use their limbs with little inconvenience.

Similar satisfactory results have been attained in the three remaining instances.

The authors believe that the extension of the legs in the two former cases being made at four different periods, each time only to an angle of about twenty degrees towards the straight position, has materially contributed to the prevention of the violent reaction observed by other surgeons after sudden and perfect extension.

Before the authors close these pages, they take the liberty of making some additional remarks on the mechanical treatment of

club foot. Various contrivances have been made use of to meet the four indications of the treatment, namely:—

1st. Rotation of the foot on its longitudinal axis.

2d. Abducting the foot.

3d. Extension of the palmar aponeurosis; reducing the arch to its normal tention, and

4th. Restoring the proper angle between foot and leg.

There is, however, to the knowledge of the writers, no instrument whose mechanical means perfectly answer the purpose; moreover, most of them are exceedingly clumsy. Drs. Bauer and Barthelmess have therefore constructed a new club foot machine which secures the before named actions, and by virtue of its little weight and neat form, enables the patient to walk with it, which is of great advantage, as the weight assists effectually in removing the deformity. The leg iron is affixed to the metallic shoe by two joints with endless screws, which enables the surgeon to alter the position of the shoe ad libitum, both as to the angle of the foot and its longitudinal direction. A pad, moved by a screw, is affixed to the anterior part of the shoe, being calculated to press upon the metatarsal articulation of the great toe, thus pushing the foot outwardly. To prevent the yielding of the exterior edge of the foot and the raising of the heel, a pad by means of a strap connected with the shoe, is screwed down upon the dorsum pedis, which allows at the same time the circulation to go on freely which a simple strap generally interferes with. The management of this apparatus is without difficulty.

PARTICULARS
CONCERNING THE ORTHOPÆDIC INSTITUTION.

The establishment is located in a fashionable and most healthy part of the City of Brooklyn. It consists in three adjoining large brick buildings, connected in the rear by a veranda. The rooms of the buildings are spacious, airy, and lighted by gas. Besides the dining-room, there are two genteely furnished parlors for the receptions and social meetings of the patients between themselves and with their respective relatives. Newspapers and an appropriate library are at their disposal. In the garden there is a gymnasium erected for exercises. As a matter of course the sexes are separated, young ladies being under the special care of Mrs. BARTHELMESS.

The board—plain and wholesome—consists principally of animal food, and is liberally afforded. Confectionary is neither offered nor permitted to be brought to the patients. The nursing is prompt and attentive. Drs. BAUER and BARTHELMESS see their respective patients regularly three times a day, but oftener if the case requires it.

Only persons afflicted with the deformities of the body are received as in-door patients into the Institution. Relatives, as boarders with the patients, are admitted only under exceptional circumstances.

The general terms embrace a bed in a room with other patients, board, fuel, light, (wine, beer, if necessary,) medicine, use of gymnastic and general orthopædic apparatus, nursing, and medical treatment. The payment is to be made a month in advance.

Extra rooms and nurse can be provided.

Special orthopædic apparatus calculated for one patient only, as

well as the repairs of such apparatus, are chargeable to the patient.

The relatives and friends of the patients have the privilege of admittance to the Institution on Tuesdays and Fridays in the afternoon: at other times only by permission of either Dr. BAUER or Dr. BARTHELMESS.

For reception of patients, Drs. BAUER and BARTHELEESS will be present at the office of the Institution until 11 o'clock, A. M.; and applications by letters may be directed to box No. 147, Brooklyn Post Office.

Drs. BAUER and BARTHELMESS have the pleasure of stating that the profession of New-York has given to their undertaking kind attention and support, and that they have been favored with the calls of a great number of medical gentlemen. The writers feel especially indebted to Dr. WILLIAM PARKER, Professor of Surgery of the College of Physicians and Surgeons, and Dr. SAYRE, Surgeon of Bellevue Hospital, besides other gentlemen, for their kind approbation and recommendation of the Orthopædic Institution.