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Evaluation of Midterm Functional Results In Acetabular Fracture Surgeries: A Prospective Study

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Abstract: *Acetabular fractures are a major challenge for an orthopaedic surgeon. As with increasing incidence of such injuries due to an increase in the frequency of road traffic accidents, it is a major concern in most of the hospitals. This study was done at Patna Medical College & Hospital, Patna between 2012 to 2016, on 20 acetabular fracture patients. All cases were operated according to standard operative techniques and surgical approaches and were followed up to 26 months on average. The midterm functional results were assessed by Harris Hip Score at 18 months. In our study, 70% of the cases had good to excellent results. It was concluded that early operative intervention according to principles of intra-articular fractures, resulted in good functional outcomes in acetabular fractures.*

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I. Introduction

Management of acetabular fractures is a complex part of the orthopaedic surgery, which every surgeon has to face now and then. Although acetabular fractures constitute only 2% of all the fractures but are associated with high morbidity and mortality. Surgical treatment is the standard modality of treatment (Judet et al) in maximum cases and principles remain same as any intra-articular fracture; anatomical reduction, rigid fixation and early mobilisation (Matta, Mears et al) as compared to conservative treatment which are invariably associated with poor results (Kebaish et al).

But surgery is not always associated with good results because multiple preoperative factors affect the end results, such as age, bone stock, fracture pattern, comminution and time of presentation, association of other co-morbidities, polytrauma and lastly surgeon's experience.

Complex fractures involving both columns are difficult to treat and often involving multiple surgical approaches and longer duration with often inferior results.

The three common surgical approaches used for management are the Kocher Langenbach approach, Ilioinguinal approach and the extended Iliofemoral approach. Some centres are also doing minimal invasive percutaneous approaches along with computer navigation technique, which the author has no experience about. Complications are associated with extensive and combined approaches such as infection, heterotopic ossification, nerve and vascular injury and DVT are to name a few.

All the cases of acetabular fracture require meticulous preoperative planning by radiographic evaluation of standard and Judet series X rays (AP view, Obturator view & Iliac view) and preferably 2 mm section CT scans. 3D reconstructions are very descriptive and helpful.

II. Material And Methods

This study was conducted between September 2012 to August 2016 to evaluate the functional results of various acetabular fractures with respect to fracture type and postoperative fracture reduction. This was a prospective study conducted at Patna Medical College and Hospital, Patna over 20 patients after clearance from the ethical committee and consent from the patients. All the closed fractures in adult patients with no other comorbidity that would limit the post operative rehabilitation were included in the study. While all the open fractures, children, neglected fractures and poly trauma cases were excluded.

A total number of 20 cases were included in the study. All the patients, after initial resuscitation (including reduction for dislocations) were put on distal femur skeletal traction. The standard AP view and Judet view X-rays and CT scans were done to evaluate the fracture. All the patients were posted for surgery within 10 days and after classifying the fracture according to Letournel &Judet Classification. All the surgeries were done by the same surgical team using the same company acetabular reconstruction plates and screws. Kocher Langenbach approach was used for posterior column and wall fixation, while anterior column was fixed by either

extended iliofemoral approach or ilioinguinal approach as per indication. Transverse fracture were fixed posteriorly first and if the anterior column was anatomically reduced then was left as such, no anterior fixation was done.

Range of motion exercises were started gradually after the pain of surgery subsided in about 7 to 10 days and all the patients were kept non-weight bearing upto appearance of signs of union on radiograph. Initial toe touch weight bearing was advised using a walker for first six weeks and gradually shifted to full weight bearing over another 10 weeks. No medical DVT pro prophylaxis was given and only mechanical prophylaxis was done.

Patients were called for followup at 1 month, 3 months, 6 months, 1 year and then annually. Clinical and radiological evaluation was done at each followup. Harris Hip Score was used to evaluate the functional results. Average Harris Hip Score was calculated according to separate categories; of 'type of fracture' and 'reduction of fracture' and then compared to each other.

III. Results

Total number of patients in the study were 20, with 17 male and 3 female patients. The age range of the patients were from 22 years to 44 years (Average age 32.8 years). There were 4 cases of fall from height and rest 16 cases (80%) were of road traffic accident.

Transverse fracture was the most common profile in 8 patients, followed by posterior wall fractures in 5 patients, Transverse with posterior wall in 3 patients, posterior column fractures in 2 patients, T-type fractures in 2 patients and Anterior column fracture in 1 patient.

Kocher Langenback approach was the most common approach done to treat 7 Transverse, 5 Posterior wall, 2 Posterior column and 2 Transverse with posterior wall fractures. Combined Kocher Langenback and Ilioinguinal approach was used in 3 cases of Transverse and T-type fractures and Kocher Langenback with Extended Iliofemoral approach in 1 T-type fracture.

Postoperative radiographic assessment was done to check the reduction of fracture and was classified according to Matta's Reduction Criteria into Anatomical, Imperfect and Poor (TABLE 1). There were 9 cases of anatomical reduction, 9 cases of imperfect reduction and 2 cases of poor reduction.

Harris Hip Score is a validated functional hip score and was used for assessment of the patients on followup. Minimum follow up was upto 18 months and maximum upto 36 months (Average 26 months). The results of Harris Hip Score has been given in TABLE 2 as against fracture type and in TABLE 3 as against Matta's fracture reduction criteria. Overall HHS scores are given in TABLE 4.

TABLE 1

MATTA's REDUCTION CRITERIA	
ANATOMICAL	0-1 mm displacement
IMPERFECT	2-3 mm displacement
POOR	>3mm displacement
SURGICAL SECONDARY CONGRUENCE	

TABLE 2

FRACTURE TYPE	**HHS AT 18 MONTHS (AVERAGE)**
TRANSVERSE	82.3
POSTERIOR COLUMN	84.5
POSTERIOR WALL	85.2
TRANSVERSE + POSTERIOR WALL	83.3
T-TYPE	75.5

TABLE 3	
MATTA'S CRITERIA	**HHS AT 18 MONTHS (AVERAGE)**
ANATOMICAL	85.9
IMPERFECT	81.7
POOR	69

TABLE 4	
HHS SCORE	
EXCELLENT	20%
GOOD	50%
FAIR	25%
POOR	5%

We had 2 cases of SSI in our series which responded to debridement and intravenous antibiotics and 2 case of post operative sciatic nerve palsy which improved to normal over 4 months. We also had 2 cases of non union of fracture site which had became eventually painless but had severe restriction of hip movements, but the patient continued to accept and walk using a walker. One patient had developed osteonecrosis of femoral head which may require a total hip replacement in future.

IV. Discussions

The acetabular fractures are one of the most complex surgeries in orthopaedics and its management protocol is being defined continuously. The importance of open reduction and internal and rigid fixation with anatomical reduction and early immobilisations has been described by Matta and Letournel & Judet in their studies.

The average age of all patients our study was 32.8 years and majority of them males, which were similar to studies by Swiontkowski et al and Giannoudis et al. Also the major Mode of injury in our study was road traffic accident (80%) which was similar to retrospective study by Almeida et a and Giannoudis et al where are the Association of RTA was seen in over 80% of the cases.

According to Tile, an anatomic reduction could be obtained in only 70% cases of acetabular fractures in best of the hands. Matta at all reported a perfect anatomical reduction 64% of the cases while Stockle et al reported 79% anatomical reduction. But, in our study anatomical reduction could be achieved in only 55% percent of cases. This was a surgeon and radiographer dependent data and could be very much variable.

Harris Hip Score was chosen for evaluation of functional results of the hip in our study. Any score less than 70 was marked as poor, 70-79 fair, 80-89 good and 90-100 excellent.

Posterior wall fractures (85.2) had the best HHS scores in our study, while T-type fractures (75.5) had the worst score. According to Tile, Transverse fractures had the best and Anterior column and posterior hemi transverse had the worst prognosis in his study. Our results were different from that of other groups as our sample size was small in their comparison.

14 patients (70%) in our study group had good to excellent results of Harris Hip Score at 12 months follow up. There 10 cases (50%) of good results and 4 cases (20%) of excellent results. This result is similar to other studies reported in literature by Letournel & Judet et al, Matta et al, Siebenrock et al, Helfet & Schmeling et al, Erdogan et al & Nail et al. 90.9% of cases with anatomical reduction had good to excellent results. This reinforces the study of Matta and Letournel of importance of anatomical reduction for good hip function in acetabular fractures management. Similar results were shown in studies by Kebaish et al & Deo et al.

Heterotopic ossification was a common complication during extensile approaches and is presumed due to scarping of gluteus muscles from external surface of iliac bone. Alonso et al reported 53% heterotopic ossification for triradiate approach and 86% for extended iliofemoral approach. The same rate was 8% by Letournel et al and 47% according to Griffin et al. Surprisingly we did not have a single case of Heterotopic ossification in our series, this may be due to the fact that extended approach was done in only 1 case in our study, gentle soft tissue handling in our surgeries and all patients were advised Indomethacin for 4 weeks post-operative.

2 patients in our study group had surgical site infection, which were diagnosed early. Debridement and intravenous antibiotics lead to healing and went into recovery. 'Staphylococcus Aureus' was isolated on both cases on culture. Our infection rate of 10% was similar to the studies by Liebergall et al and Starr et al who quoted similar rates of 5-12%.

2 cases had sciatic nerve palsy in our series, both developed in the immediate post-operative period. Both the patients were put on foot drop splint and the nerve injury improved over 4 months to normal function. Sciatic nerve injuries are common among acetabular fractures, with 8% quoted by Giannoudis and Swiontkowski et al. which is close to our 10% injury rate. Inadvertent placement of bone retractors in the greater sciatic notch and stretching of the nerve was the probable cause in our cases. It is also sometimes due to direct injury by femoral head or posterior wall fragments in a posterior fracture dislocation injuries.

Osteonecrosis of the femoral head has been reported between 5 and 23% in various studies by Matta et al, Mayo et al, Aşık and Eralp et al etc. Frequency of osteonecrosis increases in patients having acetabular fracture with hip dislocation. In our study, osteonecrosis occurred in 1 patient (5%), which was a case of posterior wall fracture dislocation, despite all measures that were taken to reduce any femoral head dislocations in the emergency. The patient was walking with a limp upto that last followup of 24 months and may require a Total hip arthroplasty at a later date.

V. Conclusion

It was concluded in our study, that operative management of acetabular fractures lead to good functional results in most cases. Anatomical reduction and rigid immobilisation are important factors in achieving this goal, which cannot be achieved by conservative methods. Kocher Langenbach approach can be used for majority of fractures and is one approach that has to be mastered by every aspiring acetabular surgeon. Anterior and Extensile approaches are associated with some complications and requires a steep learning curve.

FIGURES

Figure 1: T -TYPE acetabular fracture, treated by dual plating through Kocher Langenbach and Ilioinguinal approach

Figure 2: TRANSVERSE acetabular fracture, posterior plating by Kocher Langenbach approach

Figure 3: TRANSVERSE acetabular fracture treated by dual plating through Kocher Langenbach and Ilioinguinal approach

Figure 4: TRANSVERSE acetabular fracture posterior plating by Kocher Langenbach approach

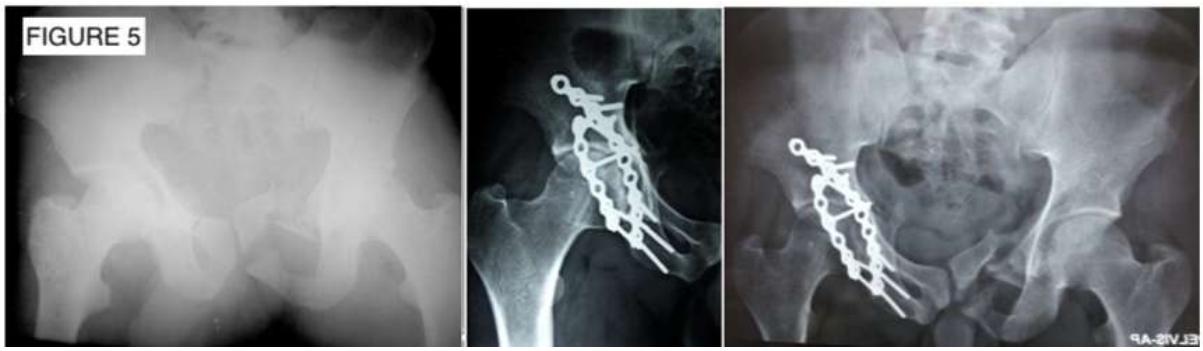

Figure 5: TRANSVERSE WITH POSTERIOR WALL acetabular fracture treated by dual posterior plating through Kocher Langenbach approach

Figure 6: COMMINUTED POSTERIOR WALL acetabular fracture treated by posterior plating with SPRING PLATES through Kocher Langenbach approach

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