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A PROSPECTIVE STUDY OF RESULT OF FIXATION OF ACETABULAR FRACTURES

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ABSTRACT

Background: Aim of the study was to evaluate the results of operative procedures for fixation of Acetabular fractures and the complications and functional outcomes related to them.

Material and Methods: Total of 20 patients who presented at DMC, Ludhiana and who presented with acetabular fractures between 2002 to 2005 were included in the study and were analyzed prospectively for maximum of 15 years to assess their functional outcomes after operation. Data of patients related to duration of hospital stay, mode of injury, injury surgery interval, associated injuries, surgical approach, amount of blood loss during surgery, post operative complications and functional scores were recorded.

Results: Out of 20 patients evaluated in the study, functional outcome was assessed according to Harris Hip Score. Excellent results were obtained in 13 patients, good results in 2 patients, fair results in 2 patients and 3 patients had poor results.

Conclusion: As compared to patients treated by conservative means, operative fixation of acetabular fractures provides stable fixation and better results.

KEYWORDS : Acetabular fracture,operative treatment

INTRODUCTION

Acetabular fractures are usually the result of high energy trauma in road accidents and sometimes during a fall from height.The conservative treatment of these fractures has shown to give inferior results compared to operative treatment (ref7) Incidence of these fractures is increasing in India due to increase in number of vehicles on the road and consequently resulting in increased number of traffic accidents and also affecting younger age group (ref16).Open reduction and internal fixation of displaced acetabular fractures,as for any intra-articular fractures,is a widely accepted mode of treatment (ref5,10 17) Principally, this would be anatomical reduction to allow early range of motion, patient mobilization and return of joint function and prevent secondary hip arthritis. While working on this article I would also like to pay tribute to Judet and Letournel whose pioneering work on operative fixation of ace tabular fractures has resulted in advancement of orthopedic surgery.

We present here the long term outcome of the operative fixation of acetabular fractures (treated at Dayanand Medical College and hospital, Ludhiana), in 20 patients followed for a maximum of 15 years.

MATERIAL AND METHODS

All cases of comminuted acetabular fractures ,both anterior and posterior pillars who presented in the institution mentioned between 2002 and 2005 were included in the study. Patients of all ages were included. Patients who underwent major neuro surgical procedures were excluded.

Indications for surgery were-

1. Unstable fracture dislocation of hip
2. fractures involving weight bearing area
3. An acetabular fracture with intra-articular loose fragments.
4. A non concentric reduction after dislocation of hip.
5. Persisting sciatic nerve palsy despite closed reduction.

20 patients were reviewed prospectively. Records available in form of admission notes, operative notes and progress notes were reviewed.

The pre-operative and post-operative x-rays and CT scans were assessed and OPD records of the patients were checked at follow up. Patients were followed up at 1 month intervals in first 6 months and subsequently at 1year,2 years ,5 years ,7 years , 10 years and 15 years

All technical problems and complications related to the procedure and the final functional outcome were recorded.

After managing life threatening emergencies i.e. head injury, chest and abdominal injuries patients were stabilized before taking them up for elective Acetabular fixation. Kocher-Langenbeck approach for posterior column and Triradiate approach for both column fractures were used. Standard AO/ Locally made 3.5 mm reconstruction plates and 4mm partially threaded screws were used for the fixation . Broad spectrum antibiotics were given for 5 days. Bed side physiotherapy started 6 hours after the surgery and increased as tolerated. Patients had an initial Harris Hip scoring at discharge at 2 weeks. Then at first follow up of 6 weeks, Then at subsequent follow ups. All the complications were assessed and recorded.

OBSERVATIONS AND RESULTS

20 patients (male 18 & female 2) with average age of32.9 years (range 21 to 52 years)were operated for acetabular fracture.19 patients suffered injury in road traffic accidents and 1 patient sustained injury due to fall from height.

Average injury-surgery interval was 6 days with range of 2 to 23 days.18 patients were operated within 2 weeks of injury.2 patients were operated 18 and22 days after injury because of head injury and blunt trauma abdomen respectively.

16 patients had posterior column fractures. Bicolumnar fractures were present in 4 patients. 9 patients had posterior dislocation of hip in which closed reduction was done and skeletal traction applied.2 patients had sciatic nerve injury preoperatively which were explored at time of surgery. Chemical prophylaxis against DVT was given to all patients (24 hours prior to surgery) except 2 patients who had head injury. 1 patient had deep wound infection, controlled with debridement, anti septic dressing and antibiotics.

Radiological reduction was evaluated by criteria given by Matta et al .It measured residual post operative displacement on AP and two 45 degrees oblique Judets views where maximum displacement (in mm) of any of normal radiographic lines or Innominate bone was measured and categorized into anatomical(0to1mm displacement),imperfect(2 to 3 mm displacement),poor(>3mm displacement) or surgical secondary congruence. (Table 2,3)

20 patients received pre-operative antibiotic prophylaxis. Subcutaneous LMW heparin was used for deep vein prophylaxis prevention in 18 patients starting one day preoperatively and continued for 2 weeks .Range of movement exercises were started on 2nd post-operative day and allowed non weight bearing mobilization at 7 days. Weight bearing was allowed once radiographic signs of fracture healing were evident. (Table 1,2)

Table 1

S. No.	Radiological reduction (Matta's criteria)	Harris Hip Score	Radiological outcome (Matta's criteria)	Complications
1.	Anatomical	92	Excellent	
2.	Anatomical	86	Excellent	
3.	Anatomical	95	Excellent	
4.	Anatomical	96	Good	
5.	Anatomical	95	Excellent	
6.	Anatomical	98	Excellent	
7.	Imperfect	68	Moderate	
8.	Anatomical	98	Good	
9.	Anatomical	99	Excellent	
10.	Anatomical	99	Good	
11.	Anatomical	92	Excellent	
12.	Anatomical	95	Excellent	
13.	Anatomical	73	Good	Wound infection
14.	Anatomical	68	Excellent	Heterotopic ossification
15.	Anatomical	86	Excellent	Heterotopic ossification
16.	Anatomical	95	Good	
17.	Anatomical	69	Good	
18.	Anatomical	98	Excellent	
19.	Anatomical	79	Good	AVN
20.	anatomical	99	Excellent	

Table 2

S. No	Age	Sex	Mode of Inj	Injury-Hospital Interval	Injury surgery interval	Hospital stay	side	Type of #	Surg-Duration	Blood loss	Dislocation	Associated Injuries
1.	36	M	RSA	1	3	16	R	Post.col.	180	700	-	-
2.	32	M	RSA	1	2	15	R	Post.col.	160	500	-	# tibial Plateau (R)
3.	35	M	RSA	2	3	15	R	Post.col.	220	850	posterior	Sciatic n. Injury
4.	40	M	RSA	1	3	14	R	Post.col.	190	800	-	-
5.	32	M	RSA	1	6	17	L	Post.wall	180	750	posterior	-
6.	23	M	RSA	2	7	18	R	Post.col.	160	550	central	-
7.	27	F	Fall from height	1	6	17	R	Post. And Ant.col.	240	1000	-	-
8.	25	M	RSA	1	23	36	R	Post.wall	210	800	-	BTA
9.	50	M	RSA	3	6	17	R	Post.col.	205	750	-	-
10.	28	M	RSA	3	5	15	R	Post.col.	190	700	-	Sciatic n. Injury,# Tibial plat.
11.	38	M	RSA	4	6	15	R	Post.col.	175	600	-	-
12.	21	M	RSA	2	8	22	R	Post.col.	165	600	posterior	
13.	26	M	RSA	1	18	34	R	Post.and Ant.col.	245	950	posterior	Head injury
14.	32	M	RSA	1	6	28	R	Post.col.	180	700	Post.	Head injury
15.	31	M	RSA	1	7	19	R	Post.wall	170	650	Post.	-
16.	40	M	RSA	2	4	15	L	Post.col.	170	600	Post.	-
17.	35	F	RSA	1	6	24	L	Post.col.	180	800	-	Diastasis of Pubic symphysis hysis, BTA
18.	52	M	RSA	1	7	20	L	Post.and Ant.col.	250	1100	-	-
19.	23	M	RSA	3	6	14	L	Post.and Ant.col.	240	1000	Post.	-
20.	32	M	RSA	1	2	16	R	Post.col.	180	700	Post.	-

Follow up period was maximum of 15 years. Functional and radiological outcome are tabulated into table2.Heterotopic ossification of Brooker class3 was found in 2 patients but gradually size of the heterotopic mass decreased allowing good range of movements at hip. One patient subsequently developed avascular necrosis of hip and later underwent total hip replacement. There were no hardware related complications. There were no iatrogenic sciatic nerve injuries. Preoperative sciatic nerve injuries of 2 cases were explored. All of them recovered in 3 months . Duration of surgery and blood loss are tabulated.

DISCUSSION

Acetabular fracture is an intra-articular fracture. Anatomical reduction and stable fixation are two important variables which affect final outcome. Till 1960, acetabular fractures were treated conservatively but with development of columnar concept as described by Judet and letournel and availability of better imaging modalities,surgical treatment is increasingly being performed with better results(4,5,6). Open reduction and internal fixation of acetabular fractures is technically challenging and only selective centres offer such treatments to patients.

Table3.Comparison with published results

Results	cases	Excellent/good
Current study	15	75%
Gupta et al.(1)	63	74%
Matta et al(3)	255	76%
Kumar et al(8)	73	75%
Deo et al(18)	74	74%

In our study injury to surgery time was 6 days.18 patients except 2 were operated within 2 weeks of surgery resulting in a better outcome in contrast to a study by Gupta RK et al revealed that lack of appropriate centres and trained personnel to deal with pelvi-acetabular surgery was reason for patients presenting late with an average delay of 12.33 days This was associated with a poor outcome.(1)

Epidemiological analysis of acetabular fracture revealed that incidence of acetabular fractures is increasing in developing countries contrary to developed countries where it is stable It affects young age group more. In present study 18 patients were below 40 years of age and 19 were male. Similar trends were also observed by Gupta RK and

Magu NK et.al in India and Khan SH et.al. in Pakistan indicating that young males were more vulnerable for acetabular injury.(1,13,14)

Choice of approach depends upon surgeon familiarity and fracture configuration. In the current series we used Kocher-Langenbeck for posterior and Triradiate approach for both column fractures. Average surgical time was 180 minutes and blood loss was 687 ml. (11)

Quality of reduction in acetabular fracture is an independent variable in terms of final outcome.Incongruous reduction reduces contact area between femoral head and acetabulum leading to increase in force per unit area to the articular cartilage and promotes post traumatic arthritis. Matta et.al.states that though capability of actabulum allows limited change in distribution and perhaps reshape itself,every attempt should be made to achieve residual displacement of no more than 1mm(3).

In our study all 20 cases had concentric reduction .Besides quality of reduction ,comminuted posterior wall fracture and femoral head injury play as important factors in clinical outcome. In our study of 20 patients,excellent and good functional results were seen in 13 and 2 patients respectively.2 patients in our study had fair results and remaining 3 patients had poor results.Results of our studies are compared with other studies in table3.

There are conflicting reports of incidence of deep vein thrombosis and pulmonary embolism in asian population.In the absence of long term prospective studies,routine use of chemical prophylaxis for DVT is not recommended in routine orthopaedic procedures.Sen R et. al. reported 16 cases of venous thromboembolism and 10 pulmonary embolism in 56 patients who had undergone pelvi-acetabular surgery without chemical prophylaxis and concluded that posterior injuries, patients operated on lateral decubitus position and kocher-langenbeck approach are risk factors for venous thromboembolism.(19)In the current study,18 patients received chemical prophylaxis and 2 did not because of head injury. None of them developed clinical features of DVT and pulmonary embolism. Depending on the conditions of other associated co-morbidities,patients in the current study were mobilized out of bed as early as possible once surgical drains were removed.

Heterotopic ossification is another complication with variable incidence depending on surgical approach.Extended ilio-inguinal (35%to57%) and tri-radiate approach have higher incidence as compared to low incidence in ilio-inguinal(4.8%) approach and moderate incidence in kocher-langenbeck approach.(20)Various factors have been reported to be associated with higher incidence of heterotopic ossification such as head, chest or abdominal injury, associated hip and femur fracture, T type of acetabular injury and patients with mechanical ventilation.(15)

The use of osteotomies,the amount of subperiosteal stripping and severity of fracture predispose to heterotopic ossification.(21,22)In current study 2 patients had heterotopic ossification of brooker class 2 which was later resorbed on subsequent follow up. Both patients had posterior dislocation of hip and were operated with Kocher-langenbeck approach. One of these patients was operated 2 weeks after injury, resulting in delayed operative intervention, leading to more handling and stripping of tissue at surgery.

Both these patients had a fair outcome according to Harris hip score. We did not use Indomethacin as a prophylaxis of heterotopic ossification in current study.

Wound infection was noted in 1 patient (5%) in our series which was similar to that reported in other studies (23,24).This patient was operated 18 days after injury leading to more handling and stripping of tissue at surgery consequently leading to infection.This patient underwent wound debridement and completely recovered subsequently.

Iatrogenic nerve injury such as sciatic nerve,femoral nerve and lateral cutaneous nerve of thigh are possible complications during acetabular surgery. There were 2 patients with pre-operative sciatic nerve injury in the current study.There were no cases of any nerve injuries during the operative period in our study.Both cases of sciatic nerve injury recovered completely on subsequent follow up.Incidence of femoral vessel injury is reported in 0.8% to2% of ilio-inguinal approach.(16) There were no cases of femoral artery injury in current study.

There was 1 patient in our series who developed avascular necrosis and had to undergo total hip replacement subsequently.

So in conclusion, acetabular fracture,which is mainly due to high velocity injury involving young adults, can be effectively managed with open reduction and internal fixation and have predictable and comparable functional and radiographic outcomes.Team of trained orthopaedic and general surgeon and support of anaesthetist are necessary to deal with any possible complications and associated other injuries. The surgeons should prepare well for problems such as prolonged operating time and increased blood loss especially in the learning curve phase and in the patients operated after a delay of more than 2 weeks.

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