CASES
OF
INTRA-UTERINE FRACTURE,

WITH OBSERVATIONS

TO SHOW THE ANALOGY BETWEEN FRACTURE IN UTERO
AND CONGENITAL DISTORTION.

BY

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THERE are several instances of fracture of the bones of the foetus on record—instances both of simple and of compound fracture. Thus, Montgomery states: "I saw a woman, eight months pregnant, fall from a window twenty-five feet into the stony street, on her face; her hip-joint was dislocated, and her face and hands cut, but the uterus was not ruptured. She was delivered that night of a dead child, which had some of its bones broken, and had sustained several other injuries. She recovered perfectly."¹ There are also numerous instances of fracture of the foetal skull on record, as well as of depression of the cranial bones.

Such cases are related by Montgomery,² West,³ W. J. Schmitt,⁴ Meissner,⁵ Schnuhr,⁶ D'Outrepont;⁷ and by

¹ 'An Exposition of the Signs and Symptoms of Pregnancy,' Case 42, p. 680, 2d edit., 1856.

² Ibid.

³ 'Med.-Chir. Transactions,' vol. x, 2d series, 1845.

⁴ 'Abhandlungen der Physikalisch-Medicinischen Societät zu Erlangen,' Band ii, s. 60, 1812.

⁵ 'Kinderkrankheiten,' Band iii, 1826.

⁶ 'Medicinische Zeitung von dem Verein für Heilkunde in Preussen,' N. 32, s. 152, 1834.

⁷ 'Neue Zeitschrift für Geburtskunde,' Band ii, s. 116.

Osiander, Roederer, Schilling, Flügel, Baudelocque, and others. Rokitsansky says, speaking in reference to "Anomalies and Diseases of the Osseous System:" "There is a remarkable form of incomplete fracture, in which a bone becomes bent. It occurs on flat bones, like the skull, as well as on long bones. It is produced sometimes by sudden and violent mechanical force, sometimes by more gentle means, which act through a longer period, either uniformly or with intermissions. Its occurrence is favoured by the softness of the bones, which in foetal life and in childhood exists naturally, but in subsequent periods of life is a morbid condition. These inflections of bone are chiefly observed in the skull of the new-born child, as a consequence of the pressure which the head has undergone from the pelvis of the mother or the forceps of the accoucheur. They may, however, be occasioned by accidental or intentional violence after birth, or they may take place in the bones of the limbs of persons who are affected with rickets or osteomalacia. They may be brought on by mechanical violence or by excessive muscular contraction."¹

There are also cases, such as those to which allusion has just been made in the last quotation, where the skeleton is cartilaginous or very imperfectly ossified at birth, and where solutions of continuity have been found. Such a case is related by Sartorius² as congenital rickets. The same case, however, has been quoted by Graetzer³ and others as one of intra-uterine fracture. Other cases of the same kind are reported by Amand,⁴ Chaussier,⁵ Mansfeld,⁶ Barker,⁷ D'Outre-pont,⁸ and others, as instances of intra-uterine fracture. Thus,

¹ 'A Manual of Pathological Anatomy,' p. 141, vol. iii, Sydenham Society's edition.

² 'Rhachitidis Congenitæ Observationes.'

³ 'Die Krankheiten des Fötus,' 1837.

⁴ 'Nouvelles Observations sur la pratique des Accouchemens,' obs. 8, p. 92, 1714.

⁵ 'Bulletins de la Faculté de Médecine de Paris,' No. 3, p. 306, 1813.

⁶ 'Journal der Chirurgie von Gräfe und Walther,' Band xix, s. 552, 1833.

⁷ 'British Medical Journal,' Sept. 26, 1857.

⁸ 'Abhandlungen und Beiträge Geburtshülfflichen Inhalts,' s. 233, 1822

allusion has now been made to intra-uterine fractures where the bones are healthy, to fractures which have taken place during labour, and to solutions of continuity through congenital rickets. But the cases to which I desire to invite the attention of the Society this evening are those where, fracture in utero having occurred, reunion, more or less complete, has been found at birth; or where the appearance of the wound has been such as to lead to the conviction that fracture had occurred some days or weeks before birth. These cases are rare, and, inasmuch as they are scarcely alluded to by British authors, I may be allowed to cite some few cases before I record two instances of a similar character which have lately occupied much of my attention.

Professor Ploucquet, of Tubingen, writes thus: "A pregnant woman fell on the abdomen, and gave birth, seven weeks after the accident, to a seven-months child. It was observed, at birth, that the left femur was upraised and deformed in the middle of its shaft. The child died twelve days after birth, when it was seen that the broken ends of the bone had overlapped, and had thus united firmly, and that callus was thrown out around them."¹

The following case is related by Kopp: "A woman, æt. 30, whilst in the thirty-fourth week of her first pregnancy, fell into a pit, where she remained lying and unable to move. For many weeks after, and indeed until the termination of pregnancy, she experienced pain on the left side of the abdomen. The movements of the fœtus were not felt after the fall. Six weeks after the accident she gave birth to a boy; it was a normal, head presentation, and the birth was easy and rapid: it took place without instrumental interference. The right leg was short and misshapen, the tibia having been fractured near the middle of the bone. At birth there was a wound which corresponded to the fracture, and from which a slight serous discharge exuded. On examination, seven months after

¹ Loder's 'Journal,' Bd. ii, s. 782, 1800.

birth, a callus was found around the tibia and the fibula.”¹

Devergie read the following case before the Académie Royale de Médecine, February 24th, 1824 :—“ Fracture and reunion of the Clavicle in a Fœtus in Utero.—A woman, in the sixth month of pregnancy, fell from a high seat, and struck the abdomen forcibly against the angle of a table. The pain was excessive, and lasted for a considerable time without abatement. At length, however, it ceased, and at the ordinary period of parturition a healthy child was born, but with a considerable swelling on the left clavicle. The child died on the eighth day, when, on examination, a firmly reunited fracture of the clavicle was found, the ends of the bone slightly overlapping.” The preparation, he goes on to say, is in the museum of the hospital of Val de Grâce.

Carus relates, that “ a strong young person, a servant, named Caroline Henriette W—, æt. 25, on the 31st of March, 1826, fell on the abdomen, being then in the sixth month of pregnancy. Immediately after the accident violent movements of the fœtus were felt ; from that time, however, they became fainter and fainter. At the usual time a small, ill-nourished child was born ; it was feeble, and showed but indistinct signs of life. On the right leg was a transverse wound, three fourths of an inch in length, extending from the outer to the inner malleolus, and corresponding to it was a fracture of the tibia. The fractured extremity of the bone appeared in the wound, and was directed outwards ; the periosteum was destroyed, and the lips of the wound were pale and flabby. The broken bone was replaced, but the edges of the wound fell into a state of sphacelus ; necrosis of the tibia took place, and the child died on the thirteenth day.”²

Schubert mentions that a child was born with compound fracture of the left femur. The bone protruded fully

¹ ‘Jahrbücher f. d. Staatsarzneikunde.’

² ‘Gemeinsame Deutsche Zeitschrift für Geburtskunde,’ Band ii, s. 31, 1828.

one inch, and it was carious. This child was one of twins.¹

Hofmedicus Sachse states that "a healthy peasant, æt. 42, who had already given birth easily to eight children, fell, whilst in the third month of pregnancy, on the ice, striking her left side, without, however, causing much pain. She had already felt the movements of the fœtus for a week. When she was rather more than five months advanced in pregnancy she fell from a ladder, and again struck her left side, against a block of wood. When she stood up after the accident, she felt a pricking pain in the lower part of the abdomen, and this pain became insupportable when she was recumbent and on her side. Blood escaped, *per vaginam*, on the third day, but abortion did not take place. For eight or ten days the movements of the fœtus were not felt, and when they returned they were accompanied with pricking pain, which pain lasted until the termination of pregnancy. At the full period of gestation a small and feeble, but living, child was born. There was an oblique compound fracture of the tibia and fibula of the right side, the lower ends of the broken bones being drawn upwards. The uterus had been wounded at each movement of the fœtus by the projecting bone; hence the pain which had been excited. At birth the fracture had reunited. The fractured leg was one inch and three fourths shorter than the other, and it was half an inch smaller in circumference. On the foot were only three toes. Also, the right arm, which had likewise suffered, was smaller than the left, and on the hand there were only three fingers."²

I am indebted for the following case to Dr. Richardson. It occurred in the practice of Dr. Moffat, of Hawarden, and the details were sent to Dr. Richardson, for his Fothergillian Prize Essay, 'On the Diseases of the Fœtus in Utero.'

¹ 'Archives Générales de Médecine,' tome xvi, p. 288, 1828.

² 'Hufeland's Journal der praktischen Heilkunde,' Band lxiv, s. 27, 1827.

"On May 10th, 1846, I was requested," writes Dr. Moffat, "to visit Mrs. E—, who was in labour. On the night of the 4th of April previous, on going over the snow, she slipped, and fell with all her weight upon her right side, on the upper rail of a stile, over which she was climbing. The fall gave her so much pain that she could not move from the spot for a considerable time. The pains were, as I infer from her description, uterine. After she had rallied she walked home, and had to remain in bed for a few days. There was considerable ecchymosis on the right side of the abdomen. Ultimately she completely recovered, and went on well to the full period of utero-gestation.

"The labour was natural; it was a first pregnancy. When I was satisfied that the mother was doing well and was safe from immediate danger, the nurse directed my attention to the child, whose right arm was not, as she said, all right. I found a swelling on the lower third of the humerus, and on examination detected crepitus. There was here an ununited fracture, and the enlargement, I concluded, was produced by osseous matter. On examining the forearm, another swelling was detected, but union was complete. In the lower extremities I found the right much enlarged by osseous tissue, in the same manner as though it also had been fractured. I found also, on measurement, certain remarkable differences. The length of the sound arm, from the acromion of the scapula to the external condyle of the humerus, was three inches. This space in the fractured arm was two inches and a half. The girth of the sound arm was two inches and three fourths; that of the fractured arm at the fractured part was five inches. The length of the sound forearm was two inches and one fourth; of the fractured forearm two inches. The length of the healthy thigh, from the trochanter major to the external condyle, was three inches and a half; its girth was three inches and three fourths. The length of the injured thigh was three inches and one fourth; its girth at the fractured part was five inches and three fourths."

CASE 1.—In February, 1858, Mr. W. H. Gardner asked me to see, with him, a young lady, æt. 13, of whom the following is the history. About three weeks before giving birth to this child, her mother fell down a flight of stairs: she struck the abdomen in falling, and was much hurt. She was at that time in the seventh month of pregnancy; uterine pains were felt, and it was thought that parturition would take place: the child was not born, however, until three weeks after the accident. At birth it was observed that there was considerable swelling about the right knee, which increased somewhat, and in the course of a fortnight discharged a small quantity of purulent matter. There was also a second swelling, in the neighbourhood of the trochanter, which, however, subsided without opening, and the bone in this position did not appear to be affected. At the knee, however, it was remarked, as the swelling subsided, that an abnormal condition of the bone existed. It was soon found that the leg could be only partially flexed, and that it could not be fully extended. Both the thigh and the leg were somewhat smaller than on the opposite side. When the child began to walk, the knee was thrown inwards, and the foot was directed outwards. The leg was soon found to be shorter than the other; and in consequence, the child wore a thick sole to her boot, to compensate for the deficiency in the length of the leg. Distortion, notwithstanding, increased. It was therefore recommended that artificial support should be given to the leg; and a steel support, from the hip to the foot, was consequently worn from her fourth year until I saw her.

On examination, I found that the foot was six and a half inches from the ground, that the knee was much inverted, and that the foot was directed outwards. The limb was much smaller, as well as shorter, than the other, and the motion at the knee-joint was very limited; the leg could not be fully extended, and it could not be flexed to a right angle. Further, there was no power to raise the foot, in extension, higher than three inches, and even at that height it could only be maintained for a minute or two. The

thigh, however, could be well flexed on the pelvis. Without support, a single step could not be made. The muscles of the calf of the leg were contracted, so that the foot could not be flexed to a right angle.

It appeared to me that there had been a fracture through the epiphysis, separating the inner condyle of the femur, which, being somewhat rotated outwards, projected in front of the shaft of the femur. In consequence of the insufficient support for the head of the tibia, the internal lateral ligament had yielded, the knee had become inverted, and the hamstring muscles had become contracted.

Mr. Fergusson saw this case in consultation, and expressed his belief that it was probably an instance of intra-uterine fracture. It was determined to divide the tendons of the hamstring muscles and the tendo Achillis: which having been done, the leg was gradually extended, and the foot was flexed; the inversion of the knee also was overcome, so that considerable length was added to the limb; and, with some addition to the sole of the shoe, this young lady is now (nearly two years having expired) able to walk without artificial support and without limping. Before the tendons were divided she never attempted to walk, even in the house, without a stick; but now she never uses a stick, nor does she use artificial support except when she walks farther than the garden of the square in which she resides.

CASE 2.—In December, 1858, I saw, with Dr. Gream, some few hours after its birth, a puny child, which was so starved in appearance that its chances of life seemed to be very small. The trunk and head were well formed, but the forearms and legs, and the hands and feet were abnormal. The ulna in each arm was wanting in its lower half, and the fibula of each side was also wanting in its lower half. The radius of either side was much bent inwards, and the tibiæ had been fractured at the junction of the middle with the lower third of each bone. These bones had been broken obliquely, and the skin had been wounded at the seat

of fracture. At birth, the fractures had firmly reunited, and the skin was slightly adherent at the seat of fracture. Reunion had taken place irregularly, the lower portion of the fractured bone having been drawn upwards. A sharp projection was thus formed, which seemed to endanger the covering skin : this was especially the case on the left side. There was double talipes varus, and on each foot were only four toes ; the fifth, or little, toe being absent. On the right hand were three fingers, *i. e.* a thumb, index and middle fingers ; the nails of the two fingers were fused, so as to form a single nail with a central depression, which corresponded to the web of the fingers. The fingers and thumb were webbed to their very tips. On the left hand there were only two fingers, the index and middle fingers, which, also, were webbed, as in the right hand. In each hand, carpal and metacarpal bones corresponded to the fingers. The left hand was drawn outwards by the action of the muscles. The radius and the metacarpal bones were shorter on the left than on the right side.

With regard to the probable causes of the deformities in this child, it may be mentioned that, during the fourth month of pregnancy, the mother fell, without, however, materially injuring herself, in running down a steep descent in Switzerland ; and, again, that in travelling to London from the seacoast, the engine broke down and was detained in a railway tunnel for one hour, and, whilst in this position, the express train ran into that in which this lady was seated. A severe concussion was the result, but, beyond the shake and the fright, she was not injured. This accident occurred six weeks before parturition. The child was born at the full period of utero-gestation.

I may mention that, after the tibial tendons had been divided for the removal of varus, I endeavoured, by means of moderate pressure and the use of splints, to straighten the leg-bones. I found, however, that very little impression was made on them, but that the tendo Achillis was rendered extremely tense. It was only after this tendon had been divided that the bones could be efficiently acted on.

It must be admitted, I think, that intra-uterine fracture may occur as an effect of physical injury. Evidence appears to be strongly in favour of this point. Some have thought that these injuries to the fœtus are induced by *contre-coup*. But when we remember that the fœtus is surrounded by the liquor amnii, and that it receives a certain amount of support from the walls of the uterus, we shall probably incline to the opinion that the effect of *contre-coup* on the fœtus in utero is impossible.

Distortion not unfrequently exists together with fracture. And, entertaining a confirmed opinion with regard to the origin of congenital distortions, Dr. Little¹ has expressed his belief that the origin of intra-uterine fracture and congenital distortion is similar. It has been contended by some that these fractures and distortions are produced by the pressure of the walls of the uterus. Thus, we find Scheffel,² in the middle of the last century, supporting this view. And, at an earlier period, Ambroise Paré³ asserted an equally well-founded belief, namely, that congenital distortions were produced by the mother sitting cross-legged. Rudolphi,⁴ however, showed that congenital distortions could not owe their origin to pressure in utero, since they were not unfrequently found to exist in the embryo at the third and fourth months. At this day his opinion prevails throughout Europe. If such, then, is the fact, that the limbs of the fœtus cannot be compressed by the walls of the uterus, we may discard also this theory, and assert, as of *contre-coup* so of compression, that fracture from one cause or the other is impossible, *so long as the membranes remain unruptured*. But if these causes are removed, we are thrown back upon the muscles as the only remaining cause of fracture and distortion. And here I would cite two instances of distortion, as illustrations of the mode in which abnormal

¹ 'Lectures on the Deformities of the Human Frame,' p. 329, 1853.

² 'De Fœtu natibus in partu prodeunte, Observationes et Analecta,' 1770.

³ 'Les Œuvres,' 1641.

⁴ 'Grundriss der Physiologie,' 1823.

muscular action may be excited in the fœtus. It will be seen that in these cases (which have long been published)¹ a somewhat similar cause gave rise to distortion as, in the cases already related, produced fracture. And this being the case, there can be no difficulty in admitting, with Dr. Little, that abnormal muscular action, however excited, is the cause, not only of congenital distortions, but of fractures in utero.

CASE 3.—Early in 1852 the wife of a Lincolnshire farmer, returning home in the dusk of the evening, came unawares on the edge of a deep dyke, in which were from eight to nine feet of water, and into which another forward step would have carried her. She was alone at the time, and only saved herself from imminent destruction by a great and sudden muscular effort. Naturally, great emotion was excited by the danger and her escape from it. She was at this time in the sixth month of pregnancy. Until this occurrence she had felt the ordinary movements of the fœtus; from this time, however, they ceased, and she expressed her belief that her child was dead. On the fourth day after this event, however, a tremulous motion or slight fluttering was experienced, and this motion increased, until the movements of the fœtus were again felt, as before the accident. Parturition took place at the eighth month of utero-gestation: the child was very small and feeble, and it was affected with double club-foot and double club-hand. No other abnormality existed.

CASE 4.—A robust woman, who was six months advanced in pregnancy, fell into an opening which had been left during the evening uncovered. She was hurt by the fall, but, after a short time, was able to proceed home. At the eighth month of utero-gestation she gave birth to a child, who had double club-foot and double club-hand. No other distortion or abnormality existed. This person had previously given birth to two healthy children.

¹ 'On Club-foot and Analogous Distortions.' By B. E. Brodhurst, 1856.

Now, if, for a moment, we remove from consideration all those cases of rachitic origin which have been treated of indifferently by Grätzer and others as intra-uterine fractures, and confine our attention to those more notable cases of fracture where the bones have been healthy, we shall find that in every instance a severe mechanical injury has been received. Further, in almost every case of excessive congenital distortion with which I have met, some accident, involving violence and personal injury, has occurred during pregnancy. Fracture in utero and congenital distortion would seem, then, to have this in common, that physical injury has excited abnormal muscular action in the foetus. If this be admitted, then every case of intra-uterine fracture and congenital distortion (whether the bones be healthy or ossification be most incomplete; whether fracture be partial, complete, or compound; whether distortion be slight or excessive) may be similarly explained, cause and effect varying, not alone; perhaps, as the cause varies, but as the effect of the injury is modified by temperament and other like condition.

The importance of this subject in a medico-legal point of view must plead my apology for the length at which I have stated my views in presenting these two cases to the Society. I must own that the more I reflect on the subject the closer and more striking does the analogy appear between fracture and distortion in the foetus.

Malformation is frequently observed to exist together with fracture and with distortion. It must be considered merely as a coincidence, however, favouring in some instances fracture and in others distortion. It has its origin in the germ, and therefore is not essentially connected either with fracture or with distortion.