BRITISH MEDICAL JOURNAL:

BRING THE JOURNAL OF THE BRITISH MEDICAL ASSOCIATION.

EDITED BY ANDREW WYNTER, M.D.

No. CLX.]

LONDON: SATURDAY, JANUARY 21, 1860.

[NEW SERIES.]

Lectures

ON THE

SURGERY OF CHILDHOOD.

DELIVERED AT THE HOSPITAL FOR SICK CHILDREN.

By ATHOL A. JOHNSON, Esq., Surgeon to the Hospital.

LECTURE II.

CONGENITAL MALFORMATIONS (*continued*)—*Spina Bifida; its Treatment by Operation, by Collodion; by Iodine injections; Congenital Fatty Tumour of Spine; Deficiency and Excess of parts; Hermaphroditism; of the Male; of the Female. INJURIES AND ACCIDENTS—Foreign Bodies in Nose and Ear; Fractures; Peculiarities when complicated with Rickets; Incomplete Fractures; Traumatic separation of Epiphyses.*

GENTLEMEN,—Towards the close of the last lecture, I drew your attention to certain congenital hernial protrusions from the skull, constituting *encephalocele*. In the back we find similar tumours connected with arrest of development in some portion of the spinal column, and formed by the protrusion, through an opening in the canal, of the membranes of the cord, distended with cerebro-spinal fluid. To these the name of *spina bifida* is given, and they are usually characterised by the hard and tense nature of the swelling when the patient is erect, its softness when the pelvis is raised above the head; expiration and inspiration producing frequently the same effect. As in the skull, however, the hernia is seldom that of the membranes alone; in the majority of cases, either the spinal cord itself or some of its nerves are more or less involved. Mr. Prescott Hewett, in his valuable remarks on this affection, states, "that of twenty preparations of *spina bifida* occupying the lumbo-sacral region, which he has examined, he has only found one in which the nerves were not connected with the sac. If the tumour corresponds to the two or three upper lumbar vertebrae only, the cord itself rarely deviates from its course, and the posterior spinal nerves are generally the only branches which have any communication with the sac. But if the tumour occupies partly the lumbar and partly the sacral region, then generally the cord itself and its nerves will be found intimately connected with the sac."

On the table is a specimen illustrating this fact, taken from a patient, five months old, who died under the care of Mr. Tatum. The cord and its nerves will be seen running across the cavity of the tumour to its posterior wall, where they are firmly fixed.

I need scarcely mention the importance of this connection as influencing our treatment. Numerous operations, including removal by ligature and excision, have been proposed and performed; in some cases, it is asserted, with beneficial results, but in all, certainly, with great risk to life. Sir A. Cooper, it is well known, was successful in two cases: one of which he treated by simple compression, whilst in the other he evacuated the fluid by puncture with a needle, and subsequently employed pressure. Twenty-eight or twenty-nine years afterwards, the patients were alive and in good health. In both these cases, it may be remarked, the tumour was of moderate size, and seated in the loins; containing, probably, no portion of the spinal cord. With others, however, the results have not been so prosperous; and in a discussion on the subject of *spina bifida* at the Société de Chirurgie last October, M. Guersant stated that he had tried different operations in fifteen or eighteen cases of this kind, but had never had reason to congratulate himself on the result. Suture, excision, ligature, had been rapidly followed by death; and if puncture and com-

pression had not been so injurious, they had not prevented his little patients from dying at last. He mentioned, however, that he had never employed iodine injections. (*Gazette des Hôpitaux*, October 15th, 1859.)

In the second volume of the *Medical Times and Gazette* for 1858, will be seen an interesting collection of cases of this affection, seventeen in number. On analysing these, I find that in two cases a ligature was applied, and both died. In six cases, the tumour was punctured or wounded, and all six died. In one case, however, the notes of which are brief and imperfect, both ligature and puncture were employed, and recovery is said to have taken place. The results of operative interference, in these cases, at any rate, are not encouraging—eight out of the nine cases having died.

In seven cases, the sac was not meddled with: of these, two died, two were cured, and three remained in good health, at the ages of thirteen, twenty-three, and thirty-two, though with the tumour still present, and of large size. The remaining case I exclude, as it appears not to have been congenital, having been first noticed at the age of twenty-six, after a confinement. I may add, that every case in which I have myself punctured the sac has, sooner or later, terminated fatally.

Should nothing then be done in this affection? An application, which may be used at least with safety, perhaps with advantage, is collodion, painted over the whole surface of the tumour, and for some distance around it. In a case related in the thirty-first volume of the *Journal für Kinderkrankheiten*, this was employed from time to time by Dr. Behrend, the part being afterwards protected by an India-rubber shield; a little calomel was at the same time administered internally, on account of some head symptoms, which happened to show themselves. Absorption of the fluid took place, and the tumour contracted and finally disappeared, leaving only a hardened mass to mark its situation.

Astringents may also be applied in the shape, perhaps, of a strong Goulard lotion, especially when the integuments are thin; or the saturnine salt may be combined with the collodion; in any case, too, the tumour should be protected, but not compressed, by a kind of shield formed of some suitable material.

There is still another mode of treatment which has been specially advocated of late, and which deserves, perhaps, a further trial; I mean injection of iodine into the sac. At the discussion to which I have alluded, M. Velpeau stated that whenever he had had recourse to operations involving any loss of blood, they had always failed; but that on three occasions, he had punctured the tumour and injected iodine. Two of these patients died, but long after the operation; in one of them, the injection was renewed three times in the space of three weeks, and the iodine had not produced the least trace of inflammation. The third child, who is now six years old, was cured, and is still living, five years after the operation. In this case, five or six injections were practised in succession. After the first, the skin over the tumour, which was previously red and almost ulcerated, became more firm and less irritated; the tumour diminished, and was only of the size of a nut when last seen. The fluid injected consisted of tincture of iodine, diluted at first with two-thirds of water, the strength being afterwards increased.

In the *Chicago Medical Journal* for September (quoted in *Boston Medical Journal*, vol. lxi, p. 246), Dr. Brainard is stated to have now treated seven cases in this way; of which five are said to be cured, though one died afterwards of chronic hydrocephalus. The injections, which consisted of iodine and iodide of potassium dissolved in water, were repeated as often as was deemed necessary, the strength of the solution being gradually increased; no more of the fluid, it is remarked, should be drawn off than would correspond to the amount of injection to be introduced. After the operation, collodion is applied, and should be continued for some considerable period. The success in these instances was undoubtedly considerable; though even here, it may be remarked, two at least out of the seven patients actually died; but in truth, the cases are some-

what loosely reported, many important particulars are omitted, and their value consequently is materially diminished.

The conclusions I should draw as to the prognosis and treatment, would be these:—

1. The chances of a favourable result are never very great; and in the worst cases, where the tumour is very much distended and the deficiency of the spinal walls very considerable, where the skin is thinned, and, as it were, unravelled or on the point of bursting, or having actually burst, there is no reasonable hope.

2. Under any circumstances, the strong probability of the presence of a part of the cord or its nerves, and the fatal results of the cases in which such attempts have been made, forbid our having recourse to ligature or to excision.

3. In some cases, especially in those where the vertebral fissure is small, the tumour pediculated, and the communication with the spine limited, there is a chance of a natural cure taking place, or, at any rate, of the tumour not proving incompatible with life, if it is simply protected from external violence.

4. In treating this affection, if the tumour is of moderate size, and not enlarging, I should be unwilling, at first, to do more than apply gentle compression, by means probably of collodion, combined or not with astringents, support the part well, and protect it effectually from injury.

5. Should the tumour show a disposition to increase, I might then make a fair trial of iodine injections, though with a certain amount of foreboding as to the occurrence of inflammation of the spinal membranes. The punctures for this purpose should be made at a part where the skin is healthy and at the side of the tumour; for it is generally at the middle line that the cord and its nerves, if present, are attached. The strength of the solution, which should have been recently prepared, should be about one sixteenth of a grain of iodine, and one-eighth of a grain of iodide of potassium to the drachm of water; the quantity, at first very small, not more, perhaps, than eight or ten drops, which might be introduced by means of the instrument now in use for injecting the perchloride of iron in cases of nævus. After the injection, pressure upon the tumour should be avoided, and if any redness or heat come on, cooling lotions may be used and collodion applied, after the inflammatory symptoms have subsided. Fresh injections should not be had recourse to, so long as any signs of inflammation remain, or till the tumour ceases to contract.

Cases of *spina bifida* are sufficiently common at the lower part of the spine to be familiar to most practitioners, who are, consequently, well acquainted with their nature. They are found, however, also higher up, in the dorsal region and in the neck, cases of which I have seen; but they occur so seldom in this situation, that they may not be recognised, and attempts might be, and have been, made to excise the tumour in ignorance of its real character. It is well, therefore, to be aware of the fact that they may be met with in these regions.

Congenital Fatty Tumour of Spine. I may, perhaps, be allowed here briefly to describe a very unusual form of congenital tumour, connected with arrest of development of the posterior part of the sacrum, which came under my care at this Hospital. The patient was brought to me, three weeks after birth, with an ulcer situated on the top of an ill-defined swelling placed over the sacrum. The ulcer healed; but the swelling, which was evidently fatty in its nature, continued to increase, and caused much inconvenience by the convulsive movements in the right leg produced by any pressure upon it. I consented to operate, though with some misgiving, when the child was ten months old. It was found, during the operation, that the fatty tumour at its base extended into the interior of the sacral canal, through an opening (due to the deficiency of the *laminæ*), and was adherent to the membranes of the spinal cord; from these I dissected it off, fortunately without their being wounded, and the patient did well; the wound healed, and the convulsive movements ceased. Some time after its removal from the hospital, the child died from an accidental attack of inflammation of the bowels, when I had an opportunity of removing and examining the lower part of the spine, which is now before you. It will be seen that, in addition to the external tumor which was removed, there is a considerable fatty mass, with which the other was probably connected, extending for some distance *inside* the dura mater; this pressed upon the spinal cord, and involved the roots of the lowest spinal nerves so completely, that they seem to be imbedded in its substance. There is, moreover, a malformation of the lower sacral vertebrae, which are partly displaced and partly deficient.

The case, full details of which are published in the eighth volume of the *Pathological Transactions*, shows the care which should be exercised in operating, even on solid tumours in the spinal region, when they occur in very young children.

Deficiency or Excess of Parts. With respect to the former, though we cannot, indeed, supply the deficiency, we can generally, by surgical or mechanical means, alleviate the inconvenience. In the latter, it is often in our power to render more efficient aid, by reducing the parts to their normal proportions. On the table, for instance, is the cast of a foot with nine toes, belonging to a female child, a superabundance of which the parents and even the child herself, were desirous of getting rid. The supernumerary toes were removed, and the foot was made to match its fellow of the opposite side.

Hermaphroditism. There is another irregularity of formation occasionally brought to our notice, when, as is sometimes the case, we are called upon to determine the sex of the child. I mean *hermaphroditism*. Three varieties of this have been described—viz., apparent hermaphroditism of the male, apparent hermaphroditism of the female, and the neutral or true hermaphroditism.

The first, or pseudo-hermaphroditism of the male may depend—firstly, on *inversio vesicæ*, the red surface of the bladder having been mistaken for the vulva. As, however, this is seated principally *above* the pubic bones, the diagnosis ought to be easy.

Secondly, it may depend on adhesion of the under surface of the penis to the scrotum, in which it is buried, so as to present the appearance of an imperforate vagina. Mr. Terry relates a case of this kind, where a child, christened and considered as a female, turned out to be a boy; the penis being easily liberated, and found to be perfect, with the exception of a slight amount of hypospadias. Wrisberg mentions two similar cases, discovered at the ages of 19 and 46.

The third, and most usual form, however, consists in a fissured condition of the scrotum, which may then present a perineal cleft bounded by two folds of integument, bearing much resemblance to the labia, especially in those cases where the testicles have not descended. The resemblance to the vulva is generally increased by the small size of the penis, which is not unfrequently imperforate, or divided on its under surface, constituting the condition termed *hypospadias*. Numerous examples of errors in assigning the sex, committed from the last cause, have been noted. Amongst the most remarkable of these, is a case related in the *Cyclopædia of Anatomy and Physiology*, quoted from Otto, where the individual "had lived ten years in the state of wedlock, with three different men; but at the age of thirty-five an action of divorce was brought against her by her third husband, who accused her of being affected with some disease of the sexual parts, that rendered the connubial act on his part extremely difficult and painful". After some consideration, it was at last decided by the Royal Medical College of Silesia, that the supposed wife was a male, and that the condition of parts was that which I have just described.

A child, 15 months old, brought to this Hospital very recently, and whom many of you may have inspected, belonged, I believe to this class of hermaphroditism, though he has been christened Elizabeth, and some unusual peculiarities were present. The extremity of the glans, which, with the member itself, is of considerable size, presents in its centre a fine opening, just large enough to admit of the introduction of an Anel's probe; this opening or urethra undoubtedly leads to the bladder, for the urine is passed through it with considerable force, though in a very fine jet, and apparently with pain. The urine, however, also comes away in a much larger stream through an opening placed beneath the member, resembling a vagina, by which a catheter can easily be passed into the bladder. No direct communication exists between the two urinary passages, which are at some distance from each other. A deep groove, lined with an ash-coloured membrane, exists for some distance on the under surface of the member, passing backwards into the vagina-like opening, and ending in front in a cul-de-sac quite distinct from and below the glandular urethra. The vagina-like passage, the orifice of which was closed at birth, and was subsequently opened by a surgeon, in consequence of the straining in passing the urine, is just large enough to admit the end of a small little-finger to the extent of about an inch. No uterus can be felt, and a catheter introduced along the passage at once enters the bladder. There is a considerable interval of skin and soft parts between this opening and the anus, constituting a fair sized perineum. On each side of the opening is a kind of labium, at present in a

state of inflammation. On the right side can be felt, in its interior, a swelling bearing some resemblance to a testis, though much enlarged, and there is also a kind of cord prolonged from it into the abdomen. The left side is empty.

The congenital pseudo-hermaphroditism of the female consists mainly in an extraordinary enlargement or hypertrophy of the clitoris. In intrauterine life, it will be recollected, the clitoris is at first almost as large as the penis; and even at birth it is, proportionately, of considerable size. Its increase, however, afterwards is relatively slight, and at puberty it is usually not more than seven or eight lines in length. Occasionally, however, it happens that the development of the clitoris progresses as it did in the first few months of foetal life; and the infant, nay, even the grown woman, presents an organ closely resembling that of the male. A photographic view, though not a very good one, of a case of this kind brought to me to determine the sex in a child eleven years of age, is now on the table.

Enlargement of the clitoris, which sometimes becomes three inches or more in length, is not always congenital, but may take place subsequently—too often, probably, as a result of early masturbation. If considered desirable, it may be cut or pared down; but, in this case, you must be prepared for copious hæmorrhage.

Simple enlargement of this organ seldom causes much difficulty in our diagnosis even in infants. Frequently, however, it is combined with other malformations, and then the determination of the sex becomes less easy. The vagina, for instance, may be much contracted, and its orifice closed by a membranous septum; nay, even the ovaries, with the Fallopian tubes, are said to have descended through the inguinal canal, presenting the appearance and sensation of the testicles. There may be, too, an indentation at the point of the glans, resembling the urethra, or even a blind canal extending for a certain distance, or a groove on its under surface, as in hypospadias. It is stated, however, by M. Marc, that the clitoris is *never* perforated by an urethra.

It will be seen, therefore, that it is not always an easy matter to decide upon the sex in the child. Even at a later age, when the parts are more developed, and when we may be assisted by the supervision of the menstrual discharge, mistakes and confusion have often occurred, and experienced observers have differed in the conclusions at which they have arrived.

There is another variety of pseudo-hermaphroditism of the female I may mention, though it is met with, of course, at a more advanced age, which depends on prolapsus of the uterus and vagina, which last becomes cuticular, and may present a certain resemblance to a penis.

For the neutral or true hermaphroditism—the *hermaphrodisia per excessum* of Rokitsansky—I must refer you to the elaborate article on the subject in the *Cyclopædia of Anatomy and Physiology*; for the limited time at my disposal will not admit of my saying more at present on the subject of congenital deformities, with which, indeed, I fear I have already exhausted your patience; and yet there are numerous classes of them to which I have not even alluded—nævi and erectile tumours, for instance, which would of themselves offer abundant materials for at least a lecture. I think, however, we may fairly admit that the subject of malformations presents a wide field for surgical investigation and assistance.

II.—INJURIES AND ACCIDENTS.

The second division of surgical affections consists of accidents or injuries. Children are, of course, exposed to almost every accident which can befall an adult. There are some forms, however, to which they are either unusually liable, or the consequences of which present certain distinctive points for observation and treatment. Amongst the first, I may briefly draw your attention to the great fondness on the part of children for introducing foreign bodies into the different mucous passages. When these are taken into the mouth and swallowed, it is to the art of the physician that recourse is usually had; but, should they unfortunately pass into the wind-pipe, surgical aid often becomes necessary, and the operation of tracheotomy may be called for.

Foreign Bodies in the Nose and Ears. The main regions, however, which young England selects as repositories for its miscellaneous articles, are the nose and the ear. In the former, you will constantly find beans, peas, shells, cherry-stones, and wood-shavings; but the favourite article, according to my experience, is buttons. Any of these substances may remain lodged for a considerable time, and undergo, of course, a certain amount of change in themselves, in addition to the in-

flammation or ulceration of the passages, to which they may at last give rise. Buttons, for instance, may become corroded; peas may swell out, from the heat and moisture to which they are exposed; and, in the fifteenth volume of the *Journal de Médecine*, you will find an account of a haricot bean which is said to have germinated in the nose, and pushed out some ten or a dozen roots. Without absolutely denying this fact, we may perhaps be permitted not to believe it.

The practical points, however, for the surgeon are, the necessity, in cases of obstinate discharge from one nostril in children, of making a careful examination of the parts; for it often happens that the child, it may be from forgetfulness, or more probably from fear of punishment by the parents or dread of pain in the extraction, omits to mention anything about a foreign body having been introduced, and the case is brought to us as one of idiopathic discharge. In the removal, too, it is desirable to ascertain exactly the position, and, if possible, to get a clear view of the object; not to be hurriedly pushing at it in the dark, as is sometimes done, but clearing away any blood and mucus by syringing with plenty of water; then get the end of your probe, or of your narrow forceps, well behind the body, and so pull it forwards. It may be as well, perhaps, during the removal, to keep your patient's mouth shut, or else there may be an accident similar to one mentioned to me by Dr. West. In this case, a small shell was extracted from the nose; but unfortunately, at the moment of extraction, it slipped, and dropped into the mouth, which was wide open, when it was immediately swallowed. It is hardly necessary, on the other hand, for me to caution you against mistaking the pulpy thickening of the mucous membrane over the turbinated bones, which so often occurs in scrofulous children, for an extraneous substance, or to deprecate their forcible removal.

When foreign bodies are introduced into the external ear, they are usually at once removed, or, if allowed to remain, their presence is demonstrated by the inflammation which is set up. Occasionally, however, it happens, especially if the body is hard and smooth, that it may remain without much disturbance, and without its existence being known except to the child, by whom, too, it is probably soon forgotten. In this way, deafness of one ear may be produced, affecting only the side in which the extraneous substance is lodged. Very recently, a boy was brought to St. George's Hospital, who had been deaf of one ear for quite a twelvemonth, no cause being either assigned or known. Mr. Prescott Hewett found, on examining the ear, something which he took at first for an accumulation of wax, but which turned out to be a piece of nut-shell, which had been lying there all that time. The cause being removed, the deafness, I believe, soon vanished.

Fractures of the Bones, with which we may class separation of the epiphyses, constitute another form of injury which presents some important distinctive characters when occurring in children. As a general rule, fractures, properly so called, are not so frequent in children as in older people; principally, no doubt, in consequence of the proportionate excess of the *animal* over the *earthly* constituents, but partly also because children are not in general exposed to the same extent to external violence. Notwithstanding these advantages, fractures are by no means uncommon in early life; this is due, to a considerable degree, to the rickety condition of the bones so apt to occur then, and to the consequent alteration in their shape. M. Guersant, for instance, states (*Clinique des Hôpitaux des Enfants*, 6ième année, p. 28), that out of a mean of eighty cases a year of fractures in early life, he has found about one-third occur in rickety children. At this Hospital we do not profess to treat accidents, and consequently have comparatively few fractures carried here; but still cases like the following are occasionally brought under our notice.

A boy, of the name of Lawrence, four years of age, came to me as an out-patient, with general rickets and fracture of the upper part of one humerus, produced by some slight accident; before this had united, an equally slight accident caused fracture of the opposite arm, the separation in this case not being complete, the periosteum still connecting the broken extremities. To prevent him from undergoing a complete course of fractures, I thought it better to receive him into the Hospital, where the bones united perfectly but slowly. In another boy, too, of the name of Wentworth, eight years of age, in whom the rickety condition of the bones had advanced so far that he had been unable to walk or even to stand for a very lengthened period before he came under my care, there had been fracture of both thighs one after the other. Professor Gibson, of Philadelphia, relates a case under his own observation, where a rickety boy experienced twenty-four fractures, all from slight

causes, and all uniting without much difficulty. In the collection, too, of M. Esquirol, according to Cloquet (*Dict. de Médecine*, quoted in article "Fracture," *Cyclopædia of Practical Surgery*), is the skeleton of a rachitic female presenting the traces of above two hundred fractures, which appear to have been effected at different periods, judging from the nature of the varying amounts of consolidation.

Examples of these multiplied fractures occurring in rickety children, then, may often be met with, though they seldom show themselves before the appearance of curvature. The following interesting case is quoted from Malgaigne's work on *Fractures*. A boy, whose father was healthy, but the mother rickety, and who had himself been affected with rickets from early infancy, had a fall whilst playing, when six years of age, and the left humerus was fractured; the injury was unaccompanied with pain, and the bone united firmly in the course of a month. A year afterwards, whilst at play, he broke his left femur about the middle; consolidation took place in forty days. At the end of another three months, whilst leaning out of bed to pick up something, his left thigh bone broke again, but in a different place; forty days sufficed for the union, but he had to take to crutches, owing to his general weakness. Arrived at the age of ten, one of his crutches slipped, he fell, and fractured his right thigh-bone; he was taken to the Hôpital des Enfants, where M. Malgaigne saw him, and recognised the traces of the previous fractures; this one, which was transverse, like the others gave rise to scarcely any pain; and in forty days union had taken place.

This disposition to fracture in rickets—and rickets, according to M. Malgaigne, is perhaps the affection which predisposes the most to fractures—is due partly to the altered structure of the bone; but, besides this, the great weakness of the limbs, as well as of the whole body, in these cases, renders walking more difficult, falls more frequent; and, finally, the altered shape of the bone, which usually becomes curved, conduces to fracture, just as a bent stick is more easily broken than a straight one.

Fractures in young children, even in those not affected with rickets, usually present little deformity, owing to the periosteum not being completely separated; after the age of thirteen or fourteen, however, the periosteum tears more easily, and separation of the fragments becomes more common. Hence the breaking of a bone in early life has been compared to that of a stick which preserves, at the point of rupture, some of its fibres uninjured. To obtain much benefit from this preservation of the periosteum, the broken parts ought to be kept at rest at once, or else complete separation may occur, and the deformity may be much increased. It is as well to be aware of this peculiarity, to avoid the odium of overlooking a fracture in a child in its early stage. I was sent for, for example, a short distance into the country to see a young gentleman who had been thrown from his pony. He had been examined on the spot by a physician of eminence, who could detect no fracture; and in fact the child could and did use his arm at first, so far as to remount his pony. By the time I arrived, the periosteum had become completely lacerated, and the fracture of the clavicle was well marked, one end riding over the other.

Where rickets is present, this absence of deformity, owing to the strength of the periosteal sheath, is even more marked; and even if deformity exist, it is apt to be confounded with the curvatures so common in this affection; there is little or no crepitation owing to the softness of the bones; and, in fact, the main symptoms present, are an unusual amount of flexibility and mobility at the part which is injured. If the fracture is not recognised, if no proper treatment be adopted, if the limb is allowed to be freely used, the symptoms in these cases also become more marked; the periosteum may be ruptured, riding of the fragments may occur, and even crepitation be noticed if the softening of the bone be not too far advanced.

As a general rule, in fractures occurring in children, the period required for surgical treatment is much less than in adults; occupying, perhaps, not more than one half the time; when, however, the case is complicated with rickets, the necessity for artificial support continues for a much longer period; but still, consolidation does occur, its rapidity being in an inverse ratio to the intensity of the rickets. With respect to the treatment, I have no particular remarks to offer, except to caution you to be very careful in padding the limb well, especially over any prominence of bone, before applying your splint or starched bandage; these, too, need not, and should not, be put on with unnecessary tightness, if you wish to avoid excoriations, sloughs, or gangrene, to which the delicate skin of the

child is very liable. This caution is especially needed in rickets, where the ends of the bones are preternaturally prominent, and the soft parts over them unusually disposed to mortify. In fractures of the lower extremities, also, we should bear in mind the habits of young people with respect to passing the urine, etc., and use every care to protect the apparatus, as far as possible, by the use of oiled silk or other appropriate contrivances.

Incomplete Fracture. Occasionally it happens in children that the bone, instead of breaking, becomes bent or incompletely fractured, as may be seen in this clavicle, taken from a boy five years of age, who died from inflammation of the brain. The tendency to this form of injury may be said to date from birth, attaining its maximum about the second year, and almost ceasing at the age of twelve. The most important of the symptoms here is the deformity of the part, which may sometimes be very considerable; at the same time, there is complete absence of either mobility or crepitus, so that the fracture may be overlooked, the distortion attributed to the swelling of the soft parts. From the ordinary bending of the bones which occurs in rickets, it may be distinguished by the absence of the general marks of that affection, and by its occurring immediately after an accident. In the preparation before you it will be seen that the incomplete fracture has occurred at the centre of the right clavicle, the bony laminae at the under surface being broken through, whilst the upper surface is only partially fractured, and bent outwards.

The treatment of this injury, which principally affects the bones of the fore-arm or the leg, is generally simple; the bone being soft and yielding can almost always, by the employment of moderate force, be bent back to its original shape, and then secured on a splint according to the extent of the fracture. Even where the injury is of some standing, the deformity can in this way generally be relieved.

Separation of Epiphyses. The last form of injury of the bones to which I wish briefly to direct your attention, is traumatic separation of the epiphyses. Hippocrates is said to have made mention of this accident, Ambrose Paré treats of it, Reichel, exactly one hundred years ago, wrote a special treatise on the subject, and since then it has been described by numerous authors; but cases in which the exact nature of the injury has been shown after death are not, I believe, very common; in fact Delpech, in 1816, thought he could deny their real existence. That they do really occur, however, has been proved by actual dissection in, at least, the following situations:—both ends of the humerus, the lower end of the radius, both ends of the femur, and both extremities of the tibia as well as of the fibula.

In the seventh volume of the *Archives de Médecine* will be found a case of intrauterine injury, in which the child presented at birth an open wound of the leg, through which projected the shaft or body of the tibia, which was completely torn away from the lower epiphysis. The infant died on the thirteenth day. In the *Clinique des Hôpitaux des Enfants* will be found some papers, by M. Alphonse Salmon, detailing a series of experiments at the Paris Foundling Hospital, where he fractured 125 arms, at or near the elbow-joint, in children varying from the age of one day to three years; the children, I need scarcely say, were not alive at the time. In these cases he found that up to the age of five months, separation of one or more of the epiphyses was very easily produced, occurring, indeed, much more frequently than either fracture or bending, in the proportion of 73 to 12, but above this age, the excess diminished rapidly.

In early infancy, then, at least, this accident is one that can be produced by external violence; and the same thing occurs at a later period, when, from the progress of age, the epiphyses have acquired a great amount of development, and up to the time when they become consolidated with the shaft.

Several cases of this injury are related in Malgaigne's work on *Fractures*, occurring in boys between the ages of eleven and fifteen; and in the Museum of St. George's Hospital will be found a preparation showing separation of the lower epiphysis of the femur in a lad 16 years of age, and another in which there was separation of the lower epiphyses both of the femur and tibia, as well as of the epiphysis at each end of the fibula, in a young man of 18. The accident in the latter case, necessitating immediate amputation of the thigh, was caused by the leg getting entangled in a rope which became twisted round it whilst the lad was in the act of jumping from a pier to the deck of a steamboat. Here, too, is a preparation with laceration of the inferior epiphysis of the radius, but the exact age of the patient in this case is not known.

It has been remarked that this accident is one that occurs specially in male subjects, and M. Malgaigne says that he knows of no instance occurring in a female in which, at least, the real nature of the accident has been satisfactorily proved.

It is no easy matter to distinguish this accident from fracture near the joint, with which it has, no doubt, been often confounded. Besides the age of the patient, the most characteristic sign would be the soft, dull kind of crepitus obtained as distinguished from the more harsh and rough crepitation met with when the bone itself is broken through, though even this is by no means conclusive. The treatment, fortunately, will be the same in both cases, so that no great harm will happen to the patient, even if a mistake should occur in the diagnosis; union taking place in this injury as readily as in fracture.

Vacation Lectures

ON

FIBRINOUS DEPOSITION IN THE HEART:

ITS HISTORY AND PRACTICAL MEANING.

DELIVERED AT THE GROSVENOR PLACE SCHOOL OF MEDICINE.

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LECTURE I.

INTRODUCTORY REMARKS; *Plan of the Course*; *Different conditions of Blood in the Heart after death*. FIBRINOUS CONCRETIONS IN THE HEART: *their Forms*; *Structure*; *Weight*; *Chemistry*; *Process of Deposit*; *Post Mortem and Ante Mortem Deposits*.

[Continued from page 24.]

II.—PHYSICAL AND CHEMICAL CHARACTERS OF DEPOSITS.

FROM the consideration of the general forms of fibrinous deposits in the heart, it is instructive to turn to the deposits themselves, to remove them, and to examine their minute structure with as much care as can be bestowed upon the inquiry. In such an investigation, we may notice points relating to colour; consistency; structural outline; microscopical appearances; weight; and chemistry.

Colour. The colour of a fibrinous deposit varies from a dull red, approaching closely in tint the red of a voluntary muscle soon after death, to a perfect and pure white. This difference depends entirely upon the relation existing between the amount of hæmatine or colouring matter of the red blood-corpuscle and of separated fibrine. In cases where the separation is very rapid, some amount of coloured corpuscles, varying according to the period of separation, may be entrapped in the fibrine, when the concretion will be more or less red in colour. In other cases, where the fibrine separates very slowly, particle by particle, if I may so say, the concretion will be entirely free of coloured matter, except perhaps on its external surface, where it may have been left in contact with a little remaining red blood; and, divided in any direction, will convey the idea of a pearly looking mass throughout.

Consistence. The consistence of a fibrinous concretion is not invariably the same. In some examples—in cases, for instance, where, as we shall afterwards see, the concretion is the last fact in the course of a fatal disease, the determining fact of the death—the substance of the mass is soft and almost gelatinous in its character; while modeled to the part, and completely filling a cavity or tube, this clot may be so soft as scarcely to be removable without breakage. If it is cut across, it seems as if it were infiltrated with dirty thin fluid; and, placed on the water-bath so as to dry up, it is left as a mere film or thread on the drying plate. This condition of clot is only to be expected in cases where there has been some pre-existent asthenic long continued disease.

There is an opposite state, in which the fibrinous clot is laid down rapidly and in the course of diseases very acute and sthenic, in inflammatory diseases, such as croup and pneumonia. In these, the concretion may be, indeed generally is, so firm that it cannot be removed from any attachment it may have without some tearing either of the fibre of the concretion itself, or of the fibre of the heart. Concretion of this kind is

not unlike, in colour and firmness, the coagulated albumen of the egg after hard boiling. From this it differs, nevertheless, in that, when broken across, it is not fractured in a clean clear surface, but in a jagged fibrous form. If a fibre of such a clot be pulled, it will be found to possess a considerable degree of elasticity, and to curl up like the tendril of a vine, something in the way that the elastic or yellow tissue curls when cut across, extended, and then set free. Nothing can be more distinct, in short, than the difference in character between this form of clot and that already named as gelatinous. Both are produced by separation of the same constituent of the blood; it will be surmised, therefore, that this constituent, in the course of disease, undergoes great modification in its nature. The fact is so; and, inasmuch as death may occur at different periods in various diseases, so there may be observed, as the result of an inquiry extending over many cases, shades of consistency in all degrees, from the gelatinous and watery to the firm and fibrous.

Again, a fibrinous concretion may be found in two states. It may be firm and tough on its exterior, and soft, pulpy, or even creamy, in its centre. It was at one time assumed that, in clots having these appearances, the matter present in the centre of the concretion was pus. Mr. Gulliver was the first to point out the error of the said conclusion. He determined the fact that the fluid matter so situated is identical with softened fibrine; and that, when fibrine removed from the body is subjected to a temperature of 96°, it begins to soften in forty hours, and looks to the naked eye like purulent matter, but may be distinguished from that matter by the microscopical characters. He adds—I believe I am using his own words—"the softening of coagulated fibrine is an elementary pathological condition, frequent, distinct from suppuration, and constituting many of those cases called suppurative phlebitis." I am fully of opinion that Mr. Gulliver, in these remarks, has indicated with great precision an important but simple pathological fact. Concretions containing pulpy matter, like those gelatinous in structure, are found only in cases of the asthenic type—in cases where the fibrine may be said to be diseased or imperfectly developed.

Structural Outline. In a great number of concretions, there is found a peculiarly well marked *laminated* condition of the deposited mass; *i.e.*, when divided, the mass bears the character of having been composed in exact order, in layers laid down one upon the other, either from the centre towards the circumference, or from the circumference towards the centre. When a striated concretion is formed in an auricle or ventricle, and assumes a globular form, the layers are encircling; they are disposed, to use a common simile, like the coats of an onion, but of course, being extremely thin, are not so obvious to the sight. Still the striated character is so well traced in many examples, that the arrangement is to be discerned even by the eye alone. When the striated deposit occurs in the pulmonary artery or aorta, being then laid down as a cylinder, the layers are also circular, running the whole length of the cylinder. The *tubular* concretion is in this way formed of a series of layers, the innermost of which encloses the contained red coagulum.

Whenever in fibrinous deposit, layer upon layer, in the manner described, the red colouring principle of the blood pervades the mass, the appearance presented bears the closest analogy to a portion of voluntary muscular fibre. This analogy is so perfect that, in one case, I knew a gentleman who, on meeting with one of these formations in the pulmonary artery, mistook it at first sight for a portion of muscle. A mistake of this kind is necessarily soon dispelled on close examination; but I point out the analogy as a means of conveying the plainest description of a coloured striated deposit.

Microscopical Characters. The microscopical characters of a fibrinous deposit present but few peculiarities. In clots perfectly free from colour and firm in structure, the microscopical form is that of a closely woven fibrillar network, uniform, or nearly so, in appearance throughout. Interspersed amongst the fibrillæ, one occasionally sees, at considerable distances apart, colourless cells resembling the white blood-cells, and indeed not to be distinguished from them. When the clot is coloured, there are to be seen, in the meshes of the fibrine, red corpuscles also, their amount varying with the depth of the red coloration. The softened matter found in the centre of some concretions presents the appearance of white cells, mixed up with disintegrated fibrils and a considerable quantity of granular substance of a brick-dust shade. In concretions lying in a cavity, and having a *mechanical* attachment, these are the only microscopical characters with which I am conversant.