CASE REPORT

Bicondylar osteochondritis dissecans in the knee

A REPORT OF TWO CASES

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We describe two cases of osteochondritis dissecans (OCD) affecting both femoral condyles in the same knee. The patients presented with recurrent episodes of pain and swelling, but these were initially thought to be ‘growing pains’. Eventually, a delayed diagnosis of bicondylar OCD was established and both patients were referred for further management. After assessing the extent of the disease on MRI, matrix-induced autologous chondrocyte implantation was performed to treat the defects of the lateral condyle in each case, with a plan to address the medial defects at a later stage. Proposed theories on the aetiology of the condition and available methods of treatment are discussed. A diagnosis of OCD should be considered in young patients with persistent knee pain and effusions, and MRI is the investigation of choice for early detection.

Osteochondritis dissecans (OCD) is a localised condition where a section of articular cartilage and underlying subchondral bone separate from the joint space. If this involves a weight-bearing surface it can progress to degenerative joint disease. The condition is found primarily in the knee, ankle and elbow joints. The knee is the most commonly affected, being involved in nearly 75% of cases, with more than 85% of lesions occurring in the medial femoral condyle.\textsuperscript{1-4} Occurrence of OCD in both femoral condyles of the same knee has not been reported before. We describe two cases of bicondylar femoral OCD, both treated by matrix-induced autologous chondrocyte implantation by the senior author (TWRB).

Case 1. A 13-year-old boy presented to his general practitioner in 2003 with a history of recurring episodes of discomfort and swelling of the right knee. These had started two years earlier, with no history of direct trauma to the knee. A plain anteroposterior (AP) radiograph at the time of presentation did not reveal any abnormalities. The general practitioner reassured the patient by telling him that he had ‘growing pains’. These episodes gradually increased in frequency and intensity over the following two years. In 2006, episodes of locking in the right knee started to occur. At this stage, the patient was seen at his local hospital. Clinical examination by an orthopaedic surgeon revealed a large effusion in the right knee with a fixed flexion deformity of 10°. A plain radiograph showed two lesions of OCD, one in each femoral condyle (Fig. 1). T1-weighted coronal magnetic resonance imaging of the knee revealed that both femoral condyles were involved.
knee (Fig. 2) demonstrated a defect in the lateral femoral condyle measuring 22 mm × 20 mm and containing a subcortical cyst, with surrounding bone oedema. An osteochondral fragment was still in situ, but was completely surrounded by fluid. The defect in the medial femoral condyle measured 14 mm × 8 mm and contained a partially disseminated osteochondral fragment. No occult osteochondral fractures were noted.

The patient was then referred to our institution for further management. In November 2006, an arthroscopy of the right knee showed a defect involving almost the entire distal surface of the lateral femoral condyle, with a smaller defect medially. Three osteochondral fragments, two lateral and one medial, all almost loose, were excised from condyles. The remaining defects were debrided, and a full-thickness chondral graft was harvested from the trochlea. Histological examination of the loose bodies showed that they consisted, in part, of both bone and cartilage. No foci of osteonecrosis were identified.

Based on these findings we decided to treat the lateral defect first and address the medial defect at a second stage. After six weeks, chondrocyte implantation was performed on the lateral condyle defect using the matrix-induced autologous chondrocyte implantation-sandwich technique. Post-operatively, the right leg was put in an above-knee cast and he remained non-weight bearing for two weeks. He was subsequently allowed to partially weight-bear for three months. Eight months after operation he had a full range of movement in the right knee with reasonable improvement in his symptoms of pain and effusion. Radiographs show satisfactory healing at the recipient graft site (Fig. 3). We plan to reconstruct the defect of the medial condyle and at the same time obtain biopsy specimens from the repair site of the lateral condyle one year after operation.

CASE 2. In 1997, a 17-year-old man presented at his local hospital complaining of pain and episodes of swelling of his left knee of one year’s duration. He denied any history of trauma or major illness. Examination of the knee showed a moderate effusion, no tenderness of the joint line and full range of movement. An AP radiograph was unremarkable. The symptoms persisted and he underwent arthroscopy in 1998, which did not reveal any abnormalities. He was reassured and told that his symptoms would resolve once skeletal growth ceased. Between 1999 and 2003, he underwent arthroscopy on two further occasions, but no cause for his persistent symptoms was identified. Although several radiographs of the knee were taken during the same period, all unremarkable, MRI was not obtained. In 2005, the symptoms significantly worsened after he twisted his knee during a game of football. The left knee started to lock and the range of movement became very limited. An AP radiograph showed OCD affecting...
both femoral condyles. Severe femoral bicondylar OCD was found at arthroscopy, with a large osteochondral defect involving 80% of the lateral femoral condyle, and a smaller defect of the medial condyle containing a nearly loose osteochondral fragment. A large loose body, which corresponded closely with the shape of the eroded area on the surface of the lateral condyle, was also found. Both condylar surfaces were debrided, the large loose body was removed, and the non-viable medial fragment excised. No histological examination was carried out on the excised fragment or the loose body.

He was then referred to our institution for further management. An MRI revealed a 7 mm × 4 mm defect of the medial condyle and a 20 mm × 12 mm defect with cystic changes in the lateral condyle. A large loose body was identified in the suprapatellar pouch. Arthroscopy was undertaken, the loose body was removed, the defects of the medial and lateral condyles debrided further and a full-thickness cartilage graft harvested from the trochlea. The large loose body consisted histologically of both cartilage and bone. No signs of avascular necrosis were identified and the cartilage in the specimen appeared viable. A matrix-induced autologous chondrocyte implantation procedure to reconstruct the weight-bearing surface of the lateral condyle was performed six weeks later. Post-operatively, a cast was applied for two weeks and he remained non-weight-bearing for four weeks. At the last follow-up three months after operation, he had only mild pain with no effusion. The range of flexion was from 0° to 100°. A decision to reconstruct the medial defect was scheduled to be made at one year after operation.

Discussion
Although OCD is relatively rare, it has been reported extensively in the orthopaedic literature. The term ‘Osteochondritis dissecans’ was first used by Franz Koning in 1887 when describing young adults with loose cartilaginous fragments in their knee, elbow or ankle joints. Since then, various theories about the aetiology have been proposed, including trauma, ischaemia, ossification defects and genetic causes. None of these has received unanimous acceptance or has adequately explained the cause.¹²,³,⁷–¹⁴

The medial femoral condyle is the most commonly affected site.¹–⁴ Other sites include the talus, the capitellum, the femoral head, the distal tibia and the wrist.¹ Osteochondritis dissecans affecting the lateral femoral condyle has been rarely reported,⁴,¹⁵–¹⁷ with even fewer reports of bilateral lateral condylar lesions.¹⁸ However, no cases of OCD affecting both femoral condyles in the same knee have been described before. Both our patients developed marked bicondylar OCD resulting in multiple loose intra-articular fragments.

This unusual pattern, combined with the absence of bone necrosis, confirmed histologically in the loose fragments, indicates that defects in the ossification centres of the distal femur, rather than ischaemia, may be the cause in these cases. This was suggested by Ribbing in 1955.¹¹ He suggested that OCD represents separation of an accessory ossific nucleus of the distal femoral epiphysis, which at least partially re-attaches during maturation, but may completely separate if exposed to trauma. Although both patients reported here deny direct injury to their knees, the possibility of ‘endogenous’ trauma cannot be excluded. Several authors⁷–⁹ have shown that repetitive microtrauma and impingement of the intercondylar eminence against the medial femoral condyle may explain the development of OCD around the lateral aspect of the medial condyle. This, however, does not account for lesions occurring at other sites, such as the lateral femoral condyle and the patella.

In our second case, multiple arthroscopies failed to reveal any abnormalities, although the patient’s symptoms were becoming more severe. The twisting injury sustained whilst playing football probably separated a partially attached osteochondral fragment and resulted in locking of the knee. Although both patients complained of persistent symptoms for a number of years, their radiographs appeared normal, and, in case 2, two arthroscopic evaluations were carried out. However, MRI in both patients clearly revealed the extent of the disease. This highlights the role of MRI as a highly sensitive tool for showing early osteochondral lesions which are not yet visible on plain radiography or even arthroscopy.¹⁸ This is even more significant in patients, such as the ones reported herein, where there are lesions in multiple sites. Hetfi et al¹⁹ described a simple classification system for OCD based on the MRI findings. This is useful in the staging process and in determining the healing potential of the lesions.

A good outcome has been reported following various forms of treatment.²⁰–²⁸ These include fixation of the fragment with sticks of bone graft,²² Kirschner wires,¹⁷ Herbert screws¹⁷ and biodegradable pins,²⁰,²³ arthroscopic debride-
ment and/or surgical excision,\textsuperscript{21,28} osteochondral autogenous grafting (mosaicplasty),\textsuperscript{24} and autologous chondrocyte implantation.\textsuperscript{25-27} If the fragment is partially detached and still viable, restoration of the articular surface should be attempted by fixing it.

However, managing patients with persistent/recurrent symptoms remains controversial.\textsuperscript{20,25,28} Both our patients had persistent symptoms caused by significant defects with loose osteochondral fragments. We used the matrix-induced autologous chondrocyte implantation technique,\textsuperscript{5,29} employing a porcine type I/II collagen bilayer seeded with cultured chondrocytes, to treat the lesions of the lateral condyle in both cases. Krishnan et al\textsuperscript{25} described 37 patients with OCD, treated by autologous chondrocyte implantation. After a mean follow-up of four years, 72.3\% of patients had excellent or good results. Aurich et al\textsuperscript{27} described a 23-year-old patient with OCD in the medial femoral condyle treated with the matrix-induced autologous chondrocyte implantation-sandwich technique following several previous failed operations. Three years after operation the patient was satisfied and the radiological findings were satisfactory. A few other authors have also reported good early results using this technique for the treatment of osteochondral defects in the knee, but indicated that further long-term assessment of the procedure is needed.\textsuperscript{5,25,29}

By reporting these two unusual cases, we emphasise two important points. Firstly, cases of persistent knee pain and effusion in young males should be thoroughly investigated in order to rule out OCD as a potential cause. Secondly, MRI is a very sensitive tool for detecting early changes in this condition and should be implemented without delay in any case where OCD is suspected clinically.

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References