CASE REPORT

An uncommon chronic osteochondral defect in the lateral tibial plateau detected after a separate injury

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Accepted 14 February 2018

SUMMARY

Osteochondral defects (OCD) are rare conditions that usually present in young adolescents. The causes include trauma, inflammation, ischaemia, genetics and changes at secondary ossification centres. The case report presents a 27-year-old man with chronic intermittent left knee pain for about 3 years. He typically develops the symptom after prolonged standing or when rising from a prolonged seated position. An initial MRI scan in 2014 did not identify and report an OCD that was present in his left lateral tibial plateau. It was only after an accidental tibial fracture injury this year that the defect was incidentally detected on a scan. OCD can be staged based on MRI and/or arthroscopic findings. The treatment can be either non-operative or operative, but this largely depends on the age of the patient, the severity of symptoms and the staging of the defect.

BACKGROUND

Osteochondral defects or osteochondritis dissecans (OCD) refers to focal areas of articular cartilage and subchondral bone damage that typically occur secondary to trauma or repetitive micro-trauma to the joint such as in an athletic individual. Other proposed causes of OCD include inflammatory, vascular (ischaemic), hereditary and changes at secondary ossification centres.¹ A review by Schindler² describes the pathophysiology of OCD that develops from a precipitating insult leading to avascular necrosis of subchondral bone and failure to fully replace necrotic tissue with new bone. Callus formation subsequently remains uncalcified and cartilaginous elements expand which raises the osteoarticular fragment beyond the joint level, thereby increasing mechanical vulnerability. The affected area, with time, will not be able to withstand mechanical forces applied to the joint that leads to degenerative changes to an intact cartilage overlying the necrotic bone.²

OCD itself is actually a rare condition but potential complications of untreated OCD in the knee include loose body formation, effusions and arthritis.³ The most common site of OCD within the knee is in the medial femoral condyle (69%) followed by the lateral femoral condyle (15%).⁴ The symptoms in the knee can be variable but generally present with pain and swelling. Plain radiographs (X-ray) may not visualise early stable lesions, and often, additional imaging such as MRI or CT scans are necessary.

The case presents a non-athletic patient with an OCD in the lateral tibial plateau that has had unusual chronic left knee symptoms for about 3 years in which an original MRI scan report missed the defect. The OCD was only subsequently detected following an unrelated injury to the left lower limb. The case highlights the need to consider atypical presentations of OCD, the importance of reviewing radiological images carefully and always reassessing patients if their symptoms do not improve.

CASE PRESENTATION

A 27-year-old man at the age of 15 has always noticed the occasional brief sharp pain in the left knee with extension and ankle dorsiflexion. He was normally fit and well with no developmental issues. He played non-competitive squash and tennis until he was about 18 years old. In early 2014, he noticed intermittently that whenever he stood up after prolonged sitting or if he remains in a static standing position for up to 1 hour, he would develop a sharp 'twinge' in the anterior aspect of his left knee that radiates deep into the lateral joint line. These symptoms would quickly subside once he starts walking. He was never functionally limited and he had no locking, clicking, giving way or weakness.

His general practitioner (GP) organised a left knee MRI scan for him at the time, which was reported as normal. He then saw a private physiotherapist and was given some knee strengthening exercises that marginally improved his symptoms. He went back to his GP in mid-to-late 2015 with the same complaint and was referred to a National Health Service (NHS) physiotherapist who gave him similar exercises to before. Throughout this time, he was never given a formal diagnosis for his knee symptoms or offered any additional imaging.

In April 2017, while working in the USA, he slipped and fell while learning to roller skate and sustained a minimally displaced spiral fracture of the left tibia. A doctor in the USA noticed a subtle abnormality on his left knee X-ray and organised a CT scan that detected an old OCD in the lateral tibial plateau. His fracture was managed non-operatively with an above-knee full plaster cast.

He returned to the UK 5 days after the injury and was seen in the orthopaedic fracture clinic for follow-up of his left tibial fracture. The recommendation was to treat his fracture first and then address his OCD.

To cite: Leung R, Thomas P.
BMJ Case Rep Published
Online First: [please
include Day Month Year].
doi:10.1136/bcr-2017-
224065

Figure 1 Anteroposterior X-ray demonstrating healing of the left tibial spiral fracture.

INVESTIGATIONS

In the subsequent 3–4 months, he had serial X-ray imaging for his fracture ([figure 1](#)). Once his fracture had healed, a left knee MRI was requested for him to assess the OCD. The left knee MRI showed a depressed focal defect measuring 10.8 mm in the midportion of the lateral tibial plateau with involvement of the overlying hyaline cartilage ([figure 2](#)). A comparison of his original left knee MRI in 2014 was made ([figure 3](#)) which showed a less prominent OCD measuring 9.6 mm that was not reported.

TREATMENT

For his left tibial fracture, he remained in the same plaster cast for approximately 2.5 months which was converted into a Sarmiento cast for the latter stages of healing. He then had his plaster cast removed and was given an Aircast boot for about 2 months with physiotherapy follow-up. For his OCD, he was referred for an up-to-date left knee MRI and saw an orthopaedic knee specialist.

OUTCOME AND FOLLOW-UP

Approximately 8 months after the roller skating injury, he had made reasonable progress with physiotherapy. His left knee symptoms were still present but had never significantly changed or worsened during the tibial fracture. Examination

Figure 2 Left knee MRI coronal section showing an osteochondral defect in the lateral tibial plateau.

of his left lower limb demonstrated mild discomfort to palpate the anterior tibia, lateral joint line and distal iliotibial band. There was no swelling, redness or deformity observed. He had full range of movement and power in his left knee with no ligament instability. McMurray's test for meniscal pathology and Dial's test for posterolateral instability were both negative. A single-leg squat test bilaterally demonstrated poor lumbo-pelvic control with a tendency for his hips to internally rotate and both knees to be in valgus alignment.

After thorough assessment by the orthopaedic and physiotherapy team, it was concluded that the most likely cause of his longstanding knee symptoms were secondary to his OCD. The plan was for him to continue with his physiotherapy rehabilitation at home. After careful consideration, taking into account his age, his symptoms and the potential risk of progression to arthritis, he was referred to a specialist centre for consideration of articular cartilage implantation and bone grafting surgery.

DISCUSSION

The common sites for OCD within the knee are typically sites of secondary ossification such as the femoral condyles. The tibial plateau is an uncommon site for OCD. The authors of this report are only aware of a single case report previously published of a 26 year old presenting with a medial tibial plateau OCD.⁵ In that case report, the OCD developed a

Figure 3 A coronal section of the original left knee MRI scan done in 2014 that shows an osteochondral defect in the lateral tibial plateau which was not reported.

fragment which was managed successfully with microfracture and fragment removal.

A large multicentre study found that the clinical presentation of OCD can be variable ranging from no pain to markedly painful, and from minimal effusion to gross effusion.⁶ Most adult OCD cases are thought to arise from untreated or asymptomatic juvenile OCD that can present in adulthood if spontaneous healing does not occur.⁷ The patient reported mild symptoms when he was a teenager, so he could have conceivably had the condition in childhood before his physes closed.

A systematic review found that the overall sensitivity and specificity of MRI for identifying OCD in the knee compared with arthroscopy is between 78%–91% and 95%–97.9%, respectively.⁸ MRI can be used to classify OCD into different stages of progression. Stage 1 describes damage to the articular cartilage, stage 2 includes an underlying subchondral fracture, stage 3 involves a detached but undisplaced fragment, stage 4 involves a displaced osteochondral fragment and, finally, stage 5 is formation of subchondral cysts with degenerative changes.⁹ A retrospective imaging study by Kijowski *et al* determined that a high MRI T2 signal intensity rim of fluid or cysts surrounding an adult OCD of the knee is a sign of an unstable lesion.¹⁰ The patient in this case had small cysts deep to the OCD rather than surrounding the segment on MRI which suggests that this is not an unstable lesion.

A review by Kocher *et al*¹¹ found that non-operative treatment of OCD is favourable in children with open physes as the defects have a potential to heal. Non-operative treatment in their review would involve a period of immobilisation followed by progressive weight bearing and then knee strengthening exercises once pain free. However, their review recommended surgical intervention in most adult OCD lesions as there is limited healing potential, and the type of surgery depends on the stage of the lesion.¹¹

A review by Kon *et al*¹² summarised different effective surgical techniques to manage femoral condyle OCD. They discussed

Patient's perspective

I had reported the pain in my knee to my GP on two occasions before my tibial injury. One led to an MRI scan, which appears to have been misreported; one to physiotherapy, which only helped to an extent. It is unfortunate that the problem managed to slip through the net for so long. On the plus side, once I had evidence of the defect (in the form of a CT scan from America), the NHS orthopaedic team took an interest in it and gave me all the context to the problem that I needed. I will probably elect surgery, and I am glad that headway is being made at last.

Learning points

- ▶ Osteochondral defect (OCD) of the tibial plateau is a rare cause of chronic knee pain that may not present with features of swelling and locking.
- ▶ Patients with persistent undiagnosed knee symptoms that have not adequately responded to conservative measures such as physiotherapy should warrant further imaging.
- ▶ MRI scan is a sensitive investigation for OCD but it is important for clinicians to review the radiological images whenever possible, interpret reports carefully to ensure these correlate with the clinical assessment and seek another radiological opinion if required.
- ▶ There are very limited data on the optimum treatment for an adult OCD of the tibial plateau, but surgical management may be appropriate to reduce the risk of progression to arthritis.

massive osteochondral autologous transplantation that involves shaping up the defect and press-fitting a squared contoured graft into the recipient bed. Another method discussed was bone-cartilage paste grafting that involves using a paste made from harvested bone and cartilage to fill the defect. Autologous chondrocyte implantation with bone graft was included in the review that involves filling the OCD with harvested bone then 4–6 months later implanting a harvested cartilage scaffold arthroscopically. Furthermore, the other two techniques explored in the review were biomimetic osteochondral scaffold that uses a press-fitting technique, and three-phase bone marrow-derived cell transplantation.

There is currently very limited data for the surgical management of OCD in the tibial plateau, but autologous chondrocyte implantation elsewhere in the knee have demonstrated positive mid-long-term results in function and pain scores as well as graft survival (78% at 5 years).¹³

Contributors RL (lead author) reviewed the patient, collated all the information and wrote the manuscript. PT (contributing author) was involved in the care of the patient and reviewed and edited the manuscript.

Funding This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests None declared.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

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REFERENCES

- 1 Grimm NL, Weiss JM, Kessler JJ, *et al.* Osteochondritis dissecans of the knee: pathoanatomy, epidemiology, and diagnosis. *Clin Sports Med* 2014;33:181–8.
- 2 Schindler OS. Osteochondritis dissecans of the knee. *Curr Orthop* 2007;21:47–58.
- 3 Winthrop Z, Pinkowsky G, Hennrikus W. Surgical treatment for osteochondritis dissecans of the knee. *Curr Rev Musculoskelet Med* 2015;8:467–75.
- 4 Durur-Subasi I, Durur-Karakaya A, Yildirim OS. Osteochondral lesions of major joints. *Eurasian J Med* 2015;47:138–44.
- 5 Zhang Y, Liu X. Osteochondritis dissecans located on the medial tibial plateau: a case report. *J Med Case Rep* 2017;11:1.
- 6 Hefti F, Beguiristain J, Krauspe R, *et al.* Osteochondritis dissecans: a multicenter study of the European Pediatric Orthopedic Society. *J Pediatr Orthop B* 1999;8:231–45.
- 7 Ne SW, Insall JN. Chapter 21: Articular cartilage injury and adult OCD - treatment options and decision making. *Insall & Scott surgery of the knee*. 5th edition. Philadelphia: Churchill Livingstone, 2011:21.1–9.
- 8 Quatman CE, Quatman-Yates CC, Schmitt LC, *et al.* The clinical utility and diagnostic performance of MRI for identification and classification of knee osteochondritis dissecans. *J Bone Joint Surg Am* 2012;94:1036–44.
- 9 Hepple S, Winson IG, Glew D. Osteochondral lesions of the talus: a revised classification. *Foot Ankle Int* 1999;20:789–93.
- 10 Kijowski R, Blankenbaker DG, Shinki K, *et al.* Juvenile versus adult osteochondritis dissecans of the knee: appropriate MR imaging criteria for instability. *Radiology* 2008;248:571–8.
- 11 Kocher MS, Tucker R, Ganley TJ, *et al.* Management of osteochondritis dissecans of the knee: current concepts review. *Am J Sports Med* 2006;34:1181–91.
- 12 Kon E, Vannini F, Buda R, *et al.* How to treat osteochondritis dissecans of the knee: surgical techniques and new trends: AAOS exhibit selection. *J Bone Joint Surg Am* 2012;94:e1–8.
- 13 Nawaz SZ, Bentley G, Briggs TW, *et al.* Autologous chondrocyte implantation in the knee: mid-term to long-term results. *J Bone Joint Surg Am* 2014;96:824–30.

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