An unusual cause of locking after total knee replacement

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Locking after total knee replacement is uncommon and is generally caused by the formation of fibrous tissue around the patella. We report an unusual cause of locking resulting from intermittent occlusion of the popliteal artery, which was tethered to cement at the posterior aspect of the tibial component.

Case report

In May 2003, a 75-year-old man with a long history of painful osteoarthritis in his right knee had an AGC cruciate-retaining TKR (Biomet Ltd, Swindon, United Kingdom) secured with cement. The surgery was performed via a midline incision and a medial parapatellar approach without resurfacing the patella. No intra-operative difficulties were encountered. The initial post-operative course was uneventful.

At review eight months after surgery, he complained of episodes of clicking and painful locking that had required morphine administration both by his general practitioner and following an attendance at the accident and emergency department. No obvious cause had been identified. At a follow-up at 18 months, he was still symptomatic. Investigations, including full blood count, erythrocyte sedimentation rate, C-reactive protein, joint aspiration for culture and bone scan, found no evidence of infection or loosening. The cause of the ongoing intermittent locking was attributed to the patellofemoral articulation. He underwent resurfacing of the patella with a lateral release. At this second operation it was noted that the components were firmly fixed and there was wear of the lateral facet of the patella. The symptoms of locking, however, continued. He became unwilling to flex his knee beyond 60° because he feared that this would cause locking. Repeat radiographs and a further bone scan still failed to identify any cause for his problem. He was referred to us for a second opinion and stated that this knee would lock up to three times a day at 45° of flexion. He had noted that these episodes were accompanied by generalised pain and pallor in his foot. Examination was limited by his apprehension, but no overt signs of infection were observed. The range of movement was between 10° and 80° of fixed flexion. There was minor lateral laxity. The dorsalis pedis pulse was not palpable, although the posterior tibial pulse was present. Both pulses were present in the contralateral foot. Radiographs showed well-fixed implants, but there was a spur of cement located posterior to the tibial component. No loose bodies were seen. He was scheduled for an examination of the knee under anaesthetic, with plans to proceed to an open exploration if indicated.

While being seen in the pre-assessment clinic, he developed an episode of locking which was witnessed by the orthopaedic staff. It was noted that there was an absence of both pedal pulses and pallor of the foot. An urgent vascular opinion was sought and a Duplex scan was performed which showed occlusion of the popliteal artery and suggested the possibility of a thrombus. Shortly after the scan all his symptoms resolved. The posterior tibial pulse returned and the foot became perfused. A femoral angiogram showed the popliteal artery lying against the back of the tibial component (Fig. 1).

Examination under general anaesthetic by an orthopaedic and a vascular surgeon showed a good range of movement, with no catching or instability. The popliteal artery was explored from a medial approach and was found to be adherent to the tibial component and surrounding soft tissues (Fig. 2). An attempt was made to mobilise the artery by
careful dissection, but this resulted in arterial damage. There was sufficient length remaining to permit a successful end-to-end anastomosis.

He made an unremarkable recovery. At nine months’ follow-up there had been no further episodes of locking, nor had he any symptoms of vascular impairment. The range of movement was 5˚ to 90˚ and he was satisfied with the function of his knee.

Discussion
There are numerous causes of impingement or locking of a TKR. The most commonly reported is a fibrous tissue in relation to the patella causing the patellar clunk syndrome.1 Locking may be a result of intra-articular foreign bodies consisting of cement and polyethylene fragments.2,3 Our case is unusual in that the locking was not caused by an intra-articular disorder but to tethering of the popliteal artery, resulting in intermittent occlusion and ischaemia of the lower leg, mimicking symptoms of locking.

Vascular complications are rare and may be venous or arterial, the latter having a poorer prognosis. Arterial complications have been estimated to have an incidence of 0.03% to 0.5% and include haemorrhage caused by direct trauma to the popliteal artery or its branches, acute ischaemia, thrombosis, fistula and aneurysm formation.4 Three cases of pseudoaneurysm have been reported,5-7 each with a different presentation. In one case the patient presented with severe pain, paraesthesiae, and a cold, white foot. The second patient presented with pulsatile mass which was repaired with a vein patch,8 and the final patient presented after rupture of the artery into the adjacent calf muscle and was treated with evacuation of haematoma and oversewing of the artery.9 The most similar presentation to our patient involved a patient presenting with chronic leg ischaemia exacerbated by exercise8 following a TKR. In that case, a spur of cement from the posterior tibial component was compressing the popliteal artery. This differed from our patient in that the pain was exacerbated by exercise rather than the position of the knee.

The anatomical relationship of the popliteal artery to the tibia has been studied in vivo.9 It has been demonstrated that generally the popliteal artery moves away from the posterior aspect of the proximal tibia in the flexed knee; however, in 24% of patients studied, the artery moved closer to the tibial plateau in flexion.9 This may have contributed to the arterial injury in our patient.

Total knee replacements presenting with a complication require a systematic approach to diagnosis and management. A thorough history and careful examination are essential. Contributory factors may be extra- or intra-articular.1 Extra-articular factors include neurological, vascular, and disorders of other joints. Intra-articular issues range from infection, instability, soft-tissue impingement and patellofemoral problems.

In the presence of a painful knee replacement, patella resurfacing is sometimes considered. A recent study found that only 52% of such patients derive any benefit from a delayed resurfacing of the patella, and suggested that other causes of pain should be sought prior to considering surgery to the unresurfaced patella.10

We feel this particular complication could have been avoided if the basic principles of TKR had been observed. These include visualising the posterior aspect of the tibia, mobilising soft tissues, protecting the neurovascular structures, and removing all excess bone cement. It must be recognised that the popliteal artery does not always move backwards from the proximal tibia in flexion.

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References


