

FUNCTIONAL AND RADIOLOGICAL OUTCOME OF ACETABULAR FRACTURES TREATED BY PERCUTANEOUS SCREW FIXATION

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Abstract

Background: Acetabular fractures are a challenge to treat, with age, comorbidities, fracture and osteoporosis stability influencing decision-making. The study aims to evaluate the functional outcome of patients with acetabular fractures treated by percutaneous screw fixation. **Materials and Methods:** This prospective study was analysed on 20 patients with an acetabular fracture managed surgically by Percutaneous screw fixation to assess the functional outcome in our institute for two years. Patients were evaluated with obturator and iliac views and CT pelvis, and functional outcome was assessed using the Modified Merle d'Aubigne Scoring System. Intra Venous Antibiotics were continued until the 5th postoperative day, and patients were encouraged to sit up in the first 24-48 hours. **Result:** Among 20 patients, males were 15 (75%), and females were 5 (25%). The highest number of patients, 7 (35%), were 50-60 years old. 11 (55%) had injuries on the right side, while 9 (45%) had injuries on the left side. Injuries on the right side were more common than ones on the left. Seventeen patients (85%) experienced RTA, while three (15%) experienced a fall from height. Thirteen patients (65%) were diagnosed with anterior column fractures. Seventeen patients (85%) underwent percutaneous screw fixation only. Four patients (20%) had an excellent outcome, and nine (45%) had a good outcome. Five patients (25%) had a fair outcome, and two patients (10%) had a poor outcome. **Conclusion:** Percutaneous screw fixation is recommended for undisplaced and minimally displaced acetabular fractures to improve outcomes and facilitate rehabilitation. It is associated with almost no complications and high radiation exposure.

INTRODUCTION

For the past two decades, trauma care has increased tremendously because of the development of standardised protocols in treating RTA, which have all contributed to increased survival rates after pelvic injuries.^[1,2] Acetabular fractures comprise 10% of pelvic injuries. Posterior wall fractures are more common, containing approximately 25%; high-velocity trauma is the prime cause in younger individuals.^[3] Treating acetabular fractures is a challenging task that is continually updated and needs a concrete learning curve. Acetabular fractures are usually related to other pelvis injuries, long bones, spine and visceral organs, which may impact treatment methods, surgical approach and clinical outcomes.^[4]

Patient's age, comorbidities, fracture and osteoporosis stability may influence decision-

making. The treatment aims for early mobilization and anatomic restoration of articulating surface. Surgical fixation of acetabular fractures aims to get a precise reduction to restore joint congruence, prevent displacement, and faster rehabilitation. Internal fixation by open surgery is the benchmark method for displaced fractures. Open reduction may increase morbidity, causing nerve injury, vascular injury, blood loss, heterotrophic ossification, infection and delayed wound healing. The anatomical reduction with a gap of about 2mm is a good predictor of joint function and decreased risk of post-traumatic arthritis.^[5] Percutaneous screw fixation is associated with fewer complications than open methods. But acetabular anatomy makes percutaneous screw insertion a challenging technique.

The percutaneous technique is a recommended treatment option for patients with un-displaced or minimally displaced fractures who are morbidly

obese, osteoporotic, or older and for whom total joint replacement is difficult. It can also be an effective treatment option for displaced acetabular fractures that are challenging to manage with traditional methods.^[6] By percutaneous methods, it is easy to fix minimally displaced fractures by restoring the joint surfaces completely and getting enough stability for early hip movement.^[7] The management of simple acetabulum fractures is well-known and studied. Treatment of complex Acetabular fractures is difficult for reduction and fixation as both columns of the acetabulum have to be manipulated and fixed. Thus, the study aims to evaluate the functional outcome of patients with acetabular fractures treated by percutaneous screw fixation.

MATERIALS AND METHODS

This prospective study was analysed on 20 patients with an acetabular fracture managed surgically by Percutaneous screw fixation to assess the functional outcome in our institute for two years, from October 2018-September 2020. Informed consent was obtained from all patients before the study started.

Inclusion Criteria

Patients aged between 18 and 80 years, closed acetabular fractures, and acetabular fractures without hip dislocation were included.

Exclusion Criteria

Age <18 years and >80 years, fracture greater than three weeks old, pathological fracture of the acetabulum (metastasis or primary tumor), patients

who are medically unfit for surgery (with severe systemic illness), patients with psychiatric illness, and open fractures were excluded.

All the patients were prospectively evaluated with obturator and iliac views and CT pelvis. Accurate reduction of the fractured fragments is achieved intra-operatively. Postoperatively, all the patients were evaluated using pelvis AP, Iliac and Obturator view. The functional outcome was assessed using the Modified Merle d'Aubigne Scoring System. Intra Venous Antibiotics are continued till the 5th postoperative day Routinely. Deep Venous Thrombosis Prophylaxis and Indomethacin are not routine in our study.

Patients are encouraged to sit up in the first 24-48 hours. Strict Non-Weight Bearing walking is advocated for four weeks. Followed by Toe Touch Walking for eight weeks. With osteoporotic bone or comminuted fractures, weight bearing is delayed until 12 weeks. After 12 weeks, full weight bearing is advocated. Physiotherapy is advocated till the patient regains a complete range of motion and muscle power.

RESULTS

Among 20 patients, males were 15 (75%), and females were 5 (25%). The highest number of patients were 50-60 years old, 7 (35%).

11 (55%) had injuries on the right side, while 9 (45%) had injuries on the left side. Injuries on the right side were more common than ones on the left.

Table 1: Patient characteristics of the study

		Frequency	Percentage
Gender	Male	15	75
	Female	5	25
Age group	20-30	2	10
	30-40	3	15
	40-50	5	25
	50-60	7	35
	60-70	2	10
	70-80	1	5
Side	Right	11	55
	Left	9	45
Mode of injury	RTA	17	85
	Fall from height	3	15
Diagnosis	Anterior column	13	65
	Posterior column	3	15
	Transverse column	3	15
	Anterior and Posterior column	1	5
Associated injuries	Schatzker type VI tibial plateu	1	5
	Chest wall injury	2	10
	Head injury	3	15
	Grade II compound Distal femur	1	5
	Closed Both bone leg	2	10
	Abdominal injury	1	5
	None	10	50
Procedure	Percutaneous screw fixation only	17	85
	Percutaneous screw fixation with plating	3	15
Functional outcome	Excellent	4	20
	Good	9	45
	Fair	5	25
	Poor	2	10

Seventeen patients (85%) experienced RTA, while three (15%) experienced a fall from height. Most patients experienced road traffic accidents.

Thirteen patients (65%) were diagnosed with anterior column fractures, and three (15%) were diagnosed with posterior column fractures. Three patients (15%) were diagnosed with transverse column fractures, and one patient (5%) was diagnosed with anterior and posterior column fractures.

Among associated injuries, one patient (5%) had Schatzker type VI tibial plateau injuries, and two patients (10%) had chest wall injuries. Three patients (15%) had head injuries, and one (5%) had grade II compound distal femur injuries. Two patients (10%) had closed both bone leg injuries, one patient (5%) had abdominal injuries, and ten patients (50%) had no associated injuries.

In the procedure, 17 patients (85%) underwent percutaneous screw fixation only, and three (15%) underwent percutaneous screw fixation with plating. Four patients (20%) had an excellent outcome, and nine (45%) had a good outcome. Five patients (25%) had a fair outcome, and two patients (10%) had a poor outcome [Table 1].

DISCUSSION

There is continuous evolution in treating acetabular fractures. The fractures are due to high energy forces, and the chances of having additional visceral or skeletal injuries are high. Newer damage control orthopaedic surgery concepts recommend primary survey and hemodynamic stabilization before definitive fracture fixation. Knowledge of the mechanism of injury is important in identifying other potential injuries. Pre-op evaluation using special views and CT guides in planning the approach and duration of surgery, thereby reducing preoperative and postoperative complications.

In 1992 Gay SB et al,^[8] were the first to describe the percutaneous technique for acetabular fractures. Mouhsine E et al,^[9] in their study, retrospectively analysed 18 patients. In all cases, the fracture was minimally displaced or undisplaced, Bed to a chair after 24 hrs of surgery, and weight-bearing started at 4 to 6 weeks. Copeland et al,^[10] in their study, analysed eight patients of these 5 cases with transverse fracture, one with T type, and another one case had anterior column posterior hemitransverse. In these cases, four had a full range of hip motion, and two patients had heterotrophic ossification with a good range of movements and weight bearing starting at four weeks.

Crowl Ac et al,^[11] retrospectively followed 23 patients for 11 years. Of these 23 patients, 14 underwent percutaneous screw fixation under fluoroscopy, and 9 underwent the same procedure under CT guidance. All patients are c for at least two years and have a good range of movements.

We used a combination of percutaneous screws and plates in 3 patients. In these cases, we have done

anterior column screw and posterior column plating, all of which had transverse fractures. In transverse fracture, if the fracture site in the posterior column acts as a tension site, it should be bolstered by plating. A percutaneous screw should compress the compression site in the anterior column. We have done percutaneous screw fixation for anterior and posterior columns in one case. In two cases, we have done sacroiliac joint screw fixation and anterior column screw fixation.

In our study, none of the patients have operative site infections. One of the patients has heterotopic ossification. We have done posterior wall plating and percutaneous screw fixation for the anterior column. One patient had an associated abdominal injury or urethral injury, two patients had chest wall injury, three patients had a head injury, and four patients had associated other long bone fractures. We have taken this case for surgery only after appropriate resuscitation and hemodynamic stabilization. Most cases were operated within seven days of admission. None of the cases in our study had been taken up for surgery after 14 days.

Nicholson JA et al,^[12] reported that avascular necrosis of the femoral head is more when associated with hip dislocation. They concluded that associated dislocations have worse long-term functional outcomes and reported higher rates of complications and conversion of total hip arthroplasty compared to those fractures without dislocation. Our study was done over two years, and follow-up may provide insight into the associated necessity of total hip arthroplasty in patients treated for acetabular fracture.

CONCLUSION

In patients with displaced acetabular fractures, the surgery aims to achieve anatomic reduction and restoration of the joint along with early mobility, which requires knowledge of anatomy and fracture patterns. Along with its accurate preoperative planning holds the key. Percutaneous screw fixation is associated with almost no complications, but its use is limited to elementary column fractures without comminution. It is associated with high radiation exposure to the surgical team as well. Almost 85% of the patients who operated for acetabular fractures had a very good functional outcome. Hence, we advocate percutaneous screw fixation for undisplaced and minimally displaced acetabular fractures to improve the outcome and for earlier rehabilitation.

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