



Acute Total Hip Arthroplasty in Unreconstructable Acetabular Fractures: Three Case Reports

¹Kuldip Salgotra, ²Sarabjeet Kohli, ³Nilesh Vishwakarma, ⁴Shaival Chauhan

ABSTRACT

The indications of acute total hip arthroplasty (THA) in acetabular fractures are limited and well defined. The reinforcement antiprotrusio cage offers an opportunity to conduct the THA in select unreconstructable acetabular fractures. The need to open-reduce the posterior column and dome fracture is not necessary and the fracture need not be aligned as the Bursch–Schneider's cage with flange can compensate for significant bone loss. Three patients in this study with unreconstructable acetabular fractures underwent acute THA. They were followed up for 3 years. The mean Harris hip score was 72.7. Two patients returned to their preexisting activity level. The short-term result in terms of Harris hip score is good and preinjury level can be achieved. There were no cases with complications of cage subsidence or osteolysis during the 3-year follow-up.

Keywords: Acetabulum fractures, Acute total hip arthroplasty, Bursch–Schneider's cage.

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INTRODUCTION

Traditionally, THA is indicated for primary hip osteoarthritis and hip arthritis secondary to multiple pathologies. Elderly patients with extensively comminuted acetabular fractures, acetabular fracture along with neck femur fracture, and impacted dome fracture with coexisting osteoporosis can be effectively treated with acute THA.^{1,2} Acetabular fractures which cannot be reconstructed present a unique challenge. In selected elderly patients with acetabular fractures, acute THA helps to make them ambulatory, obviating the complications associated with prolonged bed recumbency.³

CASE REPORTS

This article evaluates three cases of unreconstructable fractures of acetabulum who presented at our facility. Mean age was 57 years and mean duration since index injury was 9 days. Mechanism of injury was road traffic accident in all three cases. Two cases received first-aid treatment in the form of traction at their native places before they sought treatment. One patient had concomitant bladder injury and uncontrolled diabetes which delayed primary fixation. On radiological assessment with x-rays and three-dimensional computed tomography (3DCT), the acetabular fracture was deemed unreconstructable as per criteria enumerated by Mears and Velyvis² as well as Chana–Rodríguez et al.⁴

The fracture was classified as posterior wall posterior column fracture type of Letournel and Judet classification with involvement of superior dome of acetabulum. On X-ray of posterior wall, there was bone loss with comminution along the posterior wall (Fig. 1). On 3DCT of fractures, the defect in posterior wall and column and involvement of superior dome of acetabulum were delineated.

We relied on the landmark studies by Tidermark et al⁵ and Sarkar et al⁶ to decide regarding the use of reinforcement ring. The planning was done pre-op for the need of grafting and the method to fix the graft and the need of Bursch–Schneider reinforcement cage for the defective posterior wall as well as the weight-bearing dome of acetabulum were decided. With the help of template of the cage, the size of the graft was also determined. The bone stock of head was noted as the need of graft. A 3D model was made which helped in the delineation of the bone loss and the need of graft. Planning aimed to reconstitute the center of rotation of the hip with stability.

All the cases were operated by Kocher–Langenbeck approach with posterior dislocation of the hip. In all cases, the incision was extended distally enough to allow for femoral preparation. Necrotic tissues and devitalized tissues were excised to reduce the incidence of heterotopic ossification. The lesser sciatic notch was approached with retraction of obturator internus while protecting the sciatic nerve. Dissection was done in all cases between the hip capsule and short external rotators to expose the posterior column and sciatic notches. The part of hip posterior capsule and comminuted fragments were excised during exposure. A provisional femoral neck cut

¹Director and Professor, ²Professor, ^{3,4}Assistant Professor

¹⁻⁴Department of Orthopedics, MGM Medical College and Hospital, Navi Mumbai, Maharashtra, India

Corresponding Author: Nilesh Vishwakarma, Assistant Professor, Department of Orthopedics, MGM Medical College and Hospital, Navi Mumbai, Maharashtra, India, Phone: +919869979657, e-mail: nsv1978@gmail.com



Fig. 1: Acetabular fracture dislocation

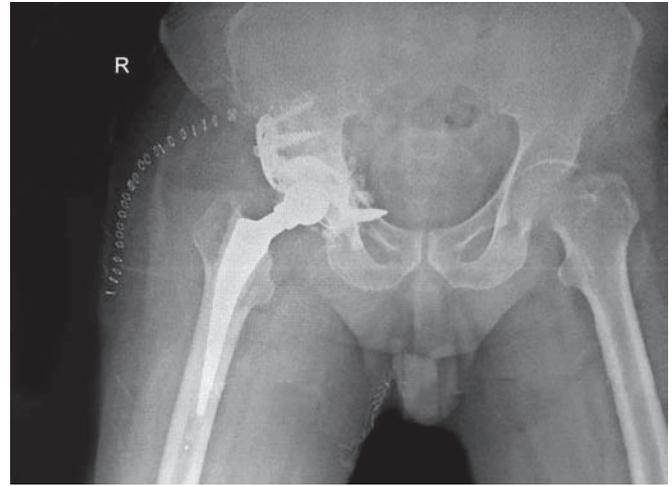


Fig. 2: Postoperative total hip replacement using Burch-Schneider's cage

was taken. A 360° exposure of acetabulum was done. The bone defect along the acetabulum superior dome and posterior wall was demarcated and edges were freshened. The gluteus medius and minimus were partially elevated above the acetabulum with chisel so that the flange of cage can be attached there. No attempt was made to reduce the fracture. The acetabulum preparation was done with reamers as in primary THR, after the cartilage of remaining acetabulum was removed and there was punctuate bleeding; the reaming was stopped and the bone defect was marked.

The head of femur was cleaned of all cartilage and the graft of appropriate size was placed in the defect after reshaping it. Graft was provisionally fixed with K-wire and then the final reamer used previously was used to finally shape the graft to fit the Burch-Schneider's reinforcement cage trial. Appropriate size cage was selected after trial. The adaptation of the flange and/or nose was performed. Entry point made with chisel, the nose of cage was tapped into ischium until implant lay in the acetabulum floor. The cage was secured to ilium with 3 to 4 screws; the graft was fixed to the cage with screws. The surrounding area of the cage was impacted with graft. The cemented cup was positioned and cemented stem inserted in femur after standard preparation and reduction. Postoperatively, patients were made to walk weight bearing on postoperative day 2, which patients tolerated well without much pain (Fig. 2).

All patients were followed up for 3 years. The mean Harris hip score was 72.7. Two patients returned to their preexisting activity level. There was one postoperative dislocation in immediate postoperative period which was managed with closed reduction and abduction pillow (Fig. 3). The leg discrepancy was found in all three patients but was well tolerated, as it was less than 1.5 cm in each. The follow-up was done at 6 weeks, 6 months,



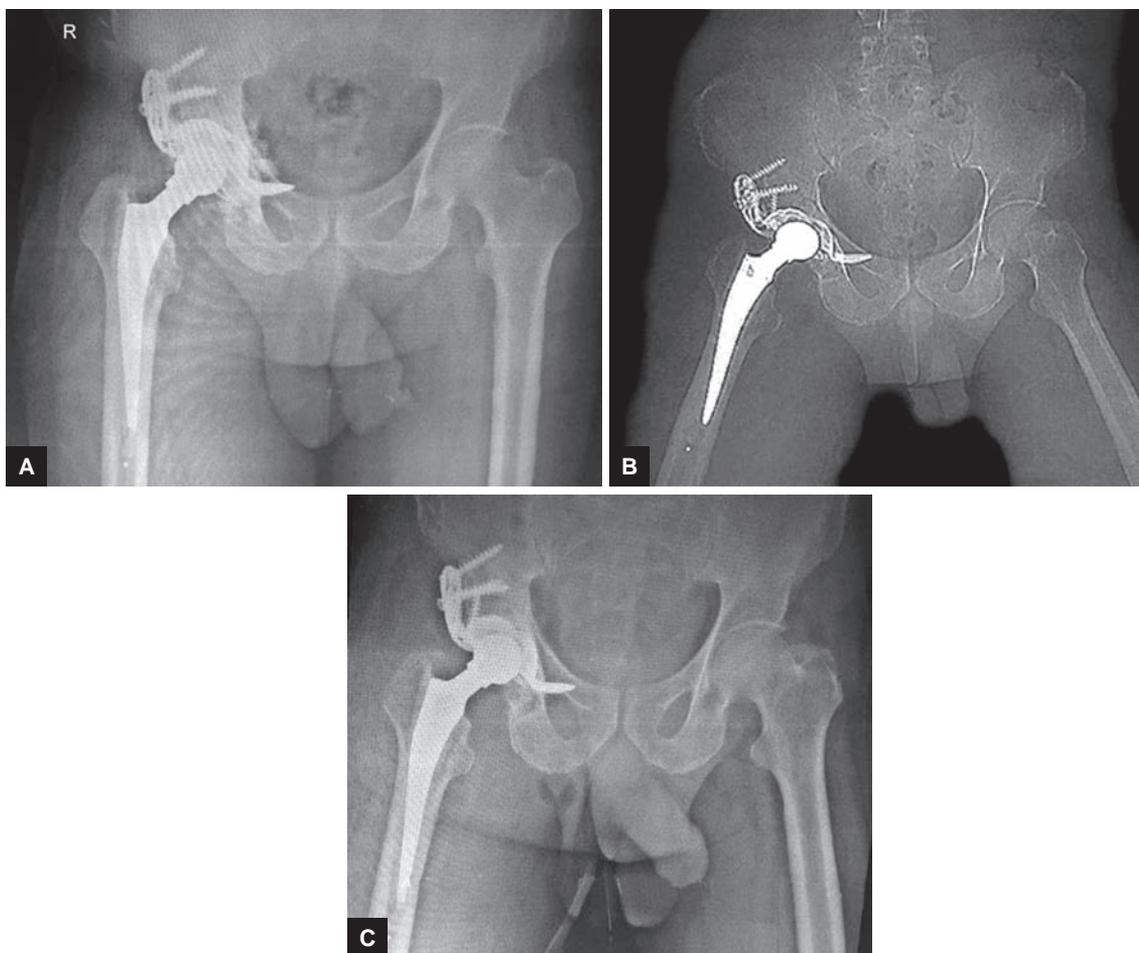
Fig. 3: Dislocation in immediate postoperative period

and then yearly. Radiological examination was done at each follow-up (Fig. 4). No case of cup subsidence or heterotopic ossification was noted in any of the patients and they retained their general level of satisfaction. No osteolysis was observed at the end of 3 years.

DISCUSSION

Acute THR serves as a salvage surgery in elderly patients with unreconstructable acetabular fractures. It enables immediate weight bearing, thereby saving the patient from complications of recumbency. Poor outcomes in acetabular fractures have been clearly enumerated by Mears and Velyvis² as severe intraarticular comminution with 10 fragments or more, impacted femoral head in acetabulum or femoral head fracture more than 40% involvement of weight-bearing arc including dome and preexisting osteoarthritis.⁴

Osteoporosis played an important factor in decision-making for acute THR. Marked osteoporosis was evident in all three patients as per Singh et al⁷ index.



Figs 4A to C: Follow-up after 6 months of Bursch–Schneider's cage

Comminuted weight-bearing dome besides severe osteoporosis in all these patients were strong criteria to go for acute THA with reinforcement cage and autologous bone graft.⁵

Tidermark et al⁵ advised using a reinforcement cage and this was supported by Sarkar et al.⁶ They observed that reinforcement rings provide higher initial stability as compared with THR along with plates for acetabular reconstruction. Thus, we preferred Bursch-Schneider's rough blasted titanium cage with flanges over conventional THR. Tidermark et al⁵ reported 10 patients, mean age 73 years (57–87), treated acutely with a THA supported by a reinforcement ring (Burch-Schneider antiprotrusion cage) and autologous bone grafting of the acetabulum. At a mean follow-up of 38 months (11–84), good-to-excellent outcomes were achieved in 60% (6/10), bone graft was completely incorporated in all cases, and no evidence of loosening was encountered. Early dislocations occurred in 30% of the subjects (3/10).

We had good results in all three cases (HHS–72.7). Two patients achieved preinjury level activity. One post-operative dislocation in immediate postoperative period was encountered. No cup subsidence or heterotopic ossification was seen in any patient and they retained their

general level of satisfaction. No osteolysis was observed at the end of 3 years. Literature reports varied dislocation rates (7–30%).^{5,8}

CONCLUSION

Acute THA with reinforcement ring along with autologous bone grafting gives promising results in a selected group of elderly patients with nonconstructable acetabular fractures. The short-term results are good with a high chance of patients returning to their preinjury level.

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