

A CASE  
OF  
BONY ANKYLOSIS OF THE KNEE-JOINT

TREATED BY  
SUBCUTANEOUS SECTION OF THE BONE.

BY  
LOUIS STROMEYER LITTLE, F.R.C.S.,  
LATE SURGEON TO THE LONDON HOSPITAL.

COMMUNICATED BY  
T. B. CURLING, F.R.S., PRESIDENT.

Received April 11th.—Read May 23rd, 1871.

COMPLETE or bony ankylosis of the knee is a rare affection, the majority of cases which at first sight appear to be of this nature being generally found, when the patients are placed under chloroform, to be cases of fibrous union. The diagnosis is not always easy or certain. The amount of force which is often applied to break down a supposed fibrous adhesion may possibly break the uniting bone, which is always of a loose character, and the case thus wrongly passes for one of firm fibrous union.

Such cases of false ankylosis are successfully treated either by gradual or sudden extension, often with tenotomy. In the following case of true ankylosis the bone was divided

subcutaneously, apparently with no more risk or suffering to the patient than accompanies the division of a tendon.

E. L—, aged 14, had been under observation at the London Hospital three years. She had always been a feeble, querulous, ill-nourished child. When first seen at the hospital both knees were contracted to about a right angle and the patient moved about on her knees. This deformity was in the right knee, the result of strumous disease when the child was five years old. There had been free suppuration for many months from many sinuses, the limb had become bent, the tibia dislocated backwards under the femur, and firmly fixed in that position. The skin over the knee was marked by many cicatrices and in places adherent to the bone. The muscles of the limb, especially of the leg, were much wasted, and the foot could not be thoroughly flexed.

The left leg was bent to about the same angle and apparently ankylosed, but without any deformity or appearance of dislocation about the joint. The child's mother stated that there had never been any pain or swelling in this knee; that it gradually became drawn up whilst the child was confined to bed with the disease in the right knee, and that when the child became convalescent, she found that both knees were fixed in the flexed position.

Such was the condition in which the girl was admitted an out-patient of the hospital under my care, extension instruments were applied and their use continued for some months, not very assiduously and without any benefit, mainly in consequence of the carelessness of the mother. The girl was then admitted as an in-patient, when I decided on trying the effect of forcible extension. The patient was placed under chloroform, and with some considerable amount of force the adhesions in the left knee were broken and the limb somewhat straightened, the extreme tension of the hamstrings preventing further immediate extension. This limb was placed in an instrument to preserve the amount of extension already gained.

The right knee was perfectly rigid and no impression was made on it by all the force two persons could employ.

As after a week's time the operation on the left knee was not followed by any inflammation or swelling, the hamstring tendons were divided. Three days later extension was commenced, and in four weeks the left leg became perfectly straight. The knee was stiff and there seemed no prospect of regaining motion. The girl could now walk with crutches, and was again made an out-patient. Before proceeding to any operation on the right knee, which would necessarily be attended with some risk, I decided to try again the effect of a powerful and well-adjusted extension instrument. Such an instrument was applied, and the girl continued its use as an out-patient till October 29th, 1868, when she was again admitted into the hospital.

Whilst an out-patient for the second time, she had been twice placed under the influence of chloroform, and every effort had been made to break down the uniting medium between the bones, but ineffectually, the limb remained at a right angle.

This deformity, as it entirely destroyed the usefulness of the member, rendered further measures not only justifiable but desirable. A serious operation, such as severing a wedged-shaped piece of bone, seemed out of the question, considering the feeble state of the girl's health; but as a subcutaneous operation, though possibly not successful, would probably be attended with little risk, I determined to attempt the division of the bone somewhat after the method of Professor Gross, of Philadelphia.

The girl was placed under chloroform on the 11th of November, 1868. To make the necessity of operative interference apparent and certain, I endeavoured with an assistant, using all our might to straighten the limb, but ineffectually. An incision the third of an inch long was therefore made down to the bone, through healthy skin on the outside of the knee, over the lower border of the outer condyle femur, about midway between the anterior and posterior aspects of the limb.

Owing to the changes in the positions of the bones it was impossible to ascertain the relations of parts with great

exactitude. A strong carpenter's chisel rather less than a quarter of an inch wide was inserted in the wound and driven with a mallet through the united bones towards the inner side of the knee, until its point was felt with the finger under the integuments on the opposite side. The chisel was then withdrawn from the bone (with some difficulty), but not taken out of the wound and was driven through again, so that its point emerged somewhat higher, *i.e.* nearer the anterior surface of the limb than before. This proceeding was repeated several times in different directions in the same plane. The last time the chisel was driven backwards as far as was thought consistent with the safety of the popliteal vessels. The chisel was now withdrawn, as nearly all the bone was considered to have been divided; the union still seemed firm, but gave way on the application of some force. The tibia was now freely movable on the femur, but the limb could not be straightened, owing to the contraction of the soft parts at the back of the joint. The hamstring tendons were next severed, as they offered some resistance and because their division would facilitate further extension, and allow the limb to remain more completely at rest after the operation. It was not considered advisable to straighten the limb at once by force, as probably, the bony union having been broken, the soft parts at the back of the limb would now yield by means of gradual extension. As blood was escaping freely from the wound, a pad of lint and a bandage were applied, and the limb was placed on a splint adjusted to the angle to which it adapted itself without tight bandaging or strapping. Fifteen drops of laudanum were ordered to be given at bedtime. During the next few days the girl complained a good deal of pain in the knee, but as she took food and wine well, and had no constitutional symptoms an examination of the limb was not made until the sixth day, when the bandages were removed. The wound was found closed but not healed, a good deal of blood had oozed out after the operation and prevented immediate union. There was no swelling, redness, or pain on pressure in any part of the knee. The leg was now placed on the extension apparatus

and was at once slightly straightened, the extension being increased a little more every day.

The girl continued well, and three weeks after the operation she could put her foot to the ground and commence walking with crutches. These she soon discarded and a fortnight later walked quickly and painlessly, though with lameness.

The subject of the above case had been for so long a patient at the hospital as to have become a reproach to surgery. It had therefore become necessary that something more should be done, or that the case should be declared incurable. The persistence with which the child attended as an out-patient showed that she felt thoroughly the inconvenience of the deformity, and that her relatives were very desirous that some further attempt at restoration be made. She was a delicate girl and not a fit subject for such an operation as the removal of a wedge-shaped piece of bone, which is moreover an operation which has often proved fatal in such cases. The skin over the knee was in many places adherent to the bone and half made up of cicatrices, and would therefore very likely have sloughed after that operation.

The careful separation with a small chisel and a mallet of the firmly united femur and tibia with as small an opening in the integuments as possible, and the smallest practicable exposure and disturbance of the surrounding parts, offered itself to my mind as beyond comparison the best and safest mode of operative procedure.

Reflexion on the probable inferior density of the osseous connecting medium in the situation where the articulation once existed as compared with the average density and hardness of the shaft of a long bone, such as the femur, led to the conviction that the united bones could be separated by chisel and mallet, and that separation by a saw such as I have employed in former divisions of long bones (tibia, fibula, and radius) for the cure of deformities ought to be discarded in this situation. In fact, the sawing asunder of the ankylosed bones of a former knee joint is simply impracticable by a subcutaneous proceeding. The result of the treatment related above was satisfactory, as the girl could walk easily

without assistance. Possibly a greater degree of straightening might have been gained by more vigorous after-treatment and by greater force immediately after the section of the bone. The violence to which the knee was necessarily subjected by the operation made it appear dangerous to increase the risk of inflammation by forcibly tearing the connecting soft parts away. Then again, as the hamstring tendons were cut, immediate straightening might have caused too great separation of their divided ends with future impairment of function, as even with a stiff knee these muscles remain of great use in standing and walking. Experience may show that some of these fears and precautions were chimerical. Indeed so complete was the absence of all inflammation after the operation that this solitary case appears to indicate that perfect removal of the deformity might very likely have been attained if more considerable straightening had been carried out sooner after the operation. The satisfaction at the result obtained from the performance of a novel operation of this nature more than compensated me for any regret that the straightening obtained was not more complete, and that the deformity was not entirely removed.

A more violent extension applied to the soft parts might have been attended with the well-known accidents of sudden forcible extension recorded to have occurred in many instances, in which without osteotomy a partially ankylosed knee has been too suddenly straightened. After an artificially produced solution of continuity of a considerable bone analogous to a "compound fracture" such as this operation, the surgeon may justly sacrifice for sound reasons the obtainment of a perfectly straight member, remembering especially that where the formation of a new false joint, that dream of the operative surgery of joints, is not expected, an absolutely, straight, stiff limb, although more sightly, is not necessarily so convenient and therefore so useful a member as one fixedly bent a few degrees.

This case is, I believe, the first instance of subcutaneous osteotomy for the relief of a completely ankylosed large joint performed in this country.