Technical note

Mosaicplasty for femoral osteochondritis dissecans

D. Louahem a, *, F. Lozach a, M. Delpont a, A. Weiss a, O. Prodhomme b, J. Cottalorda a

a Service d’orthopédie pédiatrique, CHU de Montpellier, Montpellier, France
b Service de radiologie pédiatrique, CHU de Montpellier, Montpellier, France

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The authors describe a surgical mosaicplasty technique, with an anterior surgical dislocation approach without trochanterotomy, for osteochondritis dissecans of the hip. A graft was taken from the lateral condyle of the knee. Two adolescents underwent this procedure with good results. No osteonecrosis was observed at the longest follow-up. Mosaicplasty is a useful treatment method for small osteochondritis dissecans (<2 cm²).

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Osteochondritis dissecans (OCD) of the femoral head is rare (2% of all OCD cases) [1]. Its progression can be unfavorable [1,2]. Different treatments exist: perforations, stem cell implantation, allografting, femoral osteotomy, and mosaicplasty [1–3]. Few articles have examined mosaicplasty in this location [3–7].

1. Surgical technique

The patient is installed in dorsal decubitus, with a cushion under the homolateral buttck to expose the hip contours. Knee flexion facilitates harvesting the osteocartilaginous grafts from the condylar ramp of the femur. A Watson-Jones approach is used from the anterosuperior iliac crest to the top of the greater trochanter. The space between the anterior edge of the gluteus medius and the tensor fasciae latae is opened with the finger, preserving the branch of the superior gluteal nerve above. The direct tendon of the rectus femoris muscle and the psoas tendon are cut to facilitate dislocation and exposure. The lateral circumflex artery is not ligatured to dislocate the hip because it is not found in the approach. External rotation of the lower limb extends the capsule. The joint capsule is resected 1 cm with a scalpel along the acetabular rim (labrum). The capsule is opened in a T shape with an incision along the anterolateral labrum and an incision in the axis of the femoral neck. Two Kocher clamps are placed on either side of the incision to raise the capsule and allow cutting with scissors, with image guidance, obviating the risk of injuring the labrum or the femoral head. The two upper and lower extremities of the capsule labrum are identified with sutures for closing. The lower limb is positioned in complete external rotation, flexion, and adduction. A standard table (but not an orthopaedic table) allows this manoeuvre. The femoral head dislocates anteriorly. The ligament of the femoral head is resected, exposing the femoral head. Any necrosis is carefully excised 20 mm deep until properly vascularized subchondral bone is reached.

This dislocation is temporarily reduced. To keep the patient in a single installation, with a sterile tourniquet and using specific ancillary instrumentation, osteochondral grafts are harvested on a non-bearing lateral condylar surface of the knee. Collagenous bone is also harvested. We prefer to use small grafts that are stable with this technique rather than a bone graft that requires fixation.

The hip is dislocated again. The osteochondral grafts are impacted into the defect, with inter-allograft filling using cancellous bone to obtain optimal stability of the grafts and a uniform surface. Eighty percent of the refreshed surfaces are thus filled. The capsule is closed tightly to prevent repeated dislocation [8]. Direct tendon of the rectus femoris muscle is reinserted. The wound is closed with suction drainage in place.

After surgery, dynamic traction of the lower limb (1/10th of the patient’s body weight) associated with mobilization assisted with a Merle d’Aubigné splint beginning the 1st day (then continued for 3 weeks in a rehabilitation center) prevented stiffness. Dynamic traction associated with mobilization is a safety measure against possible risk of secondary dislocation. Using crutches with no weight-bearing is authorized beginning the 4th week after surgery and with weight-bearing the 6th week.

2. Clinical cases

A 15-year-old female, overweight (BMI: 30.2 kg/m²), presented with mechanical hip pain over the previous 2 years. Limping,
internal abduction-rotation limitation, as well as pain at the fold of the groin in forced internal rotation of the hip (knee and hip flexed at 90°) were present. The patient also presented knee-locking sensations. The Harris Hip Score [9] was 65 and the Merle d’Aubigné score [10] was 12 points. The diagnosis of open OCD of the femoral head (Bédouelle stage 3) [9] with an anterosuperior location was confirmed on X-ray, MRI, and arthro-CT. Exposure of the femoral head found a 2-cm² lesion (Figs. 1–3). Five 20-mm-thick, 4.5-mm-diameter allografts (Figs. 4 and 5) were required for reconstruction. At 36 months after surgery, joint range of motion was normal and complete painlessness in sports and daily activities was achieved. The Harris Hip Score was 96 points and the Merle d’Aubigné score was 18 points. The follow-up MRIs showed good osteochondral integration, with the presence of grafted cartilage, which appeared to be of normal thickness compared to the articular cartilage (Figs. 6 and 7).

A 16-year-old female, overweight (BMI, 27.4 kg/m²), presented with mechanical hip pain lasting 4 months. She presented limping, internal abduction-rotation limitation, as well as pain in the fold of the groin in forced internal rotation of the hip. The Harris Hip Score was 53 points and the Merle d’Aubigné 14 points. The diagnosis of open OCD of the femoral head (Bédouelle stage 3) with an anterosuperior location was confirmed by imaging studies. Exposure of the femoral head found a 1.5-cm² lesion.
Fig. 4. Intraoperative view of the host bone prepared for the implantation.

Fig. 5. A. Osteochondral allografts 4.5 mm in diameter and 20 mm thick. B. Osteochondral allografts after implantation.

Fig. 6. Postoperative coronal T1-weighted MRI scans at 3-month follow-up.

Fig. 7. Postoperative coronal T1-weighted MRI scans at 4-year follow-up.

Six 4-mm-diameter allografts were needed for reconstruction. At 18 months postoperative, joint range of motion was normal and complete painlessness in sports and daily activities was achieved. The Harris Hip Score was 100 points and the Merle d’Aubigné score 18 points. The follow-up MRIs showed good osteochondral integration, with the presence of grafted cartilage, which appeared to be of normal thickness compared to the articular cartilage.

3. Discussion

Mosaicplasty has often been described for the ankle and knee, but rarely for the femoral head [2,4]. We found no articles reporting mosaicplasty with anterior dislocation of the femoral head with no trochanterotomy in adolescents.

Other surgical techniques exist. Femur head flexion-extension osteotomies create a malunion of the upper end of the femur that can be detrimental to eventual implant replacements [2]. Allografts and grafts of chondrocytes can be used and provide encouraging preliminary results [1,2]. These grafts can only be used on healthy subchondral bone, which was not the case in our two patients.

Hart et al. [5] and Nam et al. [6] described one and two cases of post-traumatic OCD of the femoral head, respectively. Mosaicplasties were performed via a Kocher-Langenbeck approach associated with a trochanterotomy. The results at the longest follow-up were
satisfactory. Girard et al. [4] performed mosaicplasties with hip dislocation and trochanterotomy with good results. We do not believe trochanterotomy to be warranted in adolescents. Good exposure of the femoral head is obtained with anterior dislocation without performing a trochanterotomy. The secondary complications to this trochanterotomy are avoided, most particularly malunion of the greater trochanter. In the two cases reported herein, the approach to the lesion would not have been possible without dislocating the femoral head because of the location of the lesions. The risk of osteonecrosis is very low or absent, as shown by Ganz et al. [11] for a trochanterotomy approach. This very low or null risk has not been demonstrated for anterior dislocation via the Watson-Jones approach. However, we find this risk to be minimal since it has not been necessary to ligature the medial circumflex artery or the lateral circumflex artery.

Petit and Philippon [3] described the arthroscopic mosaicplasty technique but with no clinical cases. It is theoretically possible to perform this procedure arthroscopically, but it seems very difficult because of the limited exposure.

We harvested grafts from the knee so as not to further weaken a pathological femoral head. This choice is debatable and it is possible to harvest the graft from the femoral head in a non-bearing area. Since the lesions are not the same size, we adapted the diameter of the grafts to the lesions.

Mosaicplasty is an alternative for OCDS under 2 cm². This technique with anterior dislocation of the femoral head and without trochanterotomy keeps the anatomy of the hip intact. Postoperative recovery is simple because the approach is anatomic. This technique should be evaluated over the long term and with larger series to confirm this favorable result.

Disclosure of interest

The authors declare that they have no competing interest.

References