Clinical Sheet

HIP PROSTHESIS REVISION WITH THE AID OF BONE GRAFTS

Flexible and chips bone grafts can be used in hip prosthesis revision surgeries.

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Hip prosthetic rehabilitation can be considered a fairly common procedure and modern technologies make it possible to use very high quality hip prostheses. Nevertheless, the average increase in life span and the increase in the number of younger patients who undergo this type of procedure, mean that there is a significant increase in cases in which it is necessary to intervene again after some time and perform a new revision arthroplasty. The reasons lie in the increased mechanical stress which the prostheses undergo on average, both in terms of duration and intensity. In older patients, due to the increased life span; in younger patients, due to the higher expectations in terms of functional recovery of the joint. Mechanical stress is associated with wear of the main prosthetic components as well as their progressive loosening. This condition often goes hand in hand with the loss of part of the bone tissue, especially in the acetabulum. According to Paprosky, there are three classes of acetabular defects: Type I, with minimum bone loss; Type II, with moderate loss; Type III, with severe bone loss. Type II and Type III defects pose a challenge upon revision, as they do not offer appropriate bone support to the new acetabular components. In such cases, the use of bone grafts may make up for the lack of tissue and provide adequate secondary stability to the prosthetic components.

Materials

The Osteoplant bone substitutes used in the case presented in this sheet consist in equine-derived cancellous bone grafts obtained through the Zymo-Teck antigen elimination process (Osteoplant Flex Acetabular Mat, Bioteck and Osteoplant Bone Chips, Bioteck). This technology involves the use of a mixture of lytic enzymes optimized to preserve bone collagen in its native form and keep the mineral component unaltered. These properties allow the grafts to be physiologically recognized by osteoblasts and osteoclasts, leading to total remodeling in the patient's viable bone. The mechanical features of Bioteck grafts allow them to be molded, drilled or fixated with osteosynthesis devices with no risk of rupture. The presence of unaltered bone collagen also allows some graft formats to undergo a partial demineralization process; in this way flexible grafts like the one used in the case presented are obtained (Osteoplant Flex Acetabular Mat). The advantage of this graft lies in the easy adaptability to curvilinear profiles without needing to be previously shaped for the purpose.

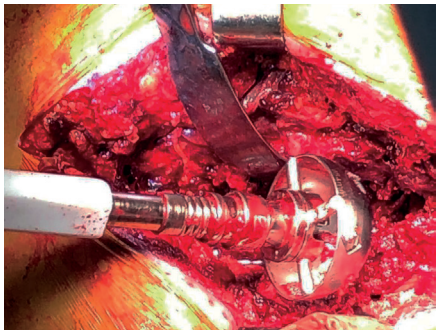

Fig. 1 *– After removing the acetabular components, the acetabular floor is reamed up to the diameter of 56 mm.*

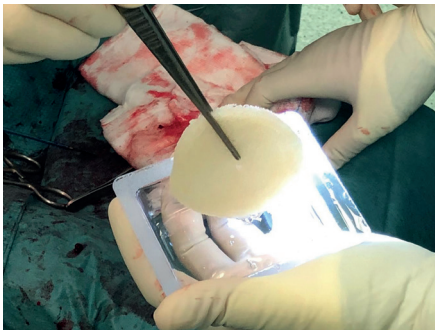

Fig. 2 *– The Osteoplant Flex Acetabular Mat is hydrated; the mat is flexible and does not require preliminary shaping.*

Fig. 3 *– The mat is inserted to seal the acetabular fracture.*

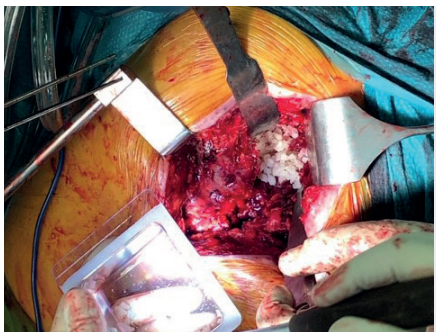

Fig. 4 *– The Osteoplant bone chips are placed on top of the mat.*

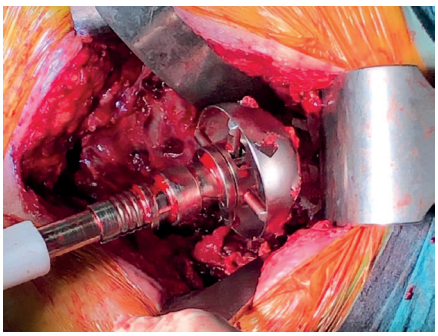

Fig. 5 *– The graft is spread evenly by using the bur with inverted direction of rotation.*

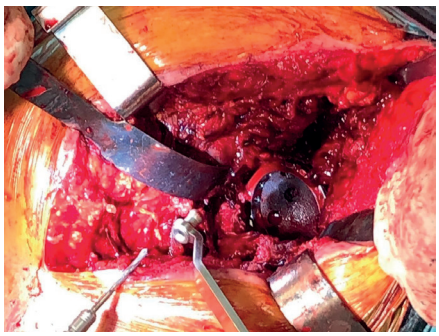

Fig. 6 *– The new prosthetic components are placed.*

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Results

The case presented in this sheet concerns a 69-year-old female patient with a past history of rheumatoid arthritis on therapy with methotrexate, bisphosphonates, vitamin D and corticosteroids. The patient, following a fracture of the neck of the left femur, underwent total hip replacement (THA) but, the following month, the prosthetic components loosened with consequent creation of a Paprosky grade III acetabular defect, with fracture. Total prosthetic revision of the left hip was therefore performed. After appropriate preparation of a sterile field and adequate preoperative antibiotic prophylaxis, the limb was washed with chlorhexidine and an incision was made on the previous surgical scar, which was enlarged. This was followed by the dislocation of the prosthetic implant, removal of the head and neck, removal of the metal cup and of the prosthetic cement. Once the prosthetic components were removed, the tissues around the residual bone of the acetabulum were debrided and it was reamed with increasing drills up to size 56 (mm). After preparing the acetabular fundus, the flexible Osteoplant mat was placed onto it (Osteoplant Flex Acetabular Mat, Bioteck) previously hydrated for 2 minutes in sterile saline and the bone chips were grafted (Osteoplant Bone Chips, Bioteck).

The grafts were spread evenly over the reconstructed acetabular fundus using the reverse bur. The new prosthetic components were then implanted, starting with the cup of 56 mm in diameter, fixed with two screws. The revision shell was positioned engaging the obturator foramen, performing proximal fixation with three screws. At the time of fixing, stability of the implant appeared good; stability and motility tests followed with a trial cup and then the final polyethylene cup was implanted with shoulder, and modular stem with short neck anteverted 8°.

Abundant pulse washings and careful haemostasis ensued. The sutures were performed by plane with aspiration drainage. Neither intra- nor post-operative complications were observed.

At the time of drafting this sheet, the patient is regularly followed up at the center where the authors operate.

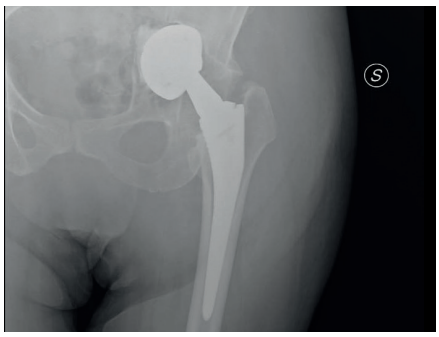

Fig. 7 *– Preoperative X-ray: acetabular fracture is observed.*

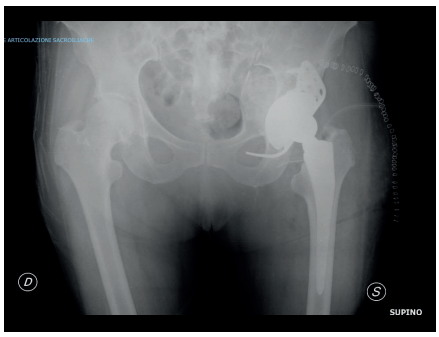

Fig. 8 *– Control X-ray at the end of the revision procedure.*

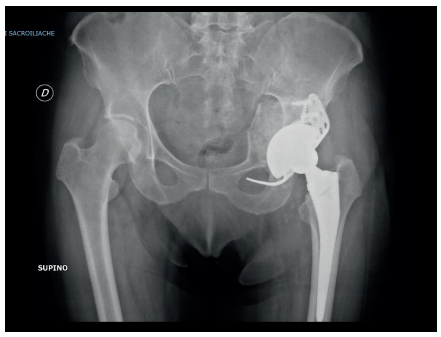

Fig. 9 *– Control X-ray one month after the revision procedure; the large amount of grafted material is observed clearly.*

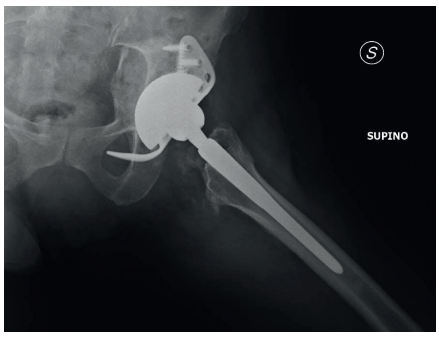

Fig. 10 *– Control X-ray one month after the revision procedure, patient in the supine position; the grafted material can be appreciated also from this angle.*

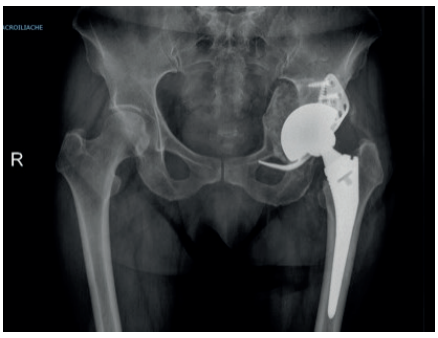

Fig. 11 *– Control X-ray six months after the revision procedure; the radiographic appearance of the grafted material, increasingly indistinguishable from the surrounding bone, points to how the graft is undergoing remodeling.*

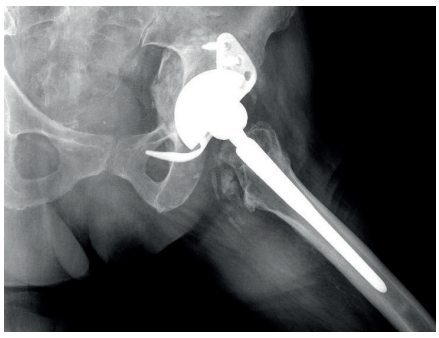

Fig. 12 *– Control X-ray six months after the revision procedure, patient in the supine position; the excellent integration of the grafted material is clearly observed.*

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