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PART I.

ORIGINAL COMMUNICATIONS.

ART. I.—*The Treatment of Fractures by Ancient and Modern Methods.*^a By W. I. DE C. WHEELER, M.D., F.R.C.S.I.; Surgeon to Mercer's Hospital.

MR. PRESIDENT AND GENTLEMEN,

WHEN you did me the honour of inviting me to become your President for the coming year—an invitation which every old member and officer of the Association practising in this city is ambitious to receive—I had little difficulty in choosing a subject for my address. It seems to me that this is an appropriate occasion for the review of the treatment of fractures, when surgeons for the first time in history are introducing drastic and revolutionary changes in methods which until yesterday were considered settled and irrevocable. Secondly, paradoxical as it may seem, the study of fractures must be considered a new one, since operative surgery and X-ray photography have made possible a study of the anatomy and pathology of living bones. And, thirdly, the subject has attained a very considerable medico-legal importance

^aThe Inaugural Address delivered before the Dublin University Biological Association, November 19, 1910.

owing to the introduction of the "Workmen's Compensation" and "Employers' Liability" Acts of Parliament.

A study of the treatment of fractures makes us realise how slow was all surgical progress up to and including part of the last century. Thirty years ago the late Sir William Lawrence, when opening a clinical lecture on the subject of the kidney, said:—"And now, gentlemen, I will deal with an organ which, thank God, is beyond the reach of surgery"; and to-day we find in some of the so-called modern hospitals the adoption of methods for the treatment of broken bones which were practised with more success by the Egyptians three thousand years before Christ.

As far back as surgical literature can be traced the principle which governed the treatment of fractures was regarded like "the Law of the Medes and Persians which altereth not." No surgeon ever questioned the necessity of prolonged immobility with or without extension in appliances, sometimes simple, sometimes resembling the torture jackets of the Middle Ages.

It is true that the nineteenth century saw the birth of a number of works describing the mechanism of fractures, amongst the most famous of which were those by Dupuytren, Hamilton, and Malgaigne. Velpeau had doubts as to the effectiveness of the orthodox methods of treatment, but had not the courage of his convictions, and, like all his immediate predecessors, accepted the claim of Ambroise Paré, the Father of French surgery, who, in 1578, said that he had brought the art of chirurgery to such perfection that there was nothing left for posterity "but a small hope to add some things." Wiseman, who acquired much fame as a surgeon in the reign of Charles II., and who formed "a bridge of a single plank between the Stuarts and the great eighteenth century school, led by Pott and Hunter," was found advocating operation in certain cases; but beyond this only added to the surgery of fractures more splints and more extension. Hippocrates and Galen advanced the teach-

ing of their own forefathers, and there seems to be no beginning to the methods of treating fractures which have been accepted as infallible up to our own time.

Yet it should be possible to trace the surgery of fractures to the fountain head, for a bone once broken forms a permanent index from which can be gauged the ability of the surgeon or the healing powers of nature, and there is no lack of specimens from the earliest times to enable such a study to be made.

An example of the primitive state of the surgery of the bones is furnished in the works of Sir Astley Cooper as late as 1828. The directions for reducing a dorsal dislocation of the hip are as follows:—Free venesection is at first resorted to, then the patient is placed in a bath at a temperature of 100°, the heat of the water being gradually increased until the patient faints. While he is in the water he is given a grain of tartarised antimony every ten minutes until nausea is excited. He is then taken out of the bath, put on a hard mattress, and the bone put back in its socket. Crude as this treatment appears it is not less scientific than the more modern employment of a long Liston's splint with a perineal band for counter-extension.

The most antiquated surgical appliances ever discovered, with the exception of some ancient instruments for circumcision, were two sets of splints found applied to the bones by the Egyptian expedition from the University of California in the latter part of the year 1907. The application of these splints has been proved, after the most careful scientific investigation, to date about three thousand years before Christ. During the progress of the expedition a cemetery of rock-cut tombs of the Fifth Dynasty (2370 B.C.) was excavated, and in these tombs the splints which shall be briefly described were found intact. They are the only examples of *ante-mortem* splints found previous to the Christian era, although others were found applied by the priests to the forearm of King Siptah (Nineteenth Dynasty), who

received his injuries long after death at the hands of plunderers of his tomb.

The first case was that of a girl, aged about fourteen, who sustained a comminuted compound fracture of the middle of the shaft of the right femur. This was treated by the application of one anterior, one posterior, and two lateral splints, fashioned from the mid-rib of the date palm. It is of special interest that the splints only reached a point about three inches above the site of fracture, although inferiorly they were carried to a level seven inches below the knee joint.

The splints were carefully padded with folds of linen bandage, and were held in position by like material tied in reef knots.

A single pad was found just below the site of fracture covered with rust-like stains which, notwithstanding the lapse of nearly five thousand years, had the appearance of remarkable freshness. That these were blood stains is undoubted from the circumstances under which they were found in numerous instances. The pad was probably employed to cover the wound in the soft parts and to control hæmorrhage.

The presence of blood was extremely significant, for in *ante-mortem* fractures the broken ends of the bones were copiously stained, and, on the other hand, when a fracture had been produced *post-mortem* by plunderers of a tomb, the blood marks were conspicuous by their absence.

The second case—a fracture of the forearm found with splints *in situ*—was discovered by a strange coincidence in the same cemetery, for together these two cases constitute the only known splints applied to living patients earlier than the Christian era. As in the first case, this fracture was probably compound, for a stained pad of vegetable fibre was found pushed into the medullary cavity of the ulna.

Probably the fracture was treated as follows:—

The wound was first plugged with the pad of vegetable fibre. A bandage (also found in good condition) of much

finer material was wound carefully round the forearm, and the splints were then applied. Each had a natural curve, forming with its fellows a tubular casing for the forearm. A gap between the splints at the back was filled in with a bundle of coarse grass. The whole was bound to the arm with broad linen, secured by tapes of folded bandage.

It is clear from the study of these two cases that splints were used by the ancients more as a protection from external injury than as a means of holding the bones in position. This is particularly evident in the first case, where they only reached about three inches above the site of fracture. It is impossible to tell how generally splints were used at these periods in the world's history, but the presumption is, from a study of many hundreds of fractures to which they were found applied only twice, that their employment was extremely limited.

In accordance with the strict conservatism which has characterised the treatment of fractures in all ages, the Egyptians in the Christian era three thousand years later were found treating fractures in almost precisely the same way. Two thousand years subsequently—so late as 1903—the medical officer in charge of an expedition into Abyssinia reported that patients with broken arms flocked to him, wearing splints in no material way different from those just described in the case of the girl five thousand years before. It is not, however, with the sole view of demonstrating the want of progress through the ages that the study of ancient methods of treatment is of interest. In many cases the ætiology as well as the character of the injury are rendered very definite, and the results found almost perfect. For example, in the case of the bones of the forearm the frequency of fracture was great then as it is now. The ulna was most constantly injured, probably owing to the use of the naboot—a stout staff employed for purposes of offence and defence by the ancient Nubians.

The left arm was raised to guard the blow, and was fractured in a large proportion of cases, the subsequent union being all that could be desired. The results of the treatment are remarkable. In eleven cases of fracture of the humerus there was only one bad result. In fractures above the middle of the shaft of the femur union was almost end-to-end with little development of callus. The worst case had but scarcely two inches shortening; in two cases there was only half an inch difference in measurement, and in many the difference was imperceptible. Below the middle of the shaft the apposition of the fragments was not so good, but compared favourably with the results of modern treatment. Fracture of the clavicle showed the worst results, and gave the only examples of ununited fracture. It is interesting to compare these ancient specimens with the broken bones found in modern times among the uncivilised races who have not had access to the methods of white men. Examples of these can be found in the Anthropometrical Museum of Trinity College amongst what is known as the Hadden collection of bones. The specimens are gathered from the remains of the natives of Torres Straits between New Guinea and Australia, and comprise several beautiful examples of healed fractures of the skull, in addition to fractures of the humerus, radius, ulna, and fibula.

The first specimen demonstrates a double fracture of the humerus, one immediately below the tuberosities, the other below the insertion of the deltoid. From the severity of the injury or injuries it is not to be wondered at that marked shortening is the result, though the chief displacement is a rotatory one, the internal epicondyle having passed forward through an angle of 45° .

There is slight angular deformity due to the action of the triceps, a displacement which was noted in healed fractures of the humerus found during the Egyptian excavations.

The final result, taking into account the double fracture, cannot be said to be unsatisfactory.

The second humerus in this series is an example of an oblique fracture below the insertion of the deltoid, the line of fracture travelling from in front downwards and backwards, so that the adjacent ends of the fragments overlapped.

The fracture united with no rotatory displacement and with apparently very little shortening, the amount of which could not be accurately estimated owing to absence of the bone of the opposite side. There is in this case also slight angular deformity.

In one example of Colles's fracture the union is almost perfect, there being but 7 mm. elevation of the styloid process. The fracture could not be detected but for the slight alteration in the direction of the facet.

Four fractures of the ulna at different levels in each specimen have united with practically no displacement.

Compare these fractured bones and those found by the Egyptian expeditions with the specimens recovered from the victims of quite recent surgery, examples of which are to be seen in the Museum of the Royal College of Surgeons in Ireland, and our sympathy must rest entirely with the modern patient treated by orthodox methods.

The successes of the archaic surgeons, without having recourse to prolonged fixation or extension, taken with the results obtained by uncivilised peoples, are surely an ancient justification for the modern anti-fixation teaching of Lucas Championnière.

The high standard of repair found in fractures, either untreated or treated in a manner far removed from methods of immobilisation, proves there must be a wonderful self-adjustment of the fragments in the mending of broken bones. The immediate forces causing displacement sooner or later become antagonised, muscle-spasm ceases through fatigue and is counteracted by the action of other muscles not yet brought into play. This secondary action of muscles may be helped by natural forces, such as the weight of the limb.

This brings us to the question that, given an oblique

fracture with marked overlapping, is it possible to reduce the deformity and hold it reduced by the application of splints? Is it not more likely that the overlapping will remain or recur and the application of the splints prevent the natural adjustment of the bones to which reference has been made? If the prolonged use of splints tends to maintain malpositions rather than to hold deformities reduced, and the results of treatment on classical lines seem to justify the assumption, it is surprising their general use, with the attendant pain, stiffened joints, adherent muscles, and persistent œdema, should have been countenanced for so many years.

Erichson was one of the last great writers to adopt an attitude of *laissez faire*, but his opinions as to the finality of surgery have been effectually shattered in the case of fractures by the dawn of an era inseparably associated with three names—Arbuthnot Lane and Sir William Bennett of London, and Lucas Championnière of Paris. These, although not the first to discard the fossilised methods of surgical ages, were discoverers in the sense laid down by Sidney Smith—"That man is not the first discoverer of any Art who first says the thing, but he who says it so long, so loud, and so clearly that he compels mankind to hear him." Lucas Championnière, whose methods were modified and popularised in England by the work of Sir William Bennett, was the first to show the absolute futility of the treatment of fractures by prolonged immobilisation in splints, and to insist that clinical observation must alter methods based on ancient usage. He ascribes his courage in condemning customs which had become almost a religion in surgery to the great examples of Lister and Pasteur.

By gradual stages he arrived at the principles of his treatment of fractures which are now adopted in their entirety or with modification all the world over.

First, he began by lessening the degree of immobility, then he did away with immobility altogether; after this he commenced movements at an early stage, and then

practised them immediately after the injury. Finally, he adopted the general massage of the muscles and joints and even encouraged movements of the bony fragments during repair.

Two primary conditions are laid down for the performance of the movements recommended. First, they must be painless, and secondly they must cause no new displacement. The massage is essentially different from that of ordinary masseurs; it must be at first soft and smooth, taking the form in bad cases of slight mobile pressure in the direction of the venous current. As Lucas Championnière expresses it—Let it be a “mere caress.” In this way movements are administered, so to speak, in measured doses, just as a medicine or a dose of X-rays.

It would be impossible to give even an outline of the results of the forty years’ work of this great pioneer in the time at our disposal—he deals exhaustively with every condition of fracture. Suffice it to say that he treats fracture of the patella by operation, but that of the olecranon by massage and movements which produce a perfect result in about fourteen days. In fractures of the neck of the femur he suggests treatment by movements more than massage, and recommends an attempt to walk in nine or ten days. He claims that the reduction of a fracture is only a relative necessity, which should not be resorted to unless deformities of the axis of the bone are incompatible with the function of the limb.

Reduction is useless, he says, in the lower third of the leg, in the shaft of the humerus, in all fractures with impaction, and moderate deformity, in most cases of fracture of the upper end of the femur and humerus and in all fractures produced by muscular action.

As regards operation, Lucas Championnière naturally prefers his own method, and reserves operations, of which he has had very great experience, to those cases which will yield to no other method.

Bennett quotes a remarkable case of complicated fracture treated by early movements and massage. In fifteen minutes the pain was gone, a distinct analgesic action having been produced. This he attributes to many causes, such as the reduction in the tension of the limb by the mechanical unloading of the muscles and to the reflex action on the nerves, which brings about the disappearance of muscle spasm. Dr. Dagrán has seen dislocation of the shoulder spontaneously reduce owing to the relaxation of the muscles during gentle massage.

At first sight it is difficult to reconcile the principles of Lucas Championnière with the contention of Arbuthnot Lane. The latter insists on absolute anatomical reduction of the deformity by operation in practically every fracture. One can see in the writings of the Parisian surgeon a fear lest Lane's method is a continuation of treatment by reduction and fixation, and that the use of plates and screws is but a glorified system of internal splints.

The two contentions are not, however, on so diametrically opposite a basis as at first sight appears. Both surgeons see that reduction, or so-called reduction, of a fracture with prolonged immobility in splints is futile. The one is able to produce excellent functional results by attention from the first to the muscles, nerves, vessels, and joints, and obtains in so doing great assistance from nature in the way of natural self-adjustment of the broken fragments. The other seeks not only good functional results, but ensures anatomical perfection in the only possible manner—*i.e.*, by open operation and the securing of the fragments by his plates and screws, which are now of world-wide fame.

As we are honoured by the presence of Mr. Arbuthnot Lane I will not describe his principles and methods.

In a well-equipped hospital the operative treatment is the best, and likely to produce results which will ensure that the labouring man is discharged quickly, suffering from no disability. In private practice, on the other

hand, when massage and careful daily attention can be obtained by paid masseurs and assistants, Lucas Championnière's treatment, or some modification of it, is the least anxious for the surgeon, and produces excellent results. In every case of fracture, where, after reasonable trial, the apposition of the fragments, as shown by an X-ray photograph, is not sufficient to guarantee a useful limb, operation is undoubtedly indicated. Such cases, too, are far from the exception.

It is unnecessary to add that when, after careful examination, little or no displacement of the bones is found produced by the injury, operation is contraindicated.

It is no exaggeration to say that to-day there is still a large body of surgeons who only nibble at the two methods of treatment referred to, and that massage and movements on the one hand and operation on the other are adopted only in a half-hearted manner. The mechanical ingenuity of these gentlemen is ever "lavishly expended in devising splints and apparatus, and the cry is 'Still they come.'"

There are some few who, disregarding the teaching of the new schools, persist in treatment by prolonged immobilisation in splints, and point to the case of the Chinese lady's foot, which was immobilised all her life, and yet the joints, even when examined microscopically, appeared in every way perfect. We are left to imagine, however, the physiological value of this microscopically perfect set of joints. To use the words of a recent writer—"It is a convincing illustration of the inutility of morphological perfection."

In conclusion, I think the medico-legal aspect of fractures to-day is of paramount importance to every practitioner. It is not so long ago since the decision against Lynn Thomas & Skryme rendered it dangerous for any surgeon to depart from lines of treatment laid down in text-books. Courts of law are for the most part in sympathy with this position, for, by the nature of their training, judges treat written authority with

great deference. But this anomalous state of affairs is surpassed in the endeavours made by tribunals with the little knowledge of medical matters which is proverbially dangerous to adjudicate in cases of fracture in civil actions under the Workmen's Compensation Acts. It is of daily occurrence in the courts to see medical expert witnesses on both sides illustrating to a bewildered judge the many-sidedness of truth. X-ray photography has rendered the lay judge still more liable to pitfalls. Very slight lack of skill or care on the part of a radiographer may lead to the production of a most deceptive picture. But, assuming a perfectly produced *bonâ fide* X-ray photograph is forthcoming, we all know what a high degree of practice and skill is necessary before it is possible to interpret what the picture reveals. The overlapping and shortening with which such an authority as Lucas Championnière is often content, provided a good functional limb is produced, will secure a verdict with heavy damages from a jury misled by the apparent simplicity of an X-ray photograph. Counsel for the plaintiff is in his element when he is pointing with relentless finger to the radiograph which shows the slightest deviation from the normal bony contour.

It is necessary that the public should be educated to the fact that an apparently bad result, as seen by a skiagraph, is not necessarily a bad result, and may be all that science can do, short of immediate operation on the limb, to which so many of the public object.

We must hope that the time is near when an extension of the medical referee system will be adopted, and, instead of employing a distinguished surgeon or physician to sit beside the judge in a few isolated cases, that the Government will appoint medical men at the same salaries as judges to adjudicate with the judges on questions which medical men alone are competent to decide.

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ART. II.—*Some Recent Clinical Experiences* (Second Series).^a By SIR JOHN MOORE, M.A., M.D., M.Ch., D.P.H., Dubl.; D.Sc. (*Honoris Causâ*), Oxon.; F.R.C.P.I.; Senior Physician to the Meath Hospital and County Dublin Infirmary; Professor of Practice of Medicine in the Schools of Surgery, Royal College of Surgeons in Ireland.

At a meeting of this Section of the Royal Academy of Medicine in Ireland, held on January 23, 1893, I read a paper entitled "Some Recent Clinical Experiences." In that communication I embodied notes of a number of cases, perhaps of every-day clinical experience, but which, in my opinion, threw more or less light upon obscure features in diagnosis and pathology or illustrated some practical points in treatment.

^a Inaugural Address to the Section of Medicine in the Royal Academy of Medicine in Ireland, delivered on Friday, November 11, 1910.