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Acute Reconstruction of Osteochondral Defects in Articular Fractures With a Biomimetic Scaffold: A Case Series With Two Years Minimum Follow-up

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Purpose: Acute osteochondral defects can lead to degenerative changes due to potential articular surface incongruity. Most common causes are severe comminution and open articular fractures. Different strategies are available to treat osteochondral defects, including bone marrow stimulation techniques, allograft, mosaicplasty, and joint replacement. We used a biomimetic 3-dimensional nanostructured acellular scaffold for the treatment of osteochondral defects in articular fractures of the femoral head, femoral condyles, talus, and olecranon. The purpose of this study is to evaluate clinical and radiological results with a minimum 2-year follow-up.

Methods: Patients treated with a biomimetic scaffold for acute osteochondral defects were evaluated with a minimum 2-year follow-up with clinical evaluation, consisting of visual analog scale (VAS), need for reoperation, and radiological evaluation, based on the detection of degenerative changes on radiographs. 9 patients were included in the study—3 femoral head fractures (Pipkin II-IV), 3 femoral condyle fractures, 2 talus fractures, and 1 olecranon fracture. All patients were treated with reduction and fixation of the main fragments. After completion of osteosynthesis, residual osteochondral defects were treated with local debridement and a biomimetic three-dimensional nanostructured acellular scaffold (MaioRegen; Finceramica Faenza SpA) stabilized with fibrin glue. Postoperative range of motion and controlled weightbearing were allowed in all cases.

Results: 9 patients were available for follow-up at a minimum 2 years postoperatively (range, 26-72 months). One patient with a femoral head Pipkin IV fracture dislocation required total joint replacement after 5 months for early arthritis. 8 patients did not require any other surgical procedure on the affected joint. Median VAS was 3 (range, 1-4). Radiological examination showed severe arthritic changes in 1 patient, minimal degenerative changes in 8 patients.

Conclusion: The MaioRegen biomimetic 3-dimensional nanostructured acellular scaffold could be a promising and safe option for the treatment of traumatic osteochondral defects in articular fractures leading to satisfactory clinical and radiological results. Nonetheless, further studies are needed to understand the potential of this scaffold in the treatment of acute osteochondral lesions.