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Descriptive case report on the postoperative rehabilitation of roof and posterior column acetabular fracture following accidental event

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ABSTRACT

Introduction: Fractures of acetabulum are among the most difficult injuries for orthopaedic surgeons to treat dealing with trauma. The most common injuries are RTA and falls from great height causes of acetabular fractures. These fractures that occur are prone to failure of joint and may be better treated with methods such as ORIF. In terms of patient and fracture characteristics, fractures of acetabulum in the elder population are characterized by a significant grade of diversity. Thus, the analysis focuses to show the effect of a unique surgical method for the therapy of break in the continuity of acetabulum in the posterior wall. *Case description:* A 55-year male visited to the department of emergency after RTA due to collision with an auto rickshaw. X-rays findings showed posterior wall of right fracture of acetabulum. His treatment was done by ORIF and plate osteosynthesis for acetabulum fracture. *Diagnosis, Therapeutic Intervention and outcomes:* Patient was diagnosed with the Roof and posterior column of right acetabulum fracture without neurovascular deficit. Therapeutic intervention for the patient comprised of education to him, range of motion exercises, strength building exercise. Final outcome of all the treatment showed functional recovery. *Conclusion:* This study suggests that surgical intervention along with physiotherapy help to increase the ROM, strength of the muscle, and activities of daily living over time leading to more restoration of effectiveness.

Keywords: Acetabuluar fracture, pelvis, Open reduction, internal fixation, hip joint

1. INTRODUCTION

The innominate bone, which contains anterior and posterior walls (or rims) but is open inferiorly as the acetabular notch, is made up of the ilium, ischium, and pubis, which together form the acetabulum. It also has an upside-down

U-shaped hyaline cartilage–covered articular surface that contacts the femoral head. The cotyloid fossa is the nonarticular section of the "U" that comprises the fatty pulvinar and ligamentum teres, while the fibrocartilagenous acetabular labrum lines the anterior, superior, and posterior acetabular rims, deepening the acetabulum and helping to prevent femoral head dislocation. The transverse acetabular ligament bridges the labrum inferiorly, while the quadrilateral plate or surface is the flat medial aspect of the acetabulum that confronts the organs of pelvis. Different management options, such as closed treatment, open reduction, and internal fixation, are explored, as well as their indications and outcomes. This classification system is based on the front and posterior columns and walls involvement and divides acetabular fractures into two primary groups: elementary and related types. These fractures are the highly demanding injuries which are treated by orthopaedic trauma surgeons. The use of highly personalized management ideas by skilled teams are required for successful outcomes (Hoge and Chauvin, 2022).

Fractures of acetabulum are frequently of high energy and therefore presented in combination with other organ injuries. High morbidity is common in these fractures because the damage to the cartilage can lead to disabling osteoarthritis in the future. Injury to the distal femur or knee when the hip is in flexion it causes the head of femur to drive posteriorly into the wall of acetabulum , resulting in a wall fracture posteriorly (Thurston, 2018). Joint failure is common after injuries to these locations, thus anatomic reduction is essential. Along with the entire roof, the section of the roof that accompanies this posterior column fragment is likewise hinged inwards, giving the illusion of a gull in flight. Fractures in these zones are more likely to cause joint failure and may benefit from ORIF (Laird and Keating, 2005).

The grade of articular reduction and the capacity to sustain a congruent reduction of the hip joint are rigorously monitored in clinical findings following ORIF (Scheinfeld et al., 2015). In selected cases, ORIF in posterior wall of acetabulum fractures could be a better option of surgery along with dominance of concurrent treatments of labrum and removal of loose body, the highest bone density is found to be in the roof and acetabulum (posterior wall) have due to mechanical load which are high (Pagenkopf et al., 2006). Acetabular fractures of posterior wall may be one of the most prevalent a fracture forms treated, depending on the cohort. For unstable posterior column fractures of acetabulum, ORIF is now recommended to lessen the possibility of posttraumatic degeneration of joint and allow for premature mobilisation (Durkee et al., 2006).

2. PATIENT INFORMATION

A 55-year male brought to casualty by his brother with complaint of pain and swelling over right hip since6 hours. Patient was apparently alright before 6 hours. Patient's relatives gave the history of RTA collision with an auto rickshaw) around 2:30pm (DOI: 13/01/2022) near Yavatmal sustaining injury to right hip. Onset of pain was sudden and excruciating in nature type was dull aching aggravated on walking and relieved by rest and medication. Patient was unable to bear weight over right lower limb immediately after the incident. There was no H/O head injury, LOC, ENT bleed, alcohol consumption, vomiting or seizure. Patient was brought here in AVBRH for further management. Further investigation was advised to done. In x-ray pelvis with hip s/o superior / pubic dislocation of hip with ilium fracture at greater sciatic notch with loss of Shelton line with loss of acetabular congruency. For the above-mentioned complaint patient was admitted on 13/01/2022. Patient operation that is surgical correction of pelvis for roof and posterior wall of right side acetabular fracture was done on 19/01/2022 and the procedure done was plate osteosynthesis for acetabulum fracture and patient was k/c/o Hypertension with type II DM since 3 years. Incidences that took place are sequentially arranged in a timeframe (Table 1).

Table 1 A Timeline of the events related to patient's injury and treatment

Date of admission	13/01/2022
Date of diagnosis	14/01/2022
Date of operation	19/01/2022
Physiotherapy referral	21/01/2022
Date of physiotherapy initiation	22/01/2022
Discharge	30/1/2022

3. CLINICAL FINDINGS

Physical examination and treatment was told to the patient. Patient was well time, place and person orientation and hemodynamically stable, afebrile, and blood pressure 140/90 mmHg, a pulse rate 120bpm, and Respiratory rate 20 bpm. There were no signs of cyanosis, clubbing, icterus, or edema present in the patient. On rating pain with NPRS scale it was 8/10, 2*2 cm contusion over anterior aspect of right proximal tibia, 2x2 cm abrasion over lateral malleolus. Limb length discrepancy was present.

Diffuse swelling present over right hip. There was presence of bony tenderness over anterior aspect joint line of right hip. Right hip and knee ROM was painful and restricted (Table 2). Pelvic compression was positive and was on foleys catheter

Table 2 Range of motion

	Movement of joint	Left		Right	
		Active	Passive	Active	Passive
Hip joint	Flexion	0-120˚	0-125˚	0-80˚	0-100˚
	Extension	0-30˚	0-30˚	0-15˚	0-20˚
	Abduction	0-40˚	0-45˚	0-30˚	0-35˚
	Adduction	40-0˚	45-0˚	30-0˚	10-0˚
	Internal rotation	0-40˚	0-45˚	0-10˚	0-20˚
	External rotation	0-40˚	0-45˚	0-10˚	0-20˚
Knee joint	Flexion	0-140˚	145-0˚	0-20˚	0-25˚
	Extension	0-140˚	0-145˚	0-25˚	25-0˚
Ankle joint	Dorsiflexion	0-20˚	0-20˚	0-5˚	0-20˚
	Plantarflexion	0-40˚	0-45˚	0-30˚	0-40˚
	Inversion	0-30˚	0-35˚	0-20˚	0-35˚
	Eversion	0-10˚	0-15˚	0-10˚	0-15˚

Diagnostic Assessment

The diagnosis of the patient was confirmed by the x-ray in the anterior view and lateral view (Figure 1 and 2) which revealed that there was fracture of roof of acetabulum and operated for the same and the x-ray was again done to check whether the fixations done were proper or not (Figure 3).

Figure 1 indicates the femoral head fracture with roof of acetabulum fracture.

Figure 2 Indicates the femoral head dislocation posteriorly along with the acetabular fracture.

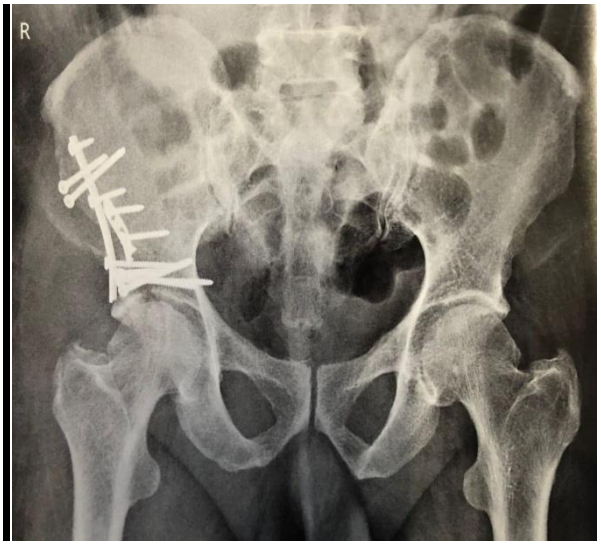

Figure 3 shows x-ray after operation with implant plate osteosynthesis

Therapeutic Interventions

Short term goals

Education of the patient

Reduction of pain and tenderness

Prevention of respiratory complication

Improvement of ROM, strength of muscles of lower limb and promote early mobility.

Long term goals

Promotion of independent walking with or without frame

Improvement of static and dynamic balance

Improvement of the endurance and restore the functional activity of daily living

Phase wise protocol has been mentioned in (Table 3 and 4)

Table 3 Phase 1 (Day 1 to Week 1) and Phase 2 (two to four weeks)

TREATMENT	REPETITION	RATIONALE
Cryotherapy	8 to 10 min / 3times a day	To minimize inflammation and swelling.
Ankle toe movement	10 repetition 1 set 2-3 times a day	Maintain blood circulation
Heel slides (left side) (Active range of motion for hip and knee)	10 repetitions 1 set 2-3 times per day.	To maintain the available ROM.
Isometrics exercise glutei, hamstring, and quadriceps muscle	10 repetition, 10 second hold., 2 -3 times a day	To initiate muscle contraction.
Abduction of hip(left side)	10 repetition, 2 sets 2-3 times a day.	To maintain available range of abduction.
Straight leg raise (b/l)	10 repetitions, 2 set 2-3 times a day.	To maintain available range of and increase strength
Log rolling by removing weight of traction	2-3reps, 10 sec hold, 2- 3 times a day.	To prevent pressure sores and initiate the movement.
Unilateral Pelvic bridging	10 reps, 2-3 times per day	To strengthen the lower back muscles and muscles of pelvis.

Table 4 Phase 3 (six to eight week)

TREATMENT	REPETITION	RATIONALE
Straight leg raise	10 repetitions with half kg weight, 2 sets, 2-3 times a day.	To increase the strength of the muscles (Fig. 5)
Log rolling	2-3reps, 10 sec hold, 2- 3 times a day.	To prevent pressure sores and initiate the movement.
Unilateral Pelvic bridging	10 reps, 2-3 times per day	To strengthen the lower back muscles and muscles of pelvis.
Heel slides (Active range of motion for hip and knee)	10 repetition 1 set 2-3 times a day	To increase the range of motion (Fig. 4)
Bed side sitting	For 10 min	To maintain sitting balance.
Sit to stand	10 reps	To improve the weight bearing capacity if the joint.
PWB with walker	1-2 rounds, 2-3 times a day	To improve the gait pattern and initiate walking.

Figure 4 while the patient is doing heel slides of left lower limb

Figure 5 when the patient is doing SLR of unaffected extremity

4. DISCUSSION

The therapy of acetabulum fractures of posterior wall can be a difficult task. Bed rest and traction are the most common nonoperative treatments. Pressure sores, infections of pin track, thrombosis, pneumonia, and infections of urinary tract are all possible side effects of extended bed rest. Open reduction of these fractures, on the other hand, necessitates extensive dissection, which might lead to a protracted recovery and heterotrophic ossification (HO) (Gurpinar et al., 2019). Furthermore, HO is commonly seen in individuals who require surgical dissection of the gluteal muscles as a consequence of fractures of acetabulum. Such surgeries, however, remain a significant challenge for an orthopaedic physician (Moed, 2016). It's not easy to analyse publications in this field—scientists looked at a variety of factors. Authors compare and contrast various types. Recent advancements in orthopaedic surgery have showed in improved endless surgical result for fracture of acetabulum. Such surgeries, however, remain a significant provocation for an orthopaedic physician (Ferguson et al., 2010).

Anatomically, fractures of acetabulum, chiefly those that penetrate through the roof, must be treated. In case, patient does not receive the best possible reconstruction, he or she may develop early arthritis, hip discomfort, reduced range of motion, or limping, all of which have a negative impact on functional capacity (Ziran et al., 2019). Acetabular breaks in the elder people vary from those in juvenile people in that they frequently occur as fissures in osteoporotic bone induced by little stress, although they can displace later. This sort of fracture is likely to union at six weeks and consolidate at twelve weeks, so keep that in mind while deciding on traction and weight-bearing restrictions (Tian et al., 2019).

Advancements in physiotherapy related to muscle stiffness, reduced strength or pain can be alleviated with the help of Theragun usage which is a percussive massage therapy proven to aid improvement in improving the quality of life (Lakhwani and Phansopkar, 2021).

5. CONCLUSION

Acetabular fractures are demanding injuries treated by orthopaedic trauma surgeons. Fractures are managed surgically; patient experienced secondary impairment like reduced mobility, strength and endurance and increased functional independence. Physiotherapy rehabilitation as an adjunct to a surgical management takes part as a major character in preventing secondary impairment and thus enhances recovery.

Author's contribution

Nikita Kaple, Dr Madhu Lakhwani and Dr Medhavi Jagzape worked on the content and matter of the report and Dr. Pratik Phanspkar guided throughout the preparation of the article.

Informed consent

Informed consent was taken from the patient included in the study.

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Conflicts of interest

The authors declare that there are no conflicts of interests.

Data and materials availability

All data associated with this study are present in the paper.

REFERENCES AND NOTES

1. Durkee J, Jacobson J, Jamadar D, Karunakar MA, Morag Y, Hayes C. Classification of Common Acetabular Fractures: Radiographic and CT Appearances. Am J Roentgenol 2006; 187: 915–925. doi: 10.2214/AJR.05.1269
2. Ferguson A, Patel R, Bhandari M, Matta JM. Fractures of the acetabulum in patients aged 60 years and older: an epidemiological and radiological study. J Bone Joint Surg Br 2010; 92: 250–257. doi: 10.1302/0301-620X.92B2.22488
3. Gurpinar T, Polat B, Kanay E, Polat A, Oztürkmen Y. Arthroscopic Fixation of a Posterior Acetabular Wall Fracture: A Case Report. Cureus 2019; 11: e6264. doi: 10.7759/cureus.6264
4. Hoge S, ChauvinBJ. Acetabular Fractures, in: StatPearls. 2022. StatPearls Publishing, Treasure Island (FL).
5. Laird A, Keating JF. Acetabular fractures. J Bone Joint Surg Br 2005; 87B: 969–973, doi: 10.1302/0301-620X.87B7.16017
6. Lakhwani M, Phansopkar P. Efficacy of Percussive Massage versus Calf Stretching on Pain, Range of Motion, Muscle Strength and Functional Outcomes in Patients with Plantar Fasciitis – A Research Protocol. J pharm res int 2021; 532–539. doi: 10.9734/jpri/2021/v33i44B32705
7. Moed BR. A thirty year perspective on posterior wall fractures of the acetabulum: Enigma or just another intra-articular injury. J Taibah Univ Med Sci 2016; 11: 179–186 doi: 10.1016/j.jtumed.2016.02.002
8. Pagenkopf E, Grose A, Partal G, Helfet DL. Acetabular Fractures in the Elderly: Treatment Recommendations. HSS J 2006; 2: 161–171, doi: 10.1007/s11420-006-9010-7
9. Scheinfeld M H , Dym AA, Spektor M, Avery LL, Dym RJ, Amanatullah DF. Acetabular Fractures: What Radiologists Should Know and How 3D CT Can Aid Classification. Radio Graphics 2015; 35: 555–577. doi: 10.1148/rg.352140098
10. Thurston M. Acetabular fracture, Radiology Reference Article | Radiopaedia.org Radiopaedia, 2018 doi: 10.53347/rID-59043
11. Tian S, Chen Y, Yin Y, Zhang, R , Hou Z, Zhang, Y. Morphological Characteristics of Posterior Wall Fragments Associated with Acetabular Both-column Fracture. Sci Rep 2019; 9(1): 20164. doi: 10.1038/s41598-019-56838-5
12. Ziran N, Soles GLS, Matta JM. Outcomes after surgical treatment of acetabular fractures: a review. Patient Saf Surg 2019; 13: 16. doi: 10.1186/s13037-019-0196-2