

**Two cases of excision of the knee-joint for forcible separation of the lower epiphysis from the shaft of the femur / by Edwin Canton.**

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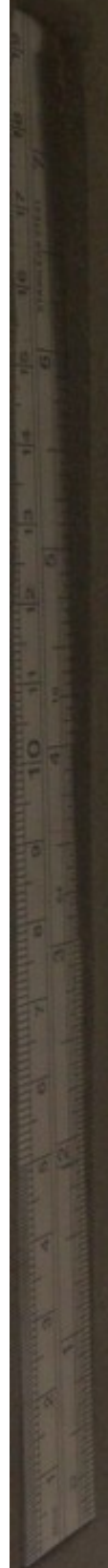
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TWO

# EXCISION OF T

POSSIBLE SEPARATION OF T  
THE SHAFT OF

EDWIN CANTY

MEMBER OF THE CLERGY-ORIGIN SOCIETY

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*J. Hogg Esq*  
*with Canton's kind regards*  
TWO CASES

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OF

# EXCISION OF THE KNEE-JOINT

FOR

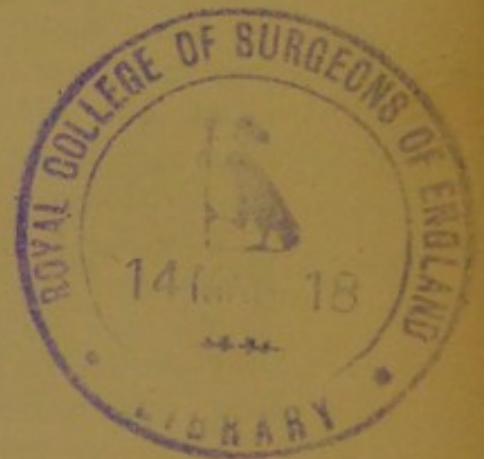
FORCIBLE SEPARATION OF THE LOWER EPIPHYSIS FROM  
THE SHAFT OF THE FEMUR.

BY

EDWIN CANTON, F. R. C. S.,

SURGEON TO THE CHARING-CROSS HOSPITAL, AND LECTURER ON SURGICAL ANATOMY.

With Illustrations.



DUBLIN:

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1861.

[From the Dublin Quarterly Journal of Medical Science, February, 1861.]

TWO CASES OF  
EXCISION OF THE KNEE-JOINT,  
&c. &c.

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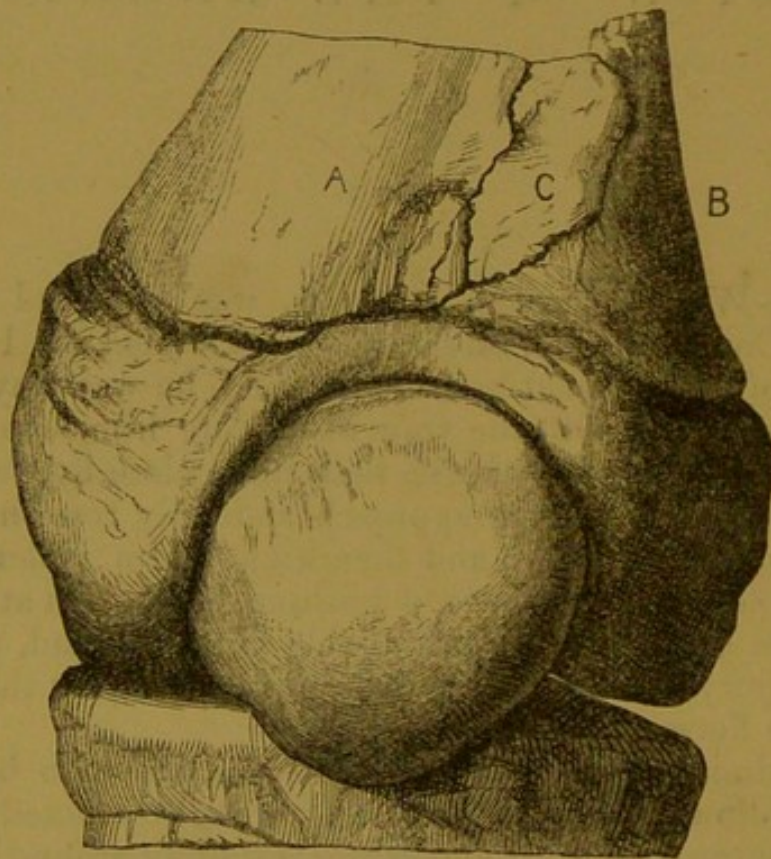
CASE I.—William Jarvis, aged 15, was admitted into the Charing Cross Hospital, under my care, October 21, 1859. At the time of the accident he had sustained, he was playing with another lad, and, with the view of eluding him, was about to run under the body of a horse that stood close by. The animal, however, seeing him approach, suddenly rose on his forefeet, knocked him down, and then kicked him violently, just above the left knee, with one of his hind hoofs. On attempting to rise, the boy found himself unable to stand; and, to escape further injury, he was forced to roll quickly along the ground out of the horse's reach.

On admission, the affected limb was found to be shorter than its fellow; foot quite everted; leg slightly flexed; patella directed outwards; great and general swelling around the knee, and with such distortion of the parts, as to give the impression of the tibia being dislocated backwards, and somewhat outwards. The inner femoral condyle appeared to project unduly, and the skin covering it was tense and abraded. On the outer side, and above the patella, a forward elevation of bone could be felt. By extension and counter-extension, the due length of the limb was restored, the patella resumed its natural position, and the projections referred to became obliterated. The usual appliances maintained adjustment.

No untoward symptom occurred until the end of October, when the incessant restlessness of the patient, from his intolerance of the necessary restraint, gave rise to violent inflammation of the joint. On the inner side of the knee the soft parts

began to slough, and in two days afterwards, the subjacent bone projected through the mortifying tissues. The part protruded was the lower end of the shaft of the femur. The high constitutional disturbance which was set up forbade further efforts to save the limb entire, and I excised the knee-joint, by the usual form of operation, on the 3rd of November.

No peculiarity marked the further progress of the case; and after the lapse of several months, the patient walked out of the hospital, cured.

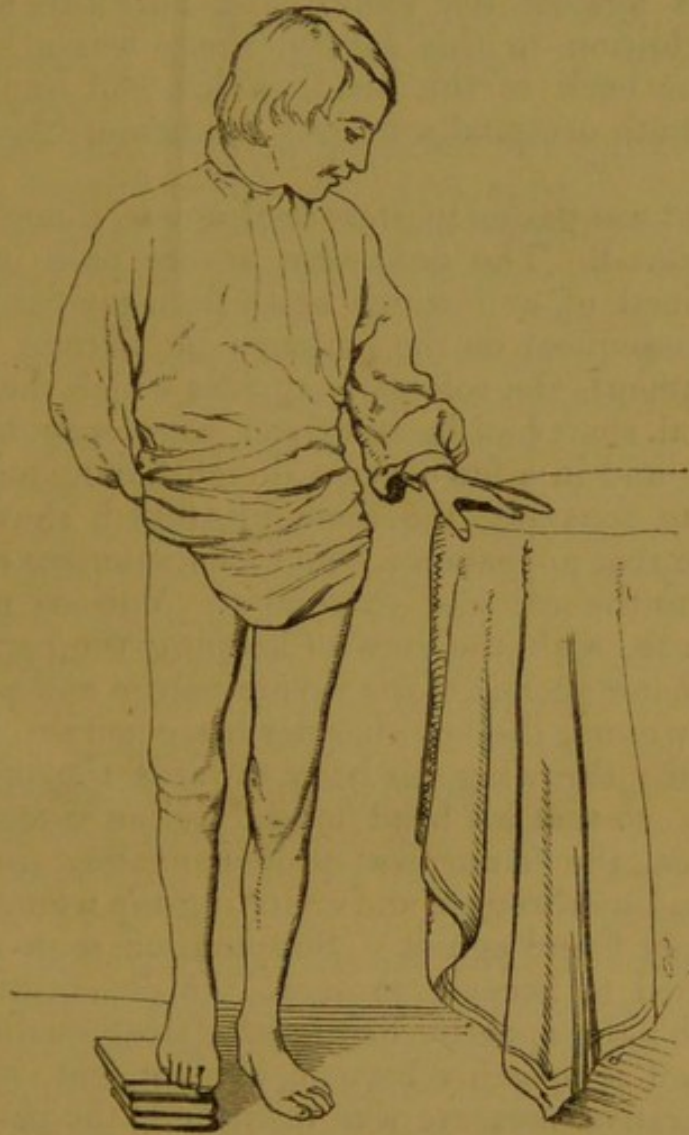


The parts removed show a separation of the shaft of the femur from its lower epiphysis to have occurred in about three-fourths of its circumference (A), while the remaining fourth is still firmly fixed in normal position (B). An oblique fracture extends through the whole thickness of the shaft, and, commencing at its outer side, reaches down to the epiphysis, where it runs into the line of separation between these two parts.

Between the attached (B) and separated (A) portions, a fragment (C) is seen, which, in the engraving, is shown restored to its place; but which had been driven backwards at the time

of the accident, between B and A, completely into the popliteal space, whence I removed it during the operation.

Twelve months after the excision of the joint, I again saw and examined the patient (Nov. 3, 1860). From a photograph then taken of him, the annexed outline has been accurately made.



The tibia and femur were firmly incorporated with one another; the patient experienced no inconvenience, and had walked twelve miles without fatigue.

CASE II.—G. C., aged 8 years, was admitted into the Charing Cross Hospital, under my care, having fallen from the back of a cart, where he had been riding; and, in the descent,



his left knee became entangled between the spokes of one of the wheels.

The joint was found to be greatly misshapen, and an external dislocation of the femur was believed to have occurred; so palpable, indeed, did the nature of the injury appear to be, that the house-surgeon at once, and with ease, restored the form of the part by pressure made in two opposite directions, viz., inwards against the femur, and outwards against the tibia. In addition to this injury, there was a large scalp-wound at the back of the head, which had implicated the branches of both occipital arteries; the hemorrhage had been profuse.

The night was passed in great restlessness, though an opiate was administered. The next day, severe pain in the knee was complained of, and which arose from malposition of the fragments consequent on the patient's inquietude. In effecting re-adjustment, the soft parts against which the lower end of the femoral shaft had been driven were seen to be much ecchymosed; and in a few days, a slough having formed there, and begun to separate, the bone protruded, showing at its lower surface that appearance which characterizes the part for attachment to the articular extremity. Various means were had recourse to, with the view of keeping the parts properly *set*; but, in consequence of the severe nature and painful state of the scalp-wound, the boy, besides his general restless state, was continually throwing his body towards the opposite side of the injury, so that his head might recline sideways on the pillow; hence, the femur was proportionately directed outwards, protruding through, and irritating the wound by which it had so lately found egress. Suppuration soon took place, and threatened to become profuse; the constitutional irritation ran high; the appetite had failed; sleep could hardly be procured; and it speedily became evident that, unless some decisive operative measure was instituted, the patient would die.

I excised the knee-joint, making the H incision; the outer cut included in it the opening already described. After the joint-ends of the femur and tibia, together with the patella, had been removed, a very thin slice was sawn from the free end of the thigh-bone, so that more even adaptation with the tibia might be ensured. No attempt at primary union followed. The restlessness of the patient continued almost unabated, and defied every means adopted to quiet the system, and maintain the limb at rest. (Much of the scalp-wound was still unclosed,

and appeared to be the source of irritation.) About an inch of the femur protruded, and could in no manner be kept reduced and covered; and, it becoming evident that this part tended greatly to increase the general *malaise*, at the same time that it was quickly passing into a necrosed condition, I removed it by the saw. The edges of the wound could be now brought once more together, and were so maintained, with an opening preserved at the outer side, so as to allow of free escape for the discharge, which slowly began to assume a more healthy character.

From this time, matters appeared to progress favourably; the patient became calm; sleep and appetite were restored; the wound of scalp and knee, in process of time, healed. No osseous union, however, took place between the femur and tibia—a fibrous one only resulted. To have cut down again to the bones, and removed more of them, considering what I had had to take away, in addition to the loss entailed by the first operation, would have conferred, in its great diminution of length, as useless a limb as the patient now laboured under, and I had no alternative but to amputate at the thigh. Accordingly, I removed the limb, when the boy's health had become thoroughly re-established. He is living, and well.

*Observations.*—The form of accident, of which the above cases are well-marked examples (*though not even alluded to by many of the highest authorities of the present day*), is, nevertheless, one fraught with great pathological and surgical interest. Valuable illustrations may be obtained therefrom of that improvement in modern surgery, which teaches the preservation of a limb through sacrifice of a joint,—affording, at the same time, a strong contrast to the unnecessary mutilation which formerly characterized the treatment of this injury, or that non-interference which resulted in death.

In an example of this injury, occurring in the practice of Coural<sup>a</sup>, amputation was resorted to. The age of the patient was eleven years. Removal of the limb was also adopted in a similar case related by Adams, of Dublin<sup>b</sup>.

Sir C. Bell<sup>c</sup> relates the case of a lad, aged 13, who met with this accident. “Suppuration took place in the joint; and by the delirious restlessness of the patient, and ulceration

<sup>a</sup> *Archiv. Génér. de Méd.*, tom. ix., 3eme Serie, p. 267. 1825.

<sup>b</sup> *Cyclopædia of Anatomy and Physiology*, Art. “Abnormal Conditions of the Knee-Joint,” vol. iii. p. 69.

<sup>c</sup> *Observations on Injuries of the Spine and of the Thigh-bone*, page 42. London: 1824.

of the integuments, the bone was thrust through. A consultation was necessary; and, on examination, it was found that not a fracture had occurred; but the spongy extremity of the shaft projected, whilst the epiphysis retained its connexion with the joint. The lad died."

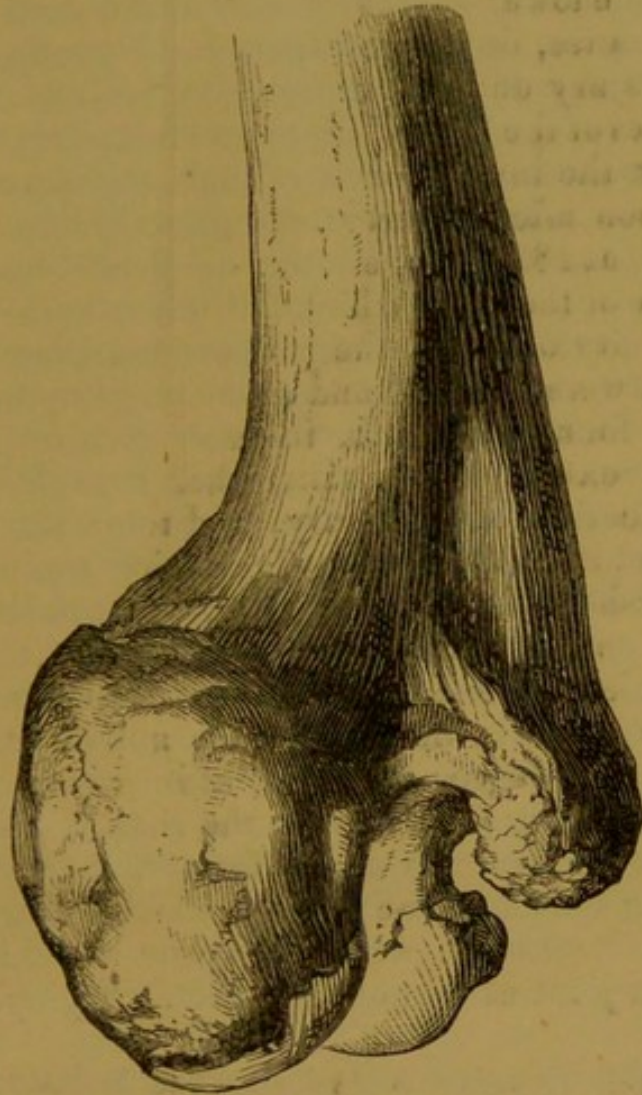


Liston<sup>a</sup> has recorded an instance of forcible separation of the lower femoral epiphysis, occurring in a girl, aged fourteen years. Firm union took place very nearly in the same manner as shown in the following case. The knee continued painful and swollen; and there was a halt in walking. After a lapse of about three years, extensive suppuration took place in the lower part of the thigh, and round the knee-joint; and amputation very soon became indispensable for the preservation of life.

Where union of the fragments has eventually taken place, the mischief has not, in certain instances, terminated with their

<sup>a</sup> Elements of Surgery, Second Edition, p. 721, London: 1840.

junction:—e. g. Sir C. Bell<sup>a</sup> describes a case where osseous consolidation occurred; but the limb was obliged to be removed many years afterwards, on account of a popliteal aneurism occasioned by the projecting extremity of the shaft.



Not only may the epiphysis of a bone be separated from its shaft by violence, but it may also become disunited and displaced from disease. An interesting specimen was exhibited at the Pathological Society of Dublin<sup>b</sup>, of a separated upper

<sup>a</sup> *Loc. cit.* p. 42.

<sup>b</sup> Dublin Journal of Medical Science, 1839. I am indebted to my colleague, Mr. Barwell, for the subjoined reference, wherein, I believe, we may find the earliest recorded instance of the *surgical* removal of the head of the femur.—“*Coxæ articuli suppuratio cum secessione coxæ femoris solidata.* Anno 1730. Puella rustica, ætat. 14, annorum coxæ articulus tumescit dolet perumpetur chirurgus dilatat foramen naturâ factum, extrahit totum ossis femoris caput. Subjecit posthâc in ulceris cavitatum, *Myrrhæ tincturam porro fluxum Ung. fel. W.*, stringat eam denique arcto vinculo raro deligat, atque sex septimanarum curriculo consolidat, ut puellam postmodum libere liceat manea inseperit.” John Daniel Schlishting, M. D. Philosophical Transactions, vol. xlii. p. 274.

epiphysis of the femur, which was spontaneously extruded, in a case of morbus coxarius. Richel<sup>a</sup> describes the particulars of a case, and adds an engraving of the parts, where the lower epiphysis of the thigh-bone, having become detached in the progress of disease of the knee-joint, was completely displaced to the lower and outer side of the shaft of the bone.

It is, of course, only in comparatively young subjects that the form of injury under consideration can occur. "The several epiphyses of the femur," observes Humphrey<sup>b</sup>, "are united to the shaft in the inverse order of their appearance: the lesser trochanter, soon after puberty; the great trochanter, at about 17; the head, at 18; and the lower epiphysis, from 20 to 25."

In neither of the cases which fell under my own care, had I the opportunity of seeing the patient immediately on his admission; both were received and attended to by my house-surgeon; and I found the limb, in each instance, arranged in splints at my next morning's visit, when I was informed of the mode of production of the injury, and told that a dislocation of the knee had been the result. Reduction was stated to have been accomplished with facility. Judging from the ages of my patients (15 and 8 years), and considering the particular manner in which violence had been inflicted, I expressed my belief that an error in diagnosis had, not improbably, been made; for, such a degree and form of injury would, with the epiphysis still unconsolidated with the shaft of the bone, more readily produce disjunction of the former, than cause a luxation by rending asunder those numerous and strong ligamentous ties, within and without, which complete and fortify so large and complex a joint as that of the knee<sup>c</sup>. My opinion, never-

<sup>a</sup> Diss. de Epiphy. ab ossium diaphysi diductione, in Sandifort's Thesaurus. Roterd. 1768. Klose has seen, in the space of eight years, thirteen cases of separation of the epiphysis from the shaft, as the result of disease, occurring in young subjects; seven of these were of the femur at the knee. He names the affection, separation of the epiphyses (epiphysentrennung), or, meningo-osteo-phlebitis. Prag Vierteljahrschrift, for January, 1855, p. 97. Stromeyer refers to a similar disease, under the name of ostitis articularis peracuta, or, Arthroplogosis totalis—*Handbuch der Chirurgie*, vol. i. p. 477.

<sup>b</sup> A Treatise on the Human Skeleton, p. 477,—London: 1858,—a work I cannot too highly commend. "The femur is complete, by the union of its parts, after the twentieth year."—Quain and Sharpey, *Elements of Anatomy*, Fifth Edition, p. 160. London: 1848. Otto remarks, "I have observed in some men of twenty-two, and in one of twenty-three years, the separation of all the epiphyses; and the same also in the skeleton of a man of twenty-seven years, in the hospital of St. Francis, at Naples."—*Compendium of Human and Comparative Pathology*, translated by South, note 5, p. 127. London: 1831.

<sup>c</sup> "All dislocations of the knee are exceedingly rare, yet we occasionally read of them; and, perhaps, in the course of twenty years, there may be one case brought into a large hospital."—S. Cooper, *First Lines of Surgery*, Seventh Edition, p. 716. London: 1840.

theless, was, at the time, deemed of little weight, inasmuch as I had not been present to examine either of the patients on his admission; and the symptoms of dislocation had appeared to be so obvious, that the supposed reduction was, at once, and with ease, effected. The issue of the cases, however, sufficiently justified the view I had ventured to entertain, and which had its origin in the above considerations.

In regard to the upper epiphysis of the femur, Roche and Sanson<sup>a</sup> have remarked:—"Chez les jeunes sujets, les causes capables de produire une fracture de col du fémur ne déterminent qu'un décollement de l'épiphyse."

With respect to the mode of production of the injury, in three instances (one of Sir C. Bell, that of Liston, and Case II.), the leg, or knee, became entangled and twisted between the spokes of a wheel in motion. In two other cases (by Sir C. Bell, and Coural), the limb was fixed to above the knee-joint; whilst the body was thrown forwards, or turned round. In Case I. violence was immediately applied just above the articulation; and in Adams' case, as well as in one figured by Maclise<sup>b</sup>, the manner in which the force was directed is not stated.

It has been shown that union by bone may take place after this injury; nevertheless, in two instances where this was the result, subsequent disease, and which might be said to date from the original mischief, necessitated, eventually, the removal of the limb. In the other cases already mentioned, amputation was more speedily required, in consequence of the violent articular inflammation which sprang up with profuse suppuration, to endanger the lives of the patients through the high constitutional disturbance so hastily supervening. Lastly, Case I. has proved with what success excision of the knee-joint may supersede removal of the limb for this accident; and I believe it is not unreasonable to presume that in Case II., the result would have been equally favourable, had the reparative powers of the patient been more adequate to the work of repair; and great, indeed, is the amount of constitutional vigour which the surgeon has to expect before union and consolidation of all the textures he severs can be fully accomplished. In place of a series of destructive processes rapidly advancing, and from a joint radiating, as it were, with still increasing in-

<sup>a</sup> *Nouveaux Elém. de Path. Méd-Chirurg.*, Third Edition, vol. ii. p. 191. Bruxelles. 1834.

<sup>b</sup> *On Fractures and Dislocations*, Plate xxxi. Fig. 5. The separation of the epiphysis is here accompanied by a transverse fracture of the shaft of the femur in its lower-third.

tensity to the implication of the whole system, the surgeon, by his performance of excision substitutes, so to speak, a condition the equivalent of a severe *compound fracture*; and in bringing the divided parts at once together, follows out a good old surgical maxim, which inculcates the endeavour to render that fracture, as speedily as possible, a *simple* one; when, by attention to position, maintenance of quietude, and removal of discharge, he has *now*<sup>a</sup> every reason to anticipate that his measures may not only preserve a threatened life, but retain, also, a useful limb.

<sup>a</sup> "Of 184 cases in all, collected by Butcher and Price, the mortality amounts to 21·2 per cent., which is less than amputation of the thigh; and, in nearly 50 per cent., the result is said to have been a useful limb."—Pirrie, *The Principles and Practice of Surgery*, Second Edition, p. 736. London: 1860.





