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TWO CASES

OF

RUPTURE OF THE CRUCIAL LIGAMENT

OF THE

KNEE-JOINT.

By JAMES STARK, M.D., F.R.S.E.

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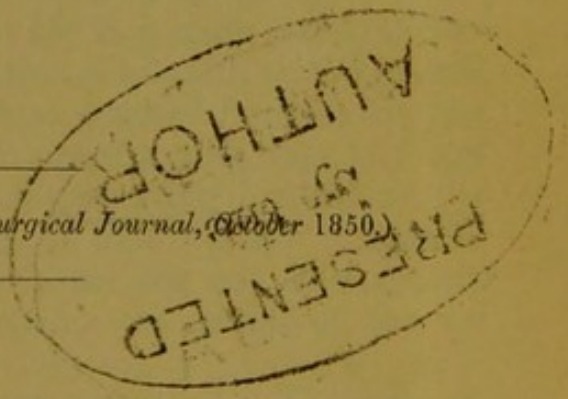

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EDINBURGH:

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MDCCCL.

TWO CASES OF RUPTURE

OF THE

CRUCIAL LIGAMENT OF THE KNEE-JOINT.

Mr S., on the evening of 8th June 1839, was wrestling in sport with one of his friends, when their legs got interlocked, and something gave way in his right leg with a snap, audible to the others in the room, and he fell down. Those in the room, from hearing the snap, imagined it was the bone of the leg, or of the thigh, which had broken across; but Mr S. himself was so unconscious of having received any injury, that, while still on the ground after his fall, he said the noise must have resulted from his trouser-strap giving way. He therefore attempted to rise, when he found he had completely lost the power of supporting himself on the right leg, and that the trouser-strap of that leg was uninjured. Several medical friends being present, his leg was immediately examined, for the purpose of ascertaining the nature of the injury.

The bones of the thigh and leg were uninjured. There was no dislocation of either ankle or knee-joints; no displacement of the knee-pan; no rupture of the *tendo Achillis*, or of any of those around the knee-joint. He had the perfect command of all the motions of the ankle-joint, and, when sitting, appeared also to have the command of the knee-joint, in so far as its ordinary motions were concerned. When he assumed the erect posture, the knee-joint was found to be preternaturally moveable; and whenever any weight was endeavoured to be thrown on the right leg,

the knee fell against the left leg, *and bent with equal facility forwards or backwards.* When he sat on the ground with the legs stretched out, the slightest pressure on the patella caused the foot to be thrown upwards, *and the leg could be bent forwards on the thigh to a certain extent.* No pain was complained of in the knee-joint, but only a sensation of weariness; and there was no redness, or swelling, or effusion of blood.

The whole symptoms, then, clearly indicated rupture of the crucial ligament of the knee-joint, and the same evening the injury was received, I made several trials to ascertain the accuracy of the diagnosis. When the knee was bound tightly with a handkerchief, and kept slightly bent, the patient could almost bear the weight of the body on it, but the moment he endeavoured to straighten the limb, he lost all command of the joint, *the knee bent backwards under him,* and he fell to the ground unless supported. When the leg was bent on the thigh, at nearly a right angle, all the tendons of the muscles of the thigh which form the outer and inner hamstrings could be distinctly traced, none were ruptured. The lateral motion of the tibia on the thigh-bone, though freer than usual, was yet so very limited, that there was no reason to conclude the lateral ligaments were injured.

No feverishness, no heat, no redness, no discoloration, no swelling followed the injury. Only very slight effusion within the knee-joint occurred, but this to such a limited extent as scarcely to cause floating of the patella when the limb was straightened.

As I could find no case of a similar injury on record, to guide me as to the position in which the limb ought to be confined, I resolved to fix it in a nearly, but not quite, straight position,—just so slightly bent as to allow the flexors of the leg to have a slight advantage over the strong extensors attached to the patella. This position was adopted;—*first,* from the belief (founded on the observed non-healing of the round ligament of the head of the femur after its rupture) that the ruptured crucial ligament would not heal; *secondly,* from the belief that if the knee-joint were confined, as most likely it would be, for months to a bent position, the flexor muscles and their tendons would become so contracted as ever after to prevent the leg being extended, or made useful for progression; and, *thirdly,* from the conviction, that the very slight flexion at the knee was necessary to secure hereafter a tolerably useful leg, should it ever again become serviceable, by allowing the flexors a slight advantage over the extensors,—as upon the flexors was now to be thrown the additional duty of preventing the knee bending backwards, when the leg was straightened during walking.

A strong flat steel spring, 14 inches long, with a slight cur-

vature, was therefore softly padded and bound to the back of the knee-joint, half of its length projecting down the back of the leg, half extending along the back of the thigh. The foot and leg, to above the knee, were then bandaged moderately tight, merely with the view of preventing any stoppage to the circulation from the pressure at the knee; and the patient, after a week's confinement to bed, was allowed to trail about the house on crutches.

At the end of a week from the date of the injury, the heavy wearied feeling in the knee had increased, and slight uneasiness was experienced on pressing into the hollow of the ham. This uneasiness was greatly increased by even the slightest attempt to put the foot to the ground, and the patient felt he had not the slightest command over the knee-joint.

Three months elapsed, and the patient had little more command over the knee than on the day of the injury. During that period, he had tried warm and cold fomentations, frictions with stimulant and other embrocations, various ointments, oil, &c., still with little improvement.

About a month after the injury, the bandages were discontinued, and their place supplied by a finely fitting laced stocking, made of Saxony broad cloth, and the broad flat steel spring was sewed to the back of it. I may here remark that, after a fair trial of the elastic and other stockings and bandages, I have come to the conclusion that the laced stocking made of Saxony broad cloth, with all the seams on the outside, is superior to any yet invented, for affording regulated pressure over the leg, combined with a certain degree of elasticity.

By the end of the fourth month, the patient was able to let the heel rest gently on the ground, but could not bear the weight of the body on the leg.

Five complete months elapsed before the patient could dispense with the use of crutches, and trust to the aid of a stick. By this time, he could nearly rest the weight of the body on the injured leg, when supported by its laced stocking, bandage and spring, but he still felt he had no command over the knee-joint. During progression, the knee was kept immoveable, and the motion was limited to the ankle and hip-joints, the weight of the body being thrown on the stick. Even at this period, the leg, if attempted to be straightened, had the tendency *to bend forwards* on the thigh, so that the spring could not be dispensed with; and more than thirteen months elapsed before its use could be discontinued.

Even at the end of eighteen months from the date of the injury, the knee remained weak, and could not be thoroughly straightened without causing a disagreeable sensation, as if the knee were to bend backwards; and still required to be supported by the laced stocking or by a stout knee-cap of chamois leather.

The patient, from this date, gradually acquired power over the knee-joint, and he can now run and walk with any man. But even yet, though eleven years from the date of the injury, the knee always feels unsteady, with a slight tendency to uneasiness in the ham, when straightened to the utmost it is capable of, or after a severe day's fatigue; and in walking, the foot is so put to the ground as to give the flexors a slight advantage over the extensors of the leg, though scarcely any one would notice that the knee-joint was not as straight as in other men.

The second case was as follows:—

Mrs H., in coming down from Stirling by the steamboat, on the 18th of August 1841, stumbled when on board, and the left foot getting at the moment wedged behind a trunk, she was thrown forwards across the trunk, and felt something give way with a snap in the left knee. When raised, she found she had lost all command over the left leg; and when the steamboat arrived at Trinity, she had to be carried out of it and sent home in a cab. I saw her the same evening, shortly after her arrival.

The bones of the leg and thigh were uninjured. There was a slight abrasion of the skin, with ecchymosis on the front of the tibia, about four inches below the patella, where the front of the leg had come in contact with the edge of the trunk. The *tendo Achillis*, and all the tendons forming the outer and inner hamstrings, appeared to be sound. There was no swelling, or redness, or pain in the knee-joint, only a kind of wearied sensation, and the most perfect loss of power, in so far as standing was concerned. When she sat on the chair, she could throw the leg forward or backwards; but when the the leg was extended, it was found *that there was nothing to oppose the knee-joint bending backwards*, in other words, *the leg could be bent forwards on the thigh* to a certain extent. When she was seated on the floor, and the leg stretched straight out, the slightest pressure on the patella caused the foot and leg to be tilted forwards, showing clearly that the structure which prevented the knee from being bent forwards beyond the straight line, was destroyed,—showing that the crucial ligament had been ruptured.

It seems unnecessary to enter into the particulars of the treatment of this case, seeing they were almost identical with those of that first narrated. This woman, however, recovered the use of the leg more speedily than the first patient. This, perhaps, resulted from her possessing a more vigorous constitution, from her being obliged to make earlier and freer use of the limb, and from her keeping the limb always more bent. She used a crutch only three months and one week, trusting to the support of a stick afterwards. She gave up the use of the flat steel support at the

end of nine months, but still required to support the knee with a chamois leather knee-cap eighteen months after the accident. At this period I lost sight of her, but when last I examined the knee it was somewhat bent, and, from the contraction of the extensor tendons, the leg could not be brought into a straight line with the thigh.

These cases appear to possess considerable interest for two reasons :—*First*, from their rarity, as I am not aware of any similar cases being on record ; *Secondly*, from their proving that the rupture of this most important mechanism of the largest joint of the body may be perfectly recovered from, so as after a while to allow as free use of the limb as before the accident.

I am not aware it has ever been shown that the round ligaments of a joint, when once ruptured, ever heal. The crucial ligaments are, anatomically and physiologically speaking, round ligaments, only they are of much greater importance to the joint in which they exist than the round ligaments are to the joints in which they occur, as, without them, the knee-joint would be utterly useless. The lateral and capsular ligaments of the knee-joint may be cut across, but if the crucial ligaments are left entire, the joint still preserves its character of a ginglymus joint. If the crucial ligaments, however, be cut, there is nothing to prevent the joint being bent to a certain extent in every direction, more especially backwards and forwards.

The fair inference from all this is that, in the above cases, the cure must have been finally effected by a reunion taking place between the extremities of the ruptured crucial ligament. The *fact* of union having taken place, cannot, of course, be demonstrated during life ; but in so far as any conclusion can be drawn from the physical characters of the joint, it seems highly probable that union must have occurred. In no other way could we account for the perfect freedom of motion which the first narrated case exhibits, and the perfect straightening of the limb without the tendency of the knee to bend backwards. The practice which this patient has in walking, of keeping the knee very slightly bent, —so slight that no ordinary observer would notice it,—probably resulted from the habit he acquired when recovering from the injury, and the fear of a similar accident resulting from an accidental stumble.