Original Research

DOI: doi.org/10.47363/POS/2015(2)112

Total hip replacement in the acute management of acetabular fractures

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Received: August 11, 2015
Accepted: September 4, 2015
Published: September 16, 2015

ABSTRACT

Purpose: Purpose of this article is to assess the outcome of total hip replacement in the management of selected Acetabular fractures in specific cases within 3 weeks after injury. **Methods:** Prospective study of twenty patients who underwent primary total hip arthroplasty for acute Acetabular fractures. The study was done in Sri Ramachandra Medical College during the period Jan 2010 to Jan 2014. The inclusion criteria were acetabulum fractures associated with femoral neck fracture, neglected dislocation of the hip, marked impaction of femoral head or acetabulum and severe comminution of femoral head. The mean age was 61 years (range 50 to 71 years) and mean duration between injury and presentation was 6 days. The mean duration between injury and surgery was 12 days (range 2 to 21 days). Patients were followed up by serial X-rays and Harris Hip Score. **Results:** In our series of primary total hip replacement for acute acetabular fractures we had 75% excellent/good results, 20% fair resulta and 5% poor results. Mean Harris Hip Score – 81 (Range 68 to 92) **Conclusion:** Primary total hip replacement is a reasonable method of treatment of selected acetabular fractures in the acute phase in specific cases. Outcomes may not be as good as total hip replacement done for other conditions.

KEY WORDS: Acetabular fracture, Harris Hip score, Total hip replacement, Heterotropic ossification

INTRODUCTION

Acetabular fractures have traditionally been treated conservatively or by open reduction and internal fixation [1]. But there are certain Acetabular fractures which can have a bad outcome in spite of the best of internal fixation, which is the current gold standard of treatment of these intra-articular fractures. These fractures are what Mears describes as fractures with an intrinsically abysmal outcome [2]. These are the fractures, which are prone for complications like post-traumatic arthritis or avascular necrosis, which would later require a total hip replacement. Acetabular fractures with associated displaced femoral neck fractures, dislocation of the hip, marked impaction of the femoral head or acetabulum, severe comminution of the femoral head, severe comminution are the Acetabular fractures with an intrinsically abysmal outcome [3].

If an Acetabular fracture has been internally fixed and later requires conversion to a total hip replacement, the problems with doing the total hip replacement are dense scar tissue, heterotopic ossification, obstructive hardware, and indolent infection. These issues could complicate a secondary total hip replacement. In view of the above problems, some surgeons like Mears have been doing primary total hip replacement for selected Acetabular fractures [4]. What is challenging in such a total hip replacement is to create a good bony bed for implantation of the Acetabular component. Aim of our study is to assess the functional and radiological outcomes of total hip replacement in the management of selected Acetabular fractures in specific cases within 3 weeks after injury.

MATERIALS AND METHODS

Prospective study of twenty patients who underwent primary total hip arthroplasty for acute Acetabular fractures. The study was done in Sri Ramachandra Medical College during the period Jan 2010 to Jan 2014.We have been performing primary total hip replacement for selected Acetabular fractures in our medical centre since January 2005.Of 88 Acetabular fractures which presented during the study period only 20 cases were selected for total hip replacement. The inclusion criteria were acetabulum fractures associated with femoral neck fracture, neglected dislocation of the hip, marked impaction of femoral head or acetabulum and severe comminution of femoral head [5]. Of the 20 patients, 18 were male and 2 were female. The mean age was 61 years (range 50 to 71 years) and mean duration between injury and presentation was 6 days. The mean duration between injury and surgery was 12 days (range 2 to 21 days). The fracture types and duration between fracture and surgery were tabulated in table 1. Post-operatively patient was kept on bed rest for a period of 6 weeks. After 6 weeks protected weight bearing was allowed. Full weight bearing was allowed after 3 to 4 months.

Table 1. Acetabular Fracture type and duration between injury and surgery

S No	Age	Sex	Fracture Type	Associated Fracture	Duration between Injury and Surgery Days
1	55	M	Comminuted posterior wall	Posterior dislocation, femoral neck	2
2	62	M	Transverse and Posterior wall	Posterior dislocation	10
3	68	M	Bicolumnar	Femoral neck	18
4	56	M	Comminuted posterior wall	Posterior dislocation	10
5	60	M	Posterior wall	Greater trochanter	13
6	57	M	Bicolumnar and posterior wall	-	14
7	50	M	Comminuted posterior column and wall	Posterior dislocation	3
8	68	F	Comminuted anterior column	-	15
9	71	M	Comminuted anterior column	-	4
10	63	M	Comminuted posterior column and wall	Posterior dislocation	2
11	70	M	Comminuted anterior wall	Femoral neck	5
12	65	M	Transverse and comminuted posterior wall	Posterior dislocation	17
13	66	M	T type	Femoral neck	18
14	60	M	Posterior Wall	Greater trochanter	4
15	58	M	Comminuted posterior wall	Femoral neck	3
16	60	M	Comminuted anterior column	-	10
17	66	M	Comminuted posterior column and wall	Posterior dislocation	2
18	60	M	Comminuted anterior wall	Femoral neck	7
19	58	M	Bicolumnar	Femoral neck	2
20	65	M	Comminuted anterior column	-	15

All cases were done through posterolateral approach. Our method was to first reconstruct the acetabulum through the approach. Bone graft from femoral head was used to augment Acetabular bone stock and coverage. Porous coated hemispherical cup was inserted after reaming and fixed with 2 superior screws. In most of our cases porous coated hemispherical cup augmented with superior screws was used for the acetabulum after the acetabulum was reconstructed with internal fixation and bone grafting. At least 2/3 rd of rim fit is required for fixation of uncemented cup, which was usually possible after reconstruction of the acetabulum. Even in cavitatory defects due to central fractures, the floor could be bone grafted and the uncemented cup could be inserted with some peripheral fit. In the initial 2 cases (our early cases), we had used a cemented Acetabular cup due to the sceptism with the fixation of uncemented cup, which gradually changed. In 2 cases where the patient presented late and there was severe comminution of both columns, we were unable to reconstruct the acetabulum by internal fixation and hence to tackle the segmental deficiency we had to resort to the use of a reconstruction ring/cage and polyethylene liner. Cemented femoral stem was used in 5 cases and in the rest uncemented stem was used.

Patient were followed up by serial X-rays and Harris Hip Scores [6] at 6 weeks, 3 months, 6 months, 1 year and yearly thereafter. The Gruen zones for cemented stems and the Enghs criteria for uncemented stems were used to assess femoral stem loosening [7]. Other radiological components that were taken into consideration were cup inclination, femoral stem position, vertical subsidence of femoral component, vertical migration of Acetabular component and heterotrophic ossification. The Broker's Classification was used to assess heterotropic ossification [8].

RESULTS

In our series of primary total hip replacement for acute acetabular fractures we had 75% excellent/good results, 20% fair results and 5% poor results. The results were tabulated in table 2. Mean Harris Hip Score – 81 (Range 68 to 92)

Table 2. Results as per Harris Hip Score

Harris Hip Score	No of cases	Percentage
Excellent (100-90)	3	15%
Good (80-89)	12	60%
Fair (70-79)	4	20%
Poor (Below 69)	1	05%

COMPLICATIONS

We had one case of post op sciatic nerve palsy which partially recovered .Two case had heterotopic ossification and one case of superficial infection. We had one case of periprosthetic femur fracture (Vancouver type B2) at 1 year 3 months follow up. There was no case of dislocation and early acetabular migration.

DISCUSSION

We had excellent and good outcomes (Fig 1, Fig 2,Fig 3, and Fig 4) in 70 % of our patients. This did not match the excellent outcomes associated with total hip replacement done for other conditions like osteoarthritis, fracture neck of femur. We postulated that the probable cause of reduced Harris Hip Scores could be pain due to acetabular non-union, which may not be visible on radiographs. Similarly our sores can not be compared with Bellbarba et al, Weber et al and Berry et al whose had excellent results for total hip replacement done for secondary arthritis following acetabular fractures [9,10,11] The goal of doing total hip replacement in acute acetabular fractures is to improve function and to decrease pain. It cannot be comparable to the THR done for routine traumatic and non-traumatic conditions [12]. We had 15% fair and 5% poor results. The poor result occurred in the patient who had sciatic nerve palsy, which at 6 month follow up partially recovered.

Fig 1. Excellent Pre op CT

Mears and Velyvis have described 3 time periods after an acetabular fracture when a total hip replacement merits consideration. First one was 3 months or more after the injury, following initial conservative treatment or internal fixation, when patient develops post-traumatic arthritis or avascular necrosis. Second was between 3 weeks and 3 months after injury. Third was less than 3 weeks after injury when acetabular fracture that possesses an intrinsically abysmal outcome – marked impaction or erosion of femoral head and/or acetabulum, associated displaced subcapital femoral neck fracture, occasionally extensive communition. In highly comminuted and displaced fractures with osteopenic bone, acute total hip replacement may not be a realistic procedure to achieve a stable cup in the disrupted acetabulum .In our series we had studied patients where primary THR was done for fractures less than 3 weeks old.

Fig 2. Excellent Post op

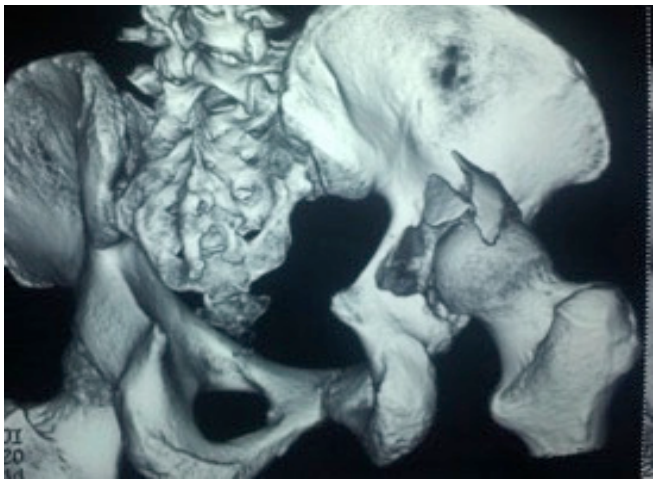

Fig 3. Good Pre op CT

Fig 4. Good post op x ray

Fig 5. Pre op xray

Fig 6. Post op x ray

One case that had a superficial infection was treated with antibiotic suppression and patient had good result (Fig 5, Fig 6) as per Harris Hip score. The patient who had a periprosthetic fracture was not willing for revision and was treated with open reduction and internal fixation with plate osteosynthesis. Currently evidences for total hip replacement in acute acetabular fractures were limited; therefore, physicians' practice and expertise are the most useful tools in clinical practice [13]. The shortcomings of our study were very small number of patients; short terms follow up therefore longevity of THR not known and medializaton of acetabulum not accurately measured.

CONCLUSION

Primary total hip replacement is a reasonable method of treatment of selected acetabular fractures in the acute phase in specific cases. Outcomes may not be as good as total hip replacement done for other conditions.

REFERENCES

1. KumarA, ShahNA, KershawSA, ClaysonAD. Operative management of acetabular fractures: a review of 73 fractures. Injury 2005; 36:605–12.
2. Joly JM, Mears DC: The role of total hip arthroplasty in Acetabular fracture management. Operative Techniques Orthop 3:80-102, 1993.
3. Giannoudis, P.V., Grotz, M.R.W., Papakostidis, C., Dinopoulos, H. Operative treatment of displaced fractures of the acetabulum. A meta-analysis (Review) Journal of Bone and Joint Surgery - Series Volume 87, Issue 1, January 2005, Pages 2-9.
4. Mears DC, et al: The results of acute total hip arthroplasty for selective displaced acetabular fractures: Two to twelve-year results. J Bone Joint Surg Am 84:1-9, 2002.
5. Mears, D.C., Velyvis, J.HAcute total hip arthroplasty for selected displaced acetabular fractures: Two to twelve-year results. Journal of Bone and Joint Surgery - Series AVolume 84, Issue 1, January 2002, Pages 1-9
6. G. Ram, B. Thamodaran, T. Ashok, S. Perumal and V. Varthi, Analysis of Functional and Radiological Outcome of Total Hip Replacements in Rheumatoid and Osteoarthritis Patients, Open Journal of Rheumatology and Autoimmune Diseases, Vol. 3 No. 4, 2013, pp. 246-250. Doi: 10.4236/ojra.2013.34038.
7. Gruen TA, McNeice GM, Amstutz HC. Modes of failure of cemented stem-type femoral components: a radiographic analysis of loosening. Clin Orthop Relat Res 1979; 141: 17-27.
8. Brooker AF, Bowerman JW, Robinson RA, Riley LH Jr.Ectopic ossification following total hip replacement. Incidence and a method of classification. J Bone joint Surg Am 1973: 55:1629-32.
9. Berry DJ, Halasy M. Uncemented acetabular components for arthritis after acetabular fracture. Clin Orthop Relat Res 2002; 405:164–167.
10. Bellabarba C, Berger RA, Bentley CD, et al. Cementless acetabular reconstruction after acetabular fracture. J Bone Joint Surg [Am] 2001; 83-A: 868–876.
11. Weber M, Berry DJ, Harmsen WS. Total hip arthroplasty after operative treatment of an acetabular fracture. J Bone Joint Surg [Am] 1998; 80-A: 1295–1305.
12. R. J. Sierra, T. M. Mabry, S. A. Sems, D. J. Berry. Fractures about the hip- Acetabular fractures-The role of total hip replacement. Bone Joint J 2013; 95-B, supple A: 11–16.
13. De Bellis UG, Legnani C, Calori GM. Acute total hip replacement for acetabular fractures: a systematic review of the literature. Injury. 2014 Feb; 45(2): 356-61. Doi: 10.1016/j.injury.2013.09.018. Epub 2013 Sep 20.

Source of Support: Nil, Conflict of Interest: None declared