



# Mosaicplasty for the treatment of osteochondritis dissecans following Legg-Calvé-Perthes disease: a case report and literature review

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Legg-Calvé-Perthes disease leads to hip joint deformity. Osteochondritis dissecans following Perthes disease (OCDP) is a less common entity. Treatment options of OCDP are limited. Osteochondral autologous transfer (OATS) is an established method of treatment of full thickness cartilage defects in different locations. This paper presents the case of a 42-year-old patient diagnosed with symptomatic OCDP and treated with lesion fixation using autologous osteochondral grafts via surgical hip dislocation. At the most recent follow-up, 5.5 years after the surgery, the patient did not complain of any pain during rest or activity. He had painless motion with persisting abduction and internal rotation reduction. Harris hip score (HHS) improved from preoperative 62 to 92 points at most recent follow-up. Treatment protocol was discussed in relation to the literature regarding this clinical topic.

**Keywords:** Mosaicplasty; osteochondritis dissecans; Perthes disease.

OATS is an established method of treatment of full thickness cartilage defects of the knee, ankle, and elbow.<sup>[1]</sup> OATS is reported to be an effective treatment method of osteochondritis dissecans (OCD) in these locations for replacement or fixation, even that of unstable lesions.<sup>[1,2]</sup>

This paper presents the case of a 42-year-old patient diagnosed with symptomatic OCD following OCDP and treated with lesion fixation using autologous osteochondral grafts via surgical hip joint dislocation.

## Case report

A 42-year-old male presented with complaints of repeated pain of the left hip with catching and locking related to everyday activities. On examination, the leg was

1 cm shorter than the opposite one. The abduction and internal rotation were reduced. The patient had a history of nonoperative treatment of Legg-Calvé-Perthes disease at the age of 12. An OCDP lesion was seen on plain radiographs (Figure 1a). Computed tomography (CT) scans confirmed the diagnosis of OCDP located in the femoral head ventral quadrant, approximately 2×4 cm large, separated from the remainder of the femoral head. A cyst located under the OCDP fragment was noted. Activity modification, extensive physiotherapy, and nonsteroidal anti-inflammatory drugs (NSAIDs) did not relieve the symptoms. Surgical intervention was proposed. The patient did not consent to total hip replacement and asked for a joint preserving procedure. Presurgical Harris hip score (HHS) was 65 points.<sup>[3]</sup>

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**Submitted:** August 08, 2013 **Accepted:** June 18, 2014

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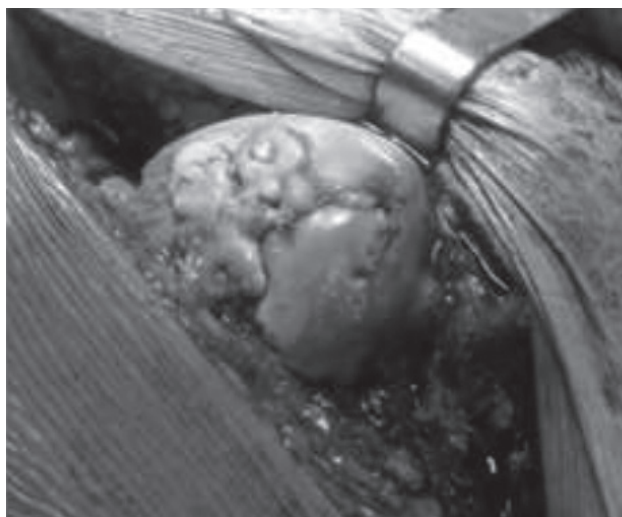
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doi: 10.3944/AOTT.2015.13.0012  
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**Fig. 1.** (a) Preoperative axial radiograph presenting OCDP lesion. (b) Follow-up radiograph taken 5.5 years postsurgically, with lesion healing. (c) Follow-up MRI scan in transverse plane after 5.5 years, confirms lesion healing

Surgical hip dislocation was performed, and the OCDP fragment was easily identified. The lesion was approximately 1 cm wide, movable, and connected with the surrounding cartilage by a narrow strap. The cyst located under the OCDP fragment was opened, cleaned with a curette, and filled with morselized autografts taken from the osteotomized greater trochanter. Osteochondral cylindrical donor grafts 2.7 mm in diameter and 25 mm in length were harvested with the use of mosaicplasty tools (Smith & Nephew, Andover, MA, USA) from the proximal lateral femoral condyle of the ipsilateral knee. The cylinders were transplanted and press fit through the necrotic fragment into the healthy recipient bone (Figure 2). The greater trochanter osteotomy was fixed with 2 cortical screws. The patient used crutches with partial weight-bearing for 12 weeks postsurgically. Full weight-bearing was advised after radiographically confirmed healing of the greater trochanter. At the most re-



**Fig. 2.** Intraoperative picture after OCDP lesion fixation with osteochondral autografts.

cent follow-up, 5.5 years postsurgically, the patient did not complain of any pain during rest or activity. He had painless motion with persisting abduction and internal rotation reduction. HHS was 92 points. The patient reported no complaints regarding the donor site in the harvested knee. X-ray examination demonstrated healing of the OCDP fragment without signs of progressive osteoarthritis or avascular necrosis of the femoral head (Figure 1b). Magnetic resonance imaging (MRI) scan confirmed complete healing of the OCDP fragment and incorporation of the bone grafts filling the cyst of the femoral head (Figure 1c).

## Discussion

The course of Legg-Calvé-Perthes disease often leads to hip joint deformity, even in cases of early diagnosis and treatment.<sup>[4]</sup> The late sequelae of this entity include coxa magna, coxa plana, coxa vara, coxa brevis, and acetabular dysplasia. OCDP was first reported by Haas in 1937 and is a less common entity, with an incidence of 2–7% in all treated patients.<sup>[5,6]</sup> OCDP should be distinguished from OCD, which is a multifactorial condition of uncertain pathology.<sup>[6]</sup>

Nonoperative treatment of OCDP should be considered in asymptomatic patients or those with intermittent pain. Spontaneous healing of the lesion is observed in some cases.<sup>[6]</sup> Operative treatment is advocated when the osteochondritic lesion is separated from its bed and interferes with hip locking or catching.<sup>[6]</sup> Surgical removal of the lesion via an open or arthroscopic procedure has been reported to yield good early results.<sup>[6,7]</sup> OCDP fragment removal may lead to incongruity of the joint and increased risk of osteoarthritis. Removal of the OCDP fragment followed by replacement with an osteochondral graft or fixation should be considered.

To the best of our knowledge, only 3 papers presenting results of late sequelae of Legg-Calvé-Perthes disease reconstruction with OATS have been published. Weisz reported good clinical results after OCDP lesion resection and reconstruction with OATS in a 21-year-old female.<sup>[8]</sup> X-ray and MRI examination 3.5 years postsurgically revealed graft healing. Anderson et al. reported the results of treatment of 14 patients with hip deformity caused by Perthes disease. Four of them had OCDP<sup>[9]</sup> and were treated with OATS harvested from part of the femoral head. The autograft was shaped to size and press fit into the lesion after debridement. At the final X-ray examination, 2 hips from the OCDP group deteriorated, with radiographic signs of osteoarthritis. The authors made no mention of autograft healing. Girard et al. reported the use of OATS in osteochondral defects of 10 femoral heads.<sup>[10]</sup> Six of the surgeries were due to sequelae of Perthes disease; no cases of OCDP were mentioned. After a mean follow-up period of 29.2 months, the patients showed clinical improvement, and radiographic evaluation demonstrated good incorporation of osteochondral grafts and restoration of articular surface conformity.

The first report on OCDP fragment fixation was published by Jenkins and Snowball in an 18-year-old patient.<sup>[11]</sup> Lindholm and Österman reported results for 2 cases of femoral head OCD which had been fixed with autologous cortical bone transplants.<sup>[12]</sup> After 6 and 9 years, respectively, the clinical results were good, without any evidence of osteoarthritis. The OCD lesions healed, and the symptoms were relieved. Siebenrock et al. reported the treatment of OCD in 5 patients.<sup>[13]</sup> Treatment consisted of femoral head dislocation and screw fixation of the fragment. All lesions had healed at an average follow-up of 4.3 years. Three patients were asymptomatic, while 2 had minor residual pain.

Our study reviews the first reported case of OCDP treatment involving the use of osteochondral autografts as a method of fixation for a fragment from the femoral head following Legg-Calvé-Perthes disease. Osteochondral grafts provided stable fixation of the lesion for time for it to heal. Our result is comparable with the use of OATS for fixation of osteochondral lesions in other locations. Yamamoto et al. used osteochondral plugs to fix OCD changes in the elbow and reported healing with good clinical results.<sup>[2]</sup> Fixation of osteochondritic lesions with autologous osteochondral grafts provides biological internal fixation and does not require later hardware removal. The reconstructed surface is smooth because grafts are covered with hyaline cartilage.

An obvious disadvantage of autologous osteochondral transfer is the necessity of exposing the knee joint.

Hangody stated that knee complaints were rare in the group of patients in which grafts were transferred outside the knee joint.<sup>[1]</sup> In 98% of these patients, knee complaints resolved within 1 year. Restoration of donor sites depends on their peripheral placement, small sizing, and proper spacing of the individual grafts.

Osteochondral grafts are implanted in a press-fit fashion. The dimensions of the graft (diameter and length) influence its stability in *in vitro* studies.<sup>[14]</sup> No reports demonstrating fixation strengths of osteochondral grafts in the stabilization of osteochondral fragments have been published to date. The long grafts (25 mm) used in this present paper ensured mechanical stability of the OCDP lesion for a sufficient period of time for the necrotic fragment to incorporate. The thicker part of the OCDP fragment was approximately 10 mm. The thicker the lesion, the shorter the part of the graft that is inserted in the recipient bone, and thus the weaker the fixation achieved.

We believe that mosaicplasty is a reasonable option in the fixation of large osteochondral defects of the femoral head in young patients. Strong fixation achieved with autologous osteochondral grafts by means of biologic fixation, allowing sufficient time for the grafts to heal, is the most important factor contributing to the successful outcome in our patient. We are aware that even a long-term result from 1 patient provides limited information, and a follow-up study with a larger patient sample is needed in order to establish the appropriateness of the treatment.

**Conflicts of Interest:** No conflicts declared.

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