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Indian Journal of Orthopaedics Surgery

Journal homepage: <https://www.ijos.co.in/>

Original Research Article

Surgical treatment of acetabular fracture

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ARTICLE INFO

Article history:

Received 29-12-2021

Accepted 04-11-2021

Available online 24-03-2022

Keywords:

Kocher -langenbeck approach

Acetabular fracture

Open reduction and internal fixation

ABSTRACT

Background: The Kocher-Langenbeck approach is the best suited approach for reduction and fixation of acetabular fracture that require fixation through posterior approach and provides sufficient access to the majority of posterior based acetabular fracture.¹ Accuracy of fracture reduction is the strongest predictor of clinical outcome in acetabular fixation surgery.

Materials and Methods: Twenty four patients with posteriorly based acetabular fracture were treated with open reduction and internal fixation using Kocher-Langenbeck incision. In our series, there were 11 posterior wall, 3 posterior column, 5 transverse, 2 posterior column and posterior wall and 3 transverse and posterior wall fractures. All the patients were in the age group of 30 to 45 years (mean age 38.5 years). Males dominated our series (n=18 i.e. 75%) and right side was more commonly involved in both the sexes (n=14 i.e. 58.33%). Road traffic accident was the leading cause (n=19 i.e. 79.16%). All the patients were operated achieving adequate stability and with utmost soft tissue care. Follow up radiograph were graded according to criteria developed by Matta J et al. A minimum follow up was two years.

Result: Patient with accurate reconstruction (n=21 i.e. 87.50%) had good or excellent functional outcome while two patients (8.33%) with inaccurate reduction and one patient (4.16%) with poor reduction had fair and poor outcome respectively.

Conclusion: Despite relatively large number of possible complications Kocher-Langenbeck Approach is the best suited approach for posterior acetabular fracture.

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1. Introduction

Acetabular fracture is one of the most complex injuries treated by orthopaedic surgeon. Now a days this fracture is more commonly seen in young adults as a result of high energy road traffic accident and thus surgical treatment of this fracture is more commonly indicated now than in the past. Surgical treatment of acetabular fracture is challenging in the sense that surgery is difficult and complication rate is high. Open reduction and internal fixation is the treatment of choice for posteriorly based displaced acetabular fracture.¹ Integrity of weight bearing

dome of acetabulum is an important prognostic factor. If the fracture crossing dome of the acetabulum remains unreduced posttraumatic degenerative arthritis is inevitable. A displaced fracture (more than 3 mm intra articular displacement either a step or widening) crossing the dome of the acetabulum is an indication of surgery. During surgery Our purpose is to restore anatomical articular congruity by accurate reconstruction of dome of acetabulum, provide adequate coverage of femoral head under reconstructed dome as well as stable and rigid fixation of wall and column to obtain best functional outcome i.e. painless range of motion. For this apart from other things the choice of approach does matter as it requires adequate exposure of acetabulum for accurate fixation of fracture

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fragments. The Kocher- Langenbeck approach is the most frequently used approach as it provides excellent direct access to the posterior column and posterior wall and indirect access to superior wall and quadrilateral surface.¹ This incision is very useful in posterior wall acetabular fracture, posterior column acetabular fracture, posterior column and posterior wall acetabular fracture, transverse and posterior wall acetabular fracture, transeverse actabular fracture with major displacement occurring at posterior column and posterior element reduction and fixation in T type acetabular fracture.

2. Aim of the Study

To evaluate functional outcome and complications of surgical treatment of displaced acetabular fracture using Kocher Lengenbec approach for internal fixation.

3. Material and Methods

This is a prospective study conducted by author during 2004 to 2019. Our series consisted of twenty-four patients of posterior acetabular fractures treated surgically using Kocher- Langenbeck approach. According to Letournel judet classification there were 11 posterior wall fracture, 3 posterior column fracture, 5 transverse fracture, 2 posterior column and posterior wall fracture and 3 transverse and post wall fracture in the series. Patient counselling and informed consent was mandatory in our series. Mean age of the patient was 38.58 years (range 30 to 45 years) with standard deviation of 3.67 and variance 13.49. Patients were more frequently male (n=18 i.e. 75%) than female (n=6 i.e.25%). All of them were investigated for their fitness for spinal or epidural block or general anaesthesia. Steps of the procedure including patient positioning, surgical procedure, provisional fixation and definitive fixation were discussed and documented. Radiographic evaluation included x-ray A-P View of pelvis, Obturator oblique view and Iliac oblique view and CT scan with or without 3D reconstruction. Five (20.83%) patients had posterior dislocation or subluxation of femoral head visible on first x-ray that was reduced within 6 hours under fluoroscopic control and held in distal femoral traction. The mean injury to operation interval was 7 days (range 3 to 15 days). Four patients (16.66%) were having sciatic nerve injury preoperatively. In our Series out of 24 patients 12 patients were operated in lateral position and 12 patients were operated in prone position with ipsilateral distal femoral traction. Incision used was Kocher -Langenbeck with and without trochanteric osteotomy as per need.

4. Surgical Procedure

Either spinal or epidural block was used during the procedure. Either Lateral or prone position was used on fracture table with radiolucent top. Draping was carried

out after proper antiseptic scrub. In all 24 cases Kocher -Langenbeck incision was used and standard operative technique was followed. Ipsilateral knee was kept flexed to 80 to 90 degree during the procedure to avoid tension on sciatic nerve. Reconstruction of posterior column was followed by reconstruction of posterior wall in order to ensure accurate reconstruction of articular surfaces, stable fixation of column and wall to provide adequate Coverage of femoral head under reconstructed dome. Reconstruction of posterior column was carried out with contoured reconstruction plate or lag screw. Reconstruction of posterior wall was done with interfragmentary screw or with reconstruction plates or one third tubular plate or locking plate in buttress mode. In all cases combination of implants were used. Intraoperative fluoroscopy was used as per need. Any incarcerated fragment was removed and femoral head is relocated. Stability was assessed by entire range of motion of hip intraoperatively. Wound was closed over drain in layers. Final fluoroscopic check was done at conclusion of the procedure.

5. Postoperative Care

In immediate post-operative period the operated limb was supported on Brown Bohler splint. Limb elevation was ensured. First dressing change was done on third postoperative day and drain was removed at the same time. Sutures were removed on 14th day. On 5th postoperative day gentle range of motion exercises were started at knee and ankle.

6. Follow UP

Patients were followed up at 2 weeks, 4 weeks, 6 weeks, 8 weeks, regularly at 6 week interval for 6 months and then at 3 month interval for next 1.5 years. Radiographic analysis (AP pelvis, obturator and Iliac oblique) was performed at each follow up. Final followup radiographs were graded according to criteria developed by Matta. Excellent denotes a normal appearing hip joint, Good as mild changes with minimal sclerosis and joint narrowing, Fair indicates intermediate changes with moderate sclerosis and joint narrowing (<50%) and Poor signify advanced changes. Functional outcome was assessed by Harris Hip Score.

Table 1: Shows radiological classification of fracture (Letournel and Judet)

Type of fracture	No. of cases (%)
Posterior wall	11 (45.83)
Posterior column	03(12.50)
Transverse	05(20.83)
Posterior column and posterior wall	02 (08.33)
Transverse and post wall	03 (12.50)
Total	24 (100%)

Table 2: Shows associated injuries

Associated injuries	No. of cases (%)
Chest injury	01(04.16)
Upper limb fracture	04(16.66)
Lower limb fracture	02 (08.33)
No associated injury	17 (70.83)

Table 3: Shows age distribution of the patients

Age of the patients	No. of cases (%)
30 -34	04(16.66),F
35 39	09(37.50)
40-44	10(41.66)
45-49	01(04.16)

Table 4: Show sex distribution of the patient

Sex of patients	No. cases (%)
Male	18(75.00)
Female	06(25.00)

Table 5: Shows side of the acetabulum affected

Affected side	No. case (%)
Right	14(58.33)
Left	10(41.66)

Table 6: Shows modes of injury

Mode of injury	No. of cases (%)
Road traffic accident	19(79.16)
Fall from height	05(20.84)

Table 7: Shows quality of reduction (Matta criteria): Radiological

Findings	Number of patients
Anatomical reduction	21(87.50)
Imperfect reduction	02(08.33)
Poor reduction	01(04.16)

Table 8: Shows complications encountered in our series

Complications encountered	No. of cases(%)
Iatrogenic Nerve injury	02(08.33)
Infection	01(04.16)
Thromboembolic complication	00(00.00)
Avascular necrosis	02 (08.33)
Posttraumatic arthritis	02(08.33)
Heterotopic ossifications	03(12.50)

The peroneal division was more commonly involved than tibial division. Most of the patient recovered within six months of operation. No mortality was seen in our series.

7. Observation

Mean length of hospital stay was 16 days (length 11 to 30 days). Reduction was assessed by x-ray using Matta criteria on third or fourth postoperative day and functional

Table 9: Shows grading of result (Harris Hip Score)

Grade	No. of cases (%)
Excellent	06 (25.00)
Good	15 (62.50)
Fair	02(08.33)
Poor	01 (04.16)

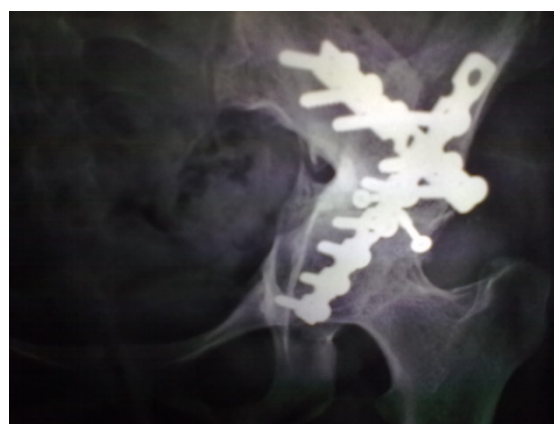
**Fig. 1:** Case 1: Preoperative**Fig. 2:** Case 1: Postoperative**Fig. 3:** Case 2: Preoperative



Fig. 4: Case 2: Postoperative



Fig. 5: Case 3: Preoperative



Fig. 6: Case 3: Preoperative



Fig. 7: Case 3: Postoperative

outcome was graded using Harris Hip Score and Merle d'Aubigne and Postel modified by Matta criteria as Excellent, Good, Fair and Poor. Main elements followed were pain, walking and range of hip motion. Poor result was noted in the patient with poor reduction (more than 10mm separation) postoperatively. There was statistically significant correlation between quality of reduction and clinical outcome ($p < .001$).

8. Discussion

Open reduction and internal fixation is the treatment of choice for most of the posteriorly based displaced acetabular fracture.²⁻⁶ Moed BR (3) in his study reported good reduction and functional outcome in posteriorly based acetabular fracture using Kocher-Lengenbeck approach.

Poor fracture reduction, multi-fragmentary fracture of posterior wall, transverse multi-fragmentary fractures of tectum or roof of acetabulum, cartilage damage to the femoral head and or acetabulum (marginal impaction), fractures associated with hip dislocations, undue delay in surgery (>15 days) and initial fracture displacement more than 10 mm are associated with poor prognosis. Positive outcomes correlated with radiographic outcomes. Worst result was seen in the patients with posterior column/posterior wall followed by transverse/posterior wall trans-tectal fracture. Despite relatively large numbers of complications, surgical treatment of acetabular fracture offers better result than conservative treatment.⁷ Kocher-Lengenbeck approach provides sufficient access to the majority of posterior based acetabular fracture.⁷ There was a statistically significant correlation between the quality of reduction and clinical result ($p < 0.001$). Fracture type and cartilage damage, sex, and age are prognostic factors for outcome after open reduction and internal using Kocher-Lengenbeck approach. The most important factor predictive of good functional outcome is anatomic reduction of fracture (less than 1 mm of displacement). O Alexia RI Malanca et al.⁷ in his study reported excellent result in 23.7%, Good in 60.5%, fair in 10.5% and poor in 5.3%.

He observed heterotopic ossification as most frequently encountered complication. Heterotopic ossification was the most frequent complication in my series also and Indomethacin was used postoperatively in those cases. Pol Maria Rommens⁸ in his study of 60 patients of posterior wall acetabular fracture reported 69.6% excellent or good result using the Kocher-Langenbeck approach.

9. Conclusion

The Kocher –Langenbeck approach is an ideal approach for posteriorly based acetabular fracture and the results and complications encountered are within acceptable limit.

10. Source of Funding

None.

11. Conflict of Interest

The authors declare no conflict of interest.


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Cite this article: Jee GM, Kumar N. Surgical treatment of acetabular fracture. *Indian J Orthop Surg* 2022;8(1):67-71.