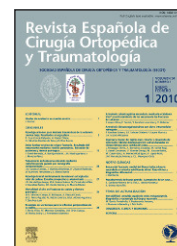


Revista Española de Cirugía Ortopédica y Traumatología

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CASE REPORT

Trapdoor technique in femoral head osteonecrosis

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Received February 12, 2010; accepted April 14, 2010

KEYWORDS

Osteonecrosis;
Knee;
Trapdoor

PALABRAS CLAVE

Osteonecrosis;
Rodilla;
Trapdoor

Abstract

We present a clinical case of a 53 year-old patient with significant osteonecrosis without collapse, in the internal femoral head of the left knee, a significant smoker and drinker, as well as having type 2 diabetes. The trapdoor technique was on the internal femoral head of the knee, with an improvement in the symptoms and without collapse of the joint 45 months after surgery.

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Técnica de *trapdoor* en la osteonecrosis del cóndilo femoral

Resumen

Presentamos el caso clínico de un paciente de 53 años, con osteonecrosis importante sin colapso en el cóndilo femoral interno de la rodilla izquierda, fumador y bebedor importante, además de diabético tipo 2. Se le practica una técnica de *trapdoor* en el cóndilo femoral interno de la rodilla, con una mejoría sintomática y sin colapso articular a los 45 meses después de la cirugía.

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Introduction

Osteonecrosis of the knee is currently classified as being of 3 types: spontaneous, secondary, and post-arthroscopic. Spontaneous osteonecrosis occurs in patients around 60 years of age and affects the head of the knee. Secondary osteonecrosis is more common in a younger population and

is bilateral as well as multi-focal. Its aetiology is unclear, but is associated with well-known factors such as treatment with steroids, alcoholism, and certain chronic, inflammatory diseases. Post-arthroscopic osteonecrosis affects a condyle after arthroscopy with laser or radiofrequency debridement or following motor meniscal debridement.¹ We present a case of advanced spontaneous osteonecrosis of the knee, but without articular collapse, treated with joint-sparing surgery, with the so-called trapdoor technique, with autogenous graft placed in the necrotic bone and conservation of the articular cartilage.

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Clinical case

Fifty-three year old male with obsessive-compulsive disorder. Regular drinker of some 250 g of alcohol per day, and smokes 2 packs of cigarettes a day. Diagnosed and on treatment for type 2 diabetes mellitus. Cardiac arrhythmia with a history of inferior infarction, not requiring treatment with oral anticoagulation.

The patient fell and twisted his left knee. He went to the Emergency Department with pain and swelling of the affected joint; an arthrocentesis was performed and 28 cm³ of hydrates were removed. The X-ray, in 2 projections of the knee, was read as being normal. Subsequently and in light of the persistence of both the pain and inflammation, 3 months after his visit to the ER, an nMRI was taken (fig. 1) that revealed injury to the internal femoral head, compatible with osteonecrosis, with mild sinking and irregularity of the joint surface, accompanied by intense bone oedema. The hypersignal image on the posterior horn of the medial meniscus, reaching the inferior joint surface, was consistent with a tear of the meniscus.

Six months after going to the Emergency Department for the first time, an exploratory arthroscopy was carried out in which a medial plica could be seen with rubbing on the internal femoral head that was resected. In addition, diffuse synovitis was seen with an osteochondral lesion affecting

the entire internal femoral head (11.25 cm²), with conserved cartilage, although no bone support. A degenerative lesion could also be seen on the surface of the internal tibial plateau. The meniscal tear was repaired.

In light of the arthroscopic findings, an open, conservative surgical approach was offered to the patient using a trapdoor technique. The cartilage of the internal femoral head, which was whole, albeit yellowish, was raised; the subchondral bed was cleaned, an autologous graft taken from the iliac crest was provided, and, after compacting it, laminae of cortical bone were put in place. The cartilage lid was sutured using Vycril® sutures and poly-p-dioxanone (Orthosorb® from Puy) (fig. 2).

The patient began active movement of the knee beginning in the immediate postoperative period and remained without any weight-bearing whatsoever for 6 weeks, after which he began walking with 2 crutches until the third month, after which time they were gradually removed. At four months post-op, he was allowed to walk without crutches. He continued to have mild discomfort, with a range of movement in the knee of 0° 5°–120°.

Four years following surgery, the patient led a normal life, with articular balance of 0° 5°–120° and the pain had diminished with respect to what it was before surgery. The visual analogue scale for pain had gone down from 8 to 3. A new nMRI was performed (fig. 1) that revealed irregularity on

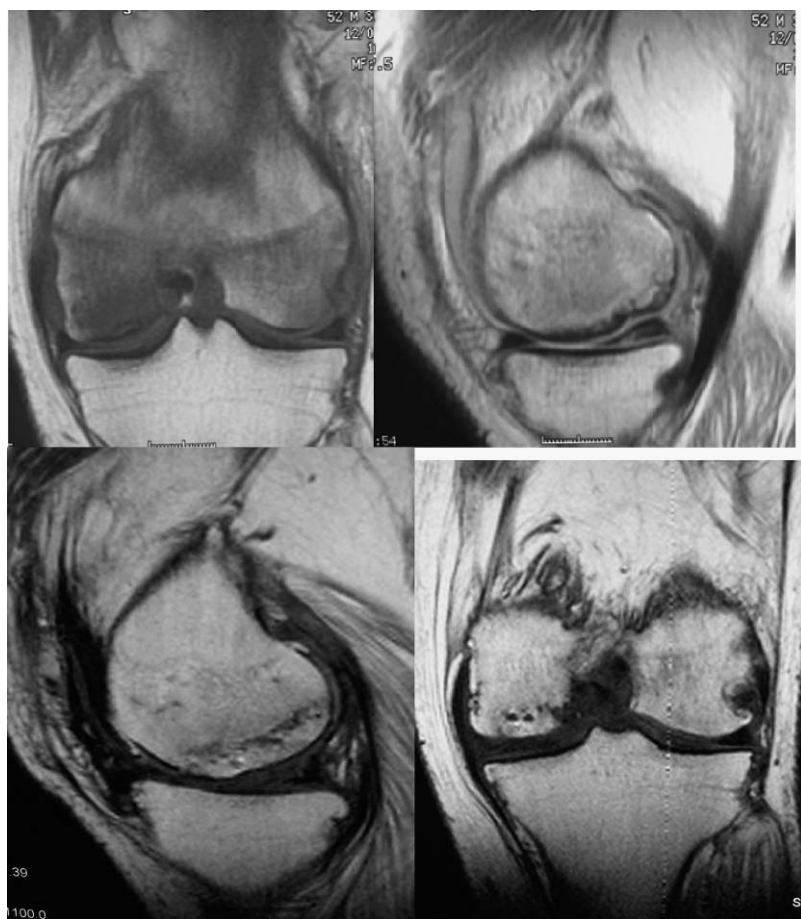


Figure 1 Nuclear MRI in which the osteochondral defect in the internal femoral head (CFI, for its initials in Spanish) and the meniscal tear can be seen in the top pictures. Nuclear MRI at 8 months following surgery in the bottom pictures.

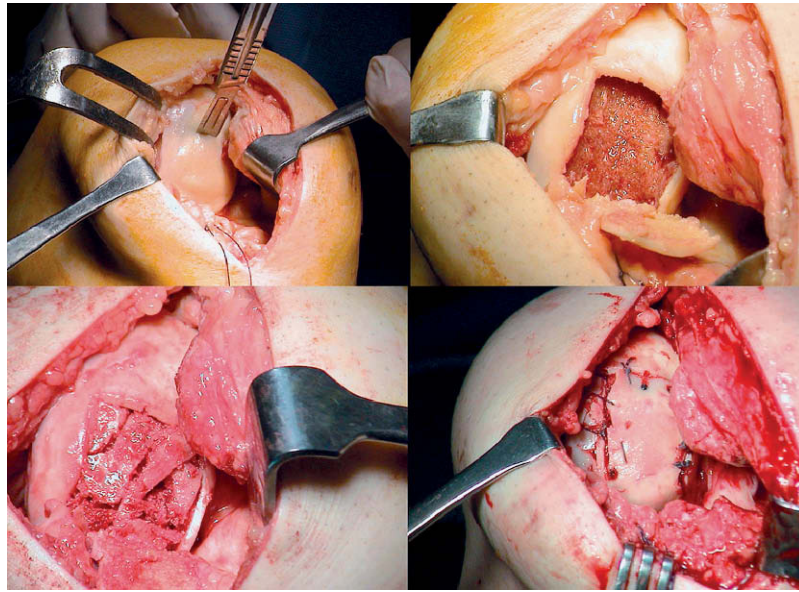


Figure 2 Intra-operative images of the steps involved in the surgical technique.

the internal femoral head surface with no sinking or associated oedema, although degenerative changes were seen in both femoral-tibial compartments with marginal osteophytes.

Discussion

Treatment of spontaneous osteonecrosis of the knee in advanced cases and large in size in a middle-aged person is complex. If we want to avoid arthroplasty, conservative techniques, such as micro-fracture or autogenous osteochondral transplants are not indicated, given the large amount of bone tissue affected. In our case, osteotomy with valgus placement was not appropriate, since the patient did not display any axial displacement of the limb. The extra-articular decompression technique has provided outstanding results, albeit in stages I and II.

Different autografts have been described for secondary osteonecrosis with good results. Fukui et al.² treated 10 cases with osteoporotic graft from the iliac crest, with a similar curvature as the condyle affected and press fit. In 2 cases, they added biodegradable screws. With a mean follow-up of 79 months, they achieved functional improvement in all cases except for one. Rijnen et al.³ treated 8 knees with osteonecrosis secondary to steroid treatment by means of an extra-articular approach to the affected area, removal of the necrotic area, and the use of a compacted, autogenous graft. Six of the 8 patients scored above 80 points on the Knee Society scale, with a mean follow-up of 51 months. Flynn et al.⁴ treated 15 patients (17 knees) with osteonecrosis of various aetiologies, with a mean follow-up of 50 months; they implanted allografts frozen to -80° , and classified 7 as excellent, 5 of them as good, one of them as fair, and the remaining 4 as poor. Zywiell et al.¹ considered that, although the studies dealing with conservative techniques with bone grafts are scant in number and have few patients, they may be indicated in well-selected patients with unaffected articular cartilage, given that there are few alternatives that conserve the joint.

The use of the trapdoor technique in the knee has not been reported, although there have been studies that describe its usefulness in osteonecrosis of the hip in Ficat stages III and IV.⁵⁻⁹ We considered this technique because of the extension of the necrosis, the conservation status of the cartilage, and the technical ease with which it can be performed. The results obtained indicate that it can be useful for the treatment of osteonecrosis of the knee in the initial phases or in pre-collapse stages as long as the cartilage is intact.

References

1. Zywiell MG, Mc Grath MS, Seyler TM, Marker DR, Bonutti PM, Mont MA. Osteonecrosis of the knee: A review of three disorders. *Orthop Clin Am.* 2009;40:193-211.
2. Fukui N, Kurosawa H, Kawakami A, Sakai H, Nakamura K. Iliac bone graft for steroid-associated osteonecrosis of the femoral condyle. *Clin Orthop Relat Res.* 2002;401:185-93.
3. Rijnen WH, Luttjeboer JS, Schreurs BW, Gardeniers JW. Bone impaction grafting for corticosteroid-associated osteonecrosis of the knee. *J Bone Joint Surg Am.* 2006;88:62-8.
4. Flynn JM, Springfield DS, Mankin HJ. Osteoarticular allografts to treat distal femoral osteonecrosis. *Clin Orthop Relat Res.* 1994;303:38-43.
5. Rodríguez-Merchán EC. Osteonecrosis of the femoral head after traumatic hip dislocation in the adult. *Clin Orthop Relat Res.* 2000;377:68-77.
6. Beaulé PE, Amstutz HC. Management of Ficat stage III and IV osteonecrosis of the hip. *J Am Acad Orthop Surg.* 2004;12:96-105.
7. Ko JY, Meyers MH, Wenger DR. "Trapdoor" procedure for osteonecrosis with segmental collapse of the femoral head in teenagers. *J Pediatr Orthop.* 1995;15:7-15.
8. Mont MA, Einhorn TA, Sponseller PD, Hungerford DS. The trapdoor procedure using autogenous cortical and cancellous bone grafts for osteonecrosis of the femoral hip. *J Bone Joint Surg Br.* 1998;80:56-62.
9. Seyler TM, Marker DR, Ulrich SD, Fatscher T, Mont MA. Nonvascularized bone grafting defers joint arthroplasty in hip osteonecrosis. *Clin Orthop Relat Res.* 2008;466:1125-32.