Georgian Scientists
ქართველი მეცნიერები
Vol. 8 Issue 4(1), 2026
https://doi.org/10.52340/gs.2026.08.04(1).59



MANAGEMENT OF MASSIVE ACETABULAR BONE DEFECTS IN REVISION HIP ARTHROPLASTY USING CUSTOM 3D-PRINTED IMPLANTS

Giorgi Phutkaradze

Orthopedic-traumatology Department, Batumi Medical Center - BMC, Batumi, Georgia

Background: In repeat revision hip arthroplasty, acetabular component loosening, wear-induced osteolysis, and metallosis may be associated with extensive bone loss. Insufficient remaining bone stock compromises structural support and makes stable fixation with standard revision components challenging.

Objective: To describe staged reconstruction of massive acetabular defects and the application of custom 3D-printed implants through two clinical cases.

Clinical Cases and Methods: Two cases are presented: a 34-year-old man and a 38-year-old woman with a history of hip arthroplasty and repeated revision procedures. Component loosening was accompanied by metallosis and massive acetabular bone defects. The first treatment stage involved implant removal, excision of metallosis-affected periprosthetic soft tissue and bone, and temporary placement of antibiotic-loaded bone cement within the defect. Definitive reconstruction was planned as a separate stage. Computed tomography and three-dimensional modelling were used to assess defect geometry and remaining bone stock, identify implant–bone contact areas, and plan component orientation, the hip centre of rotation, and screw fixation trajectories.

Reconstructive Principles: Patient-specific design allows the implant to accommodate the individual defect geometry and obtain fixation in better-preserved regions of host bone. The porous trabecular surface is intended to improve bone–implant interlock and, provided that reliable primary stability is achieved, support subsequent biological integration.

Conclusion: Custom 3D-printed acetabular implants offer a reconstructive option for complex massive defects when adequate fixation with conventional components is limited. Accurate preoperative planning, reliable support on remaining host bone, and conditions conducive to osseointegration are central to this approach. Further clinical and radiographic follow-up is required to assess long-term effectiveness.

Keywords: revision hip arthroplasty; acetabular bone defect; metallosis; custom implant; 3D printing.