

§ 3. Fissures.

These constitute the second principal form of incomplete fractures, or those in which the fracture is accompanied with no appreciable bending, which occur almost exclusively in inflexible bones, such as the compact bones of adults, and more often in the direction of their axes than of their diameters. They are complete so far as they extend, but they do not completely sever the bone so as to form two distinct fragments. They have been most frequently observed in the flat bones, such as the bones of the skull, and in the upper bones of the face; occasionally in the long bones, both in their diaphyses and epiphyses, and rarely in the short bones.

M. Gariel has reported, in the *Bulletins de la Société Anat.*, for 1835, a case of fissure of the inferior maxilla, occurring in a lad sixteen or eighteen years old. Palletta found a fissure extending partly through the third dorsal vertebra, in a man who had fallen upon his back eleven days before; and M. Lisfranc has mentioned a remarkable case of fissure and partial fracture, with bending of five ribs in the same person.¹ Malgaigne believes that he has seen one example of this variety of incomplete fracture of the scapula, occurring through a portion of the infrapinnous region. I have myself elsewhere recorded another, as having been found in the skeleton of Nimham, an Oneida Indian, who was a great fighter, and who died when about forty-five years old in consequence of severe injuries received in a street brawl; but his death did not occur until four or five months after the receipt of the injuries.

In addition to this fracture of the right scapula, five of his ribs were broken, and both legs, all of which, except the scapula, had united completely by intermediate and ensheathing callus.

The scapula was broken nearly transversely, the fracture commencing upon the posterior margin at a point about three-quarters of an inch below the spine, and extending across the body of the bone one inch and three-quarters, in a direction inclining a little upwards, being irregularly denticulate and without comminution. The fragments were in exact apposition, and, throughout most of their extent, in immediate contact. They were, however, not consolidated at any point, but upon either side of the fissure there was a ridge of ensheathing callus, of from one to three or four lines in breadth, and of half a line or less in thickness along the broken margin, from which point it subsided gradually to the level of the sound bone. The same was observed upon the inner as well as upon the outer surface of the scapula. The callus had assumed the character of complete bone, but it was more light and spongy than the natural tissue, and the outer surface had not yet become lamellated. Its blood-canals and bone-cells opened everywhere upon the surface.

Directly over the fracture, and between its opposing edges, no callus existed, but as the bone had lain some time in the earth before it was exhumed, it is probable that a less completely organized intermediate

¹ Des Fract. Incomplet. et des Fissures, par J. A. J. Campagnac, 1829, p. 20.

callus had occupied this space, and that, owing to the less proportion of earthy matter which it contained, it had become decomposed and had been removed.

M. Voillemier found the head of the humerus penetrated by two or three fissures;¹ and M. Campagnac has reported the case of a lad ten or twelve years old, who was compelled to submit to amputation of his arm at the shoulder-joint, in consequence of a severe injury, in which the humerus was found fissured from the insertion of the deltoid to near the condyles, extending through the entire thickness of the bone, and the edges of the fissure so much separated toward its lower extremity as to admit the blade of a knife.² Chaussier has related a case in which a criminal, who died soon after having submitted to the torture, was found to have a nearly longitudinal fissure of the radius in its upper fourth, and which penetrated half way through the thickness of the bone.³ Gulliver saw a fissure in the pelvis of an infant.⁴ Malgaigne has seen two specimens of this fracture in the iliac bones, both of which belonged, as he thinks, to adults; in one, the fissure was limited to the internal table;⁵ and in the case of the lad reported by Gariel, as having a fissure of the inferior maxilla, there was also found a fissure of the left ilium, but which was limited to the outer table.⁶

M. J. Cloquet has mentioned a case of fissure of the shaft of the femur passing through the condyles and extending upwards to near the middle of the bone. The fissure was produced by a bullet, which had completely traversed the bone from behind forwards, a little above the condyles.⁷ M. Malgaigne has also represented, in one of his plates, a fissure of the femur extending along the front of the bone, somewhat irregularly, from a point a little below the trochanter minor to near the condyles.⁸ The bone was presented to the museum of Val-de-Grâce, by M. Fleury; but it is to be regretted that we have no farther account of this remarkable specimen. Certainly in the complete absence of any farther history of the case, one might be justified in expressing a doubt whether it was not a fissure occasioned by the contraction consequent upon exposure, and drying after death.

The following account of a fissure of the neck of the femur, of the same character with those which now occupy our attention, is copied from the proceedings of the "Boston Society for Medical Improvement," at its regular meeting in September, 1856:

"*Partial Fracture of the Neck of the Femur in a man at. 44 years.* Specimen shown by Dr. Jackson. The fracture, which appears as a mere crack in the bone, commences anteriorly just above, but very near to the insertion of the capsular ligament, runs along the insertion for about an inch, and then extends directly upward to the margin of the head of the bone. From this last point it crosses the upper surface of the neck almost in a straight line, and at a little distance from the mar-

¹ Malgaigne, op. cit., p. 35.

² Campagnac Des Fract. Incomplet., etc., p. 24.

³ Méd. Légale, p. 447 et seq.

⁴ Gazette Méd., p. 1835, p. 472.

⁵ Malgaigne, op. cit., p. 34.

⁶ Bulletins de la Soc. Anat., 1835, p. 24.

⁷ Thèse du Concours de Pathol. Externe, 1831, pl. xii. fig. 7. Also, Des Frac. etc., par Campagnac, 1829, p. 19.

⁸ Malgaigne, op. cit., p. 37, pl. 1 fig. 1.

gin of the head, but afterwards approaches very closely to this margin posteriorly; it then turns downward and obliquely forward, and stops at a point about half way between the small trochanter and the head of the femur, and two-thirds of an inch or more anteriorly to the line of this trochanter. The fracture then involves about three-fourths of the neck of the bone; the inner anterior portion only being spared. There is considerable motion between the neck and the shaft, and the fracture could undoubtedly be completed without the application of any extraordinary force. Dr. J. referred to other cases of partial fracture; but a fracture of this sort, as occurring in this situation, and in a fully adult subject, he believed had never before been described, there was, also, in this case, a transverse fracture of the same femur midway, with a split extending upward nearly to the neck of the bone; and still further, a fracture of the spine. The patient, a laboring man fell through two stories of a building and down upon a hard floor. On the same day he entered the Massachusetts General Hospital, and on the eighteenth day from the time of the accident he died. The femur is perfectly healthy in structure, and no changes are observable in the bone about the fracture."¹

Whatever doubts may have been thrown upon the possibility of this accident, as applied to the neck of the femur, by the ingenious arguments of Robert Smith, of Dublin,² the question is now at least determined by an incontestable fact. Dr. Smith had rendered it quite probable that both Colles and Adams were mistaken, and that the cases described by them were examples of impacted fracture, and not of partial fracture; but in arguing the improbability of its occurrence, from the infrequency of fractures of the neck of the femur in early life, he overlooked the fact that there were two forms of incomplete fractures, and that it was only the "green-stick" fracture which belonged mostly to childhood, "fissures" being found most often in the bones of adults. Indeed, I think the example recorded by Tournel in the *Archives de Médecine* had already, so early as the year 1837, established the possibility of a "fissure" in the neck of the femur; although by Malgaigne this case has been mentioned as an example of that other variety of partial fractures which is almost peculiar to childhood, and in which the bones yield quite as much by bending as by breaking. But the man was eighty-five years old, and, having died three months and a half after the accident, a long crevice was found, extending nearly through the neck of the femur, partly within and partly without the capsule.

I have seen, in Dr. Mütter's valuable collection of bones at Philadelphia, a specimen of fissure of the trochanter major, which, it is believed, occasioned the death of the patient by hæmorrhage.

Gulliver says there is an example of a fissure in a patella belonging to the museum of the Edinburgh College of Surgeons, the fissure traversing its articular face only.³

¹ Bost. Med. and Surg. Journ., vol. iv. p. 351. See also Amer. Journ. Med. Sci. for 1857, p. 306, with engraving; and Bigelow on Hip-joint, p. 137.

² Treatise on Fractures in the vicinity of Joints, etc., by Robert Wm. Smith, Dublin, 1854, p. 44 et seq.

³ Malgaigne, op. cit., p. 35.

The first example of a fissure of the tibia is recorded by Corn. Stalpart Vander-Wiel, in 1867; and indeed this is, according to Campaignac, the first exact observation of this species of fracture which our science possesses, although its existence had been recognized by the most ancient authors. A servant had been kicked by a horse, and after a time, pain continuing in the limb, his surgeon, Dufoix, suspected a fissure of the tibia, and having cut down to the bone, a cure was soon effected.¹

In the Dupuytren Museum, at Paris, there are two tibiæ with linear fractures, one without history, and the other presented by MM. Marjolin and Rullier, "and which had been broken by a ball."² In the example related by Campaignac, a woman, having leaped from a second-story window, died immediately, and upon examination she was found to have three fissures in the upper portion of the left tibia, of which only one entered the articulation.³

Many examples of fissure from "perforating" gunshot wounds of the bone have been observed during the late war in this country, but as these examples belong peculiarly to military surgery, they will be discussed more at length in the chapter on gunshot fractures.

Duverney saw a priest who had fallen and bruised the middle of his left leg, the swelling and pain consequent upon which were subdued after a few days. The patient believed himself cured, and acted accordingly. Suddenly, in the night, he was seized with an acute pain in the limb; and on cutting down to the bone, a bloody serum escaped from between it and the periosteum, and the bone was discovered to be fissured longitudinally. Subsequently the tibia was trephined, but the fissure did not reach the marrow. He recovered completely in less than two months.

The same writer mentions another case, in which a soldier received the kick of a horse in the middle of his left leg, which was followed immediately by great pain, and subsequently by much inflammation, and even gangrene of the skin. The wound, however, cicatrized kindly, but after three months he was seized suddenly with a severe pain in the limb, and after the trial of many remedies, resort was finally had to the knife, when the tibia was seen to be discolored and cracked longitudinally. On the following day, the bone was opened over the course of the fissure with a chisel and mallet, and the patient was at once relieved by the escape of a yellowish and very offensive matter. At the next dressing the bone was opened more freely by several applications of the trephine, and an abscess was exposed in the centre of the bone. The patient finally recovered after about four months.⁴ M. Campaignac saw, also, at the Hôpital la Charité, the tibia of a woman, æt. 38 years, upon which were found four fissures, the report of which case is accompanied with a wood-cut illustration.⁵

Fissures may occur probably at all periods of life, but they are more frequently found in the bones of adults. Campaignac, however, mentions a fissure of the humerus in a child ten or twelve years old, and Gulliver has seen a fissure in the pelvis of an infant.

¹ Campaignac, op. cit., p. 17.

² Campaignac, op. cit., p. 21.

³ Campaignac, op. cit., pp. 21, 22.

⁴ Malgaigne, op. cit., p. 36.

⁵ Malgaigne, op. cit., p. 39 et seq.

Etiology.—Fissures may be occasioned by most of those causes which produce fractures in general, such as direct or indirect shocks; but they are occasioned much more often by direct blows, especially when inflicted upon bones imperfectly covered by soft parts, such as the tibia. Bullets, having violently struck or penetrated the bone, have frequently occasioned fissures.

Their course may be parallel with the axis of the bone, oblique, or transverse; they are often multiple; some merely enter the outer laminae, others open into the cellular tissue, and others still divide both surfaces of the bone through and through; and, according as they penetrate more or less deeply the bone, their lips will be found to be more or less separated. They frequently extend into the joint surfaces.

Diagnosis.—The signs which indicate the existence of a fissure must, in a large majority of cases, be insufficient to determine fully the diagnosis during the life of the patient. It is not probable that such fissures could ever be clearly made out by the touch alone, where the skin is not broken, since the pain, swelling, suppuration, etc., are only characteristic of inflammation of the bone or of its coverings, and might be equally present whether a fracture existed or not. In those rare cases only in which the flesh is torn off, and the surface of the bone is brought directly under the observation of the eye, will the diagnosis become certain.

Treatment.—Fortunately, an error in judgment in this matter will not materially, if at all, prejudice the interests of the patient; since, whatever may be the fact in other respects, if the bone, or its periosteum, or its medullary tissue, is inflamed, and rest, with antiphlogistics, does not accomplish its speedy resolution, incisions and perforations become inevitable, if we would give either safety or relief to the sufferer. Accordingly, in the inflammation and suppuration consequent upon these fractures, we have seen that it has been occasionally found necessary to lay open the soft tissues freely, and even to trephine the bone at one or more points.

Fissures in Cartilage.—I have once met with a fissure in the thyroid cartilage, which constitutes, so far as I know, the only example upon record of a fissure in cartilage.¹

¹ Buffalo Med. Journ., vol. xiii., article entitled Fracture of the Thyroid Cartilage.

CHAPTER IX.

FRACTURES OF THE NOSE.

§ 1. Ossa Nasi.

OF twenty-five cases of fracture of the ossa nasi recorded by me in my first edition, only fourteen were seen by a surgeon in time to afford relief. It seemed to me necessary, therefore, that the student should be instructed how frequently the nature of this accident is overlooked by the friends, and even by the surgeon himself, to the end that he might be thus admonished of the necessity of always instituting, in such cases, careful and thorough examinations. In some of the cases recorded in my notes, where surgeons were called in time, and a deformity remains, it is not improbable that the accident was not recognized. The rapidity with which swelling ensues after severe blows upon the nose, concealing at once the bones, and lifting the skin even above its natural level, explains these mistakes. The nose, also, is remarkably sensitive, and the patient is often exceedingly reluctant to submit to a thorough examination. It ought, however, not to be forgotten that the omission on the part of the surgeon to do his duty will not always be excused, even though the patient himself has protested against his interference, especially where an organ so prominent, and so important to the harmony of the face, is the subject of his neglect or mal-adjustment; since the most trivial deviation from its original form or position, even to the extent of one or two lines, becomes a serious deformity.

When the ossa nasi are struck with considerable force, from before and from above, a transverse fracture occurs usually within from three to six lines of their lower and free margins, and the fragments are simply displaced backwards; or if the blow is received partially upon one side, they are displaced more or less laterally. This is what will happen in a great majority of cases, as I have proved by examinations of the noses of those persons who have been the subjects of this accident, and by repeated experiments upon the recent subject.

These fragments are generally loose, and easily pressed back into place by the use of a proper instrument. A silver female catheter, which we have seen recommended by surgeons, may answer well enough in a few instances, but it will more often fail. The diameter of the meatus at the point where the instrument must touch in order to make effective pressure upon the ossa nasi, is on the average not more than two lines; and when the membrane which lines it is injured, it becomes quickly swollen, and reduces the breadth of the channel to a line or less. Under these circumstances, any instrument of the size of a female catheter could only be made to reach and press against the nasal process of the superior maxilla, which is too firm and unyielding to allow it to