CASES
OF
FRACTURED NECK OF THE
THIGH-BONE

WITHIN
THE CAPSULAR LIGAMENT,
WITH THE
DISSECTIONS AND OBSERVATIONS.

BY
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ON the 19th of March, 1827, a specimen of fractured thigh-bone, within the capsular ligament, which had united by bone, was exhibited by Mr. Amesbury, at the Medical Society, Bolt Court. This preparation belonged to Mr. Chorley, of Leeds, by whom the patient had been attended, and by whom the history of the case was communicated.

The discussion of this case exciting considerable interest, I was induced to mention a preparation

I have in my collection of a thigh-bone, which had been fractured at its neck, within the capsule, where bony and cartilaginous union had taken place; and on another evening I showed it to the Society, with other specimens of this accident, exhibiting the various changes which take place to effect union. I also drew up a brief history of the cases and morbid appearances, adding some observations on the possibility of osseous union, and the causes of the shortening of the cervix femoris. I now take the liberty of bringing them before the members of the Medical and Chirurgical Society, with the preparations and drawings from them, hoping they will be considered deserving a place in their Transactions, which do not contain any description of similar accidents, nor of the changes they occasion.

The nature of fracture of the neck of the thigh-bone, within the capsular ligament, and the want of osseous union, has for several years engaged the attention of some of the ablest anatomists and pathologists of this and other countries.

The dissimilarity of opinion respecting the possibility or impossibility of osseous union of the fractured cervix femoris, has been great, but I believe generally in favour of non-union by bone.

This practical inference has been drawn from the numerous preparations which have been pre-

served to shew the want of osseous deposition, in this species of fracture, and the supposed absence of any specimens in which complete bony union had taken place.

These circumstances induced Sir A. Cooper to assert, in his valuable observations on this subject, that union by bone never takes place; but he at the same time judiciously admitted the possibility of this event, as will be seen by the following abstract from his *Treatise on Dislocations and Fractures of the Joints*, page 127. “ In all the examinations which I have made of transverse fractures of the cervix femoris, entirely within the capsular ligament, I have never met one in which a bony union had taken place, or which did not admit of motion of one bone upon the other. To deny its possibility, and to maintain that no exception to the general rule can take place, would be presumptuous, especially when we consider the varieties of direction in which a fracture may occur, and the degree of violence by which it may have been produced; as for example, when the fracture is through the head of the bone, and there is no separation of the fractured ends; or when the bone is broken without its periosteum, and the reflected ligament which covers its neck, being torn; or when it is broken obliquely partly within, and partly externally to the capsular ligament. But all I wish to be understood to say is, that if it ever does

happen, it is an extremely rare occurrence, and that I have not met yet a single example of it."

Having had, during my pathological pursuits, the opportunity of attending several cases of fracture of the neck of the thigh-bone within the capsular ligament, and the advantage of inspecting, in eight cases, the injured parts after death, I have long been satisfied of the possibility of union by bone, from noticing the near approaches nature had made to effect this end in the specimens I possess; but why the ossific union of fractures within the capsule was of more rare occurrence than in fractures exterior to that ligament, is still a pathological problem of difficult solution. That the arteries belonging to the hip-joint are capable of producing bony union within the capsule, there can be no doubt; nor can there be any doubt that this would take place, as in other fractures, if the parts could be kept steadily in juxtaposition, and a sufficient length of time were allowed to make the union complete.

This I think will be sufficiently evident to any who will attentively examine the preparations, which I shall proceed to describe to the Society. These preparations shew very clearly the various changes and reparative processes, which take place in the different parts connected with the hip-joint; exhibiting the gradations from the incipient to the most

complete ligamentous union; also the first attempts at union by bone, and the mode in which complete ossific union is effected. I shall describe them in the order in which they have been numbered in my collection.

No. 242. Sections of a thigh-bone, shewing an oblique fracture of the neck within the capsular ligament, also a fracture of the upper part of the shaft of the bone, between the trochanters.

The fracture within the capsule had been of the comminuted kind, several small portions of the fractured bones having remained between the separated head and neck of the thigh-bone, which had completely prevented union of any description, although these surfaces had approached as closely as the separating fragments allowed.

The neck of the thigh-bone had been nearly absorbed; the fractured bones were brought into pretty close contact by the periosteal covering; the capsular ligament was greatly thickened, and closely embraced the joint. The fracture external to the capsule, had united firmly by bone, on its outer surface, and a large process of bone had formed at the inferior part of the neck of the os femoris, giving a kind of prop or crutch to the joint. The ligamentous line, denoting the extent of the fracture, was still apparent in the internal

part of the bone, which line remains in all fractures long after the parietes have become osseous, but in time is absorbed, and bone supplies its place.

The patient was a female, 60 years of age. At the time of the accident the foot was turned outwards, and there was a slight shortening of the limb. She was confined in bed nearly twelve months: considerable shortening of the limb during this time took place, which was easily accounted for from the absorption of the neck of the femur. She could not walk without the aid of crutches.

An engraving of one section of this preparation is given in Sir A. Cooper's work. No. 1. is a drawing of the opposite half.

No. 1913. Fractured neck of the thigh-bone within the capsule, united by ligament. The capsular ligament of an immense thickness externally, from the deposition of lymph, and the internal surface thickly coated with lymph and a cartilaginous deposit. The neck of the thigh-bone completely absorbed, and the trochanter major drawn upwards and backwards on the dorsum ilii, giving the appearance of dislocation. This patient died of diseased liver, three years after the accident.

The limb at the time of his death measured four inches less than the sound one, which measurement

is shorter by two inches than in any of the cases I have seen. This preparation has been alluded to in Sir A. Cooper's work.

No. 1999. A fracture of the neck of the thigh-bone, through the base of its cervix; a specimen of very close ligamentous union. There had also been a fracture of the thigh-bone, between the two trochanters, which had united by bone.

The capsule was greatly thickened, and a deposition of osseous matter had formed on the under surface of the neck of the bone, between the trochanters, major and minor. The interstices of the cancelli of the bones are filled with the matter of medullary sarcoma.

The patient was a female, 56 years of age, who had been afflicted with carcinoma mammæ for nearly two years; and in consequence of the glands in the axilla not appearing to have participated in the morbid action, the removal of the breast was decided on, as the only chance of saving life, and the operation was performed by my friend, Mr. Lloyd. Her health, a few months subsequently to her recovery from the operation, became seriously affected, a recurrence of the disease took place in the part whence the mamma had been removed, and tumours of the fungoid character appeared under the skin, in various parts of the body; she

became greatly emaciated and enfeebled, and in attempting to get out of bed, she fell on the floor, which occasioned the fractures.

In this instance the toes were, immediately after the accident, everted, but became afterwards inverted.

To Mr. Semple, of Islington, I am indebted for the preparation and particulars of the case.

Nos. 2030 and 2031 are sections of a thigh-bone, shewing an oblique fracture of the neck within the capsule, which had united by ligament. At the inferior part of the head of the bone, an angular portion of the fractured neck remains, which is thickly covered with ligamentous matter on its fractured surface; the same change had taken place on the fractured part of the head of the bone, and firm ligamentous union had been produced between these parts and the base of the cervix femoris, the neck of the bone having been absorbed. The capsular ligament is converted into a very dense semicartilaginous substance, which adhered closely to the newly-formed joint; and for the better protection of this part, the vessels of the periosteum had formed osseous matter in abundance, between the two trochanters: thus a prop of bone is given to the angular remains of the cervix belonging to the head of the femur.

This preparation has been alluded to by Sir A. Cooper.

These specimens were taken from a gentleman 65 years of age, who was thrown from his gig, and his hip-joint so severely injured as to prevent him making the least use of it. He was taken home, and a surgeon sent for, who considered the case only a severe contusion. He remained under this gentleman's care three weeks; the patient was then seen by two distinguished surgeons, separately, who examined the limb attentively, but from the swollen state of the parts, were prevented deciding positively upon the nature of the accident.

The patient was attended for some time by one of the surgeons, who considered the injury to be in the trochanter major. After the subsidence of the inflammatory symptoms, a caustic issue was established behind that process.

After nearly twelve months' confinement he tried to use the limb with the aid of crutches; there was considerable shortening of the limb, and he was a complete cripple. Some time previous to his death he was able to walk with two sticks.

I only attended the patient during his last illness, which was occasioned by a calculus in the ureter, which had caused ulceration of this canal, and allowed the urine to pass into the cellular tissue

connecting the psoas and iliacus internus muscles, which produced sphacelation of this structure.

No. 2090. A transverse fracture of the neck of the thigh-bone within the capsule, united by ligament. A considerable portion of the neck of the bone had been absorbed, and the fractured surface of the head had been slightly excavated by the same process; afterwards these parts had been covered by lymph. A considerable portion of the fractured surface of the neck of the bone had been absorbed, and rounded off so as to make a kind of head, which is received into a concavity in the head of the bone, thus forming an artificial joint. The internal surface of the capsular ligament is more natural in structure than in the other specimens I possess, but its cellular or external surface, surrounding the inferior part of the joint, is converted into osseous matter of considerable density, which had united to a large process of bone, formed between the two trochanters, and there was a kind of joint produced between the trochanter minor and the bone on the capsular ligament. This is the nearest approach to complete union I have seen, except No. 2293, which will be described.

The patient was 52 years of age; he received the injury eight years previous to his death.

On the receipt of the accident he was taken to St. Bartholomew's Hospital, and placed under the

care of Mr. Abernethy. He remained several months in the Hospital, whence he was discharged when he was able to walk with crutches, which he continued to employ for six months after his dismissal. The power of the limb so much improved as to enable him to walk with a stick, and for a length of time previous to his death he required no artificial aid in locomotion, and there was very little lameness, merely what was occasioned by the shortening of the neck of the bone.

No. 2293. A transverse fracture of the neck of the os femoris, within the capsule, closely united by ligament. The neck of the bone had been absorbed nearly in a line with its origin from the trochanter. The asperities of the fractured surface had also been absorbed, and rounded off as they are in bones which have been sawn through in amputation; afterwards lymph had been effused, which had become highly organized, and formed a band of union between the surfaces, by strong short ligaments. Lymph had also been thickly deposited round the ligamentum teres.

A crutch of bone had not formed in this instance round the under and inferior surface of the capsular ligament, as it does in most cases.

The patient was a woman fifty-six years of age. The nature of the accident had not been discovered by the medical attendant, consequently no

mechanical means for producing union had been attempted. She was confined to her bed nearly twelve months ; at the expiration of this period, she was able to walk with a crutch. There was a shortening of two inches of the limb. She died of an active disease, sixteen months after the accident. I merely had the inspection of the body. This and the last were the most favourable cases for osseous union I ever examined, and I believe if time had been given, after the cartilaginous changes had become complete, that their place would have been occupied by bone.

No. 2857. A transverse fracture of the neck of the thigh-bone, within the capsular ligament. The neck is nearly absorbed ; there is close ligamentous union between the head and remaining neck of the bone, the capsular ligament is slightly thickened, and contracted round the brim of the acetabulum. The limb was shortened two inches. The patient was forty-nine years of age ; she died of phthisis pulmonalis, about eight months after the accident ; the cancellous spaces of the bones of the pelvis were filled by scrofulous matter. There are no signs of newly-formed bone near the trochanters in this case ; such a diseased state of bone would not be likely to form osseous union.

No. 2858. A fracture of the thigh-bone at its neck within the capsular ligament, united by lymph, which had become organized. The neck

of the bone was shortened by absorption, but not so considerably as in most of the other specimens.

The patient only lived six months after the accident; the limb was shortened one inch and a half.

No. 2859. This is a specimen of fracture of the neck of the thigh-bone within the capsular ligament; the principal part of the neck is absorbed; the head and remaining portion of the neck were united principally by bone, and partly by a cartilaginous substance. The capsular ligament was immensely thickened, and embraced the joint very closely, the cartilaginous covering of the head of the bone and acetabulum had suffered partial absorption; the internal surface of the capsular ligament was coated with lymph.

On making a section of the bone, it was evident that there had been a fracture of the neck, within the capsular ligament, and that union had taken place by osseous and cartilaginous media. With a view of ascertaining whether there was real osseous union, the bone was boiled many hours, which discoloured it; but by destroying all the animal matter, it satisfactorily proved the extent and firmness of the osseous connexion, and the vacant spaces which had been occupied with cartilaginous matter; these appearances are well exhi-

bited in two drawings, made shortly after the boiling.

This specimen was sent to me shortly after its removal from the body, by Mr. Reeves, surgeon, Ormond Street, who also favoured me with the history of the case.

The woman was a patient of Mr. Cribb's, Holborn. She was about 50 years of age when the accident occurred. The foot was everted, and there was shortening of the limb at this time, and after death it was shorter than the other full two inches and a half. She was confined to bed nearly twelve months ; during the remainder of her life, which was ten years, she walked with crutches.

No. 3105. A comminuted fracture of the thigh-bone, which had extended through the upper part of the shaft between the trochanters, and obliquely through the neck.

The patient was a woman, eighty-five years of age ; she lived fourteen days after the accident ; the periosteal covering of the neck of the bone had been lacerated, and an opening made into the capsular ligament of the joint, into which blood had been effused from the torn vessels ; as well as into the cellular substance of the muscles of the thigh, near the fractured bone.

The preparation was presented to me by Mr. Pereira.

My motive for introducing this specimen is to show to what extent a fracture of this kind may extend in old subjects, whose osseous structure may have become morbidly fragile.

OBSERVATIONS.

From the very rare occurrence of osseous union of the neck of the thigh-bone within the capsular ligament, I feel confident that the specimen I have submitted to examination will be sceptically looked upon ; but I am also certain that those gentlemen, who have been long conversant in the examinations of the various changes of tissue from læsion, and the processes of reparation nature employs, will agree with me in considering this specimen, a fracture united by bone.

Should this, however, not be admitted, I shall naturally inquire, what *accident* or *morbid action* could have produced such changes in the natural figure and structure of this bone, and also in the ligament and parts around it ?

In fractures of the neck of the thigh-bone, there

is generally at the time of the accident a shortening of the limb ; but this is not owing to a positive loss of the length of bone, except in comminuted fracture, but attributable to the glutei muscles drawing the trochanter major upwards towards the ilium.

The real shortening of the limb takes place at a remote period after the accident, from the absorption of the fractured portion nearest the trochanter ; which fact may be seen by the inspection of the various preparations.

After the asperities of the bones have been removed by the absorbents, lymph is deposited, which becomes organized ; the capsular ligament which is by this time completely altered in structure, having been greatly thickened by depositions on its internal and external surface, contracts firmly on the fractured bones ; strong ligamentous bands are formed between the fractured surfaces, which have been thus changed, and union is occasioned, which has been generally found of the ligamentous kind ; but when osseous deposition is effected, these soft media are absorbed.

In fractures within this joint, which have proceeded to such an extent as to be nearly approximated by ligamentous deposit or osseous union, the function of the joint is generally destroyed ; while in those cases, where the patient has been allowed

after several months confinement to move about with crutches, the nature of the union and the support given to the joint by bone between the trochanters, produces a more useful limb, and is preferable to those where the fracture is so closely united as to be nearly ankylosed.