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**Dr. Panini Gaur**  
Shri Mahant Indires Hospital,  
Dehradun, Uttarakhand, India

**Dr. Pawan Kumar Rawat**  
Shri Mahant Indires Hospital,  
Dehradun, Uttarakhand, India

**Dr. Aditya Kumar Mishra**  
Shri Mahant Indires Hospital,  
Dehradun, Uttarakhand, India

**Dr. Yogesh Ahuja**  
Shri Mahant Indires Hospital,  
Dehradun, Uttarakhand, India

**Dr. Arpit Vishnoi**  
Shri Mahant Indires Hospital,  
Dehradun, Uttarakhand, India

**Corresponding Author:**  
**Dr. Panini Gaur**  
Shri Mahant Indires Hospital,  
Dehradun, Uttarakhand, India

## Prospective study of percutaneous screw fixation of anterior column acetabulum under fluoroscopic guidance: Clinical and radiological evaluation

**Dr. Panini Gaur, Dr. Pawan Kumar Rawat, Dr. Aditya Kumar Mishra, Dr. Yogesh Ahuja and Dr. Arpit Vishnoi**

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### Abstract

**Objective:** The objective of this prospective study was to evaluate the clinical and radiological outcomes of percutaneous screw fixation of the anterior column acetabulum, guided by fluoroscopy.

**Methods:** A prospective study was conducted on a cohort of patients with anterior column acetabular fractures who underwent percutaneous screw fixation. The procedure was performed under fluoroscopic guidance to ensure accurate screw placement. Clinical and radiological evaluations were conducted preoperatively, postoperatively, and during follow-up visits. Clinical evaluation included assessment of pain, functional outcomes, and complications. Radiological evaluation involved assessing the adequacy of fracture reduction, screw position, and subsequent bone healing.

**Results:** A total of 21 patients with mean age of  $41.71 \pm 13.16$  were included in the study. Males were involved in 14 cases (66.7%) followed by 7 females (33.3%). Road traffic accidents accounts major proportion of affected individuals with 18 cases (85.7%) followed by fall from height accounting 3 cases (14.3%). The majority of patients had traumatic injuries due to high-energy impact. Maximum time duration required was 55 minutes and minimum time required was 15 minutes with average time accounting 25.6 minutes. In regular follow ups at 6<sup>th</sup> month average score was 17, maximum patients i.e. 18 out of 21 were having excellent results followed by 2 patients having good results.

**Conclusion:** Percutaneous screw fixation of the anterior column acetabulum under fluoroscopic guidance is a viable treatment option for anterior column acetabular fractures. It provides favorable clinical outcomes in terms of pain relief and functional improvement.

**Keywords:** Percutaneous screw fixation, anterior column acetabulum, fluoroscopic guidance

### Introduction

Anterior column acetabular fractures are challenging injuries commonly encountered in orthopedic trauma. They often result from high-energy trauma, such as motor vehicle accidents or falls from significant heights. These fractures involve disruption of the anterior column of the acetabulum, which can significantly affect hip stability and function [1]. The treatment of choice for these fractures aims to achieve anatomical reduction and stable fixation to restore the normal biomechanics of the hip joint [2].

Acetabular fractures remain one of the most difficult orthopaedic injuries to treat successfully. It is not an infrequent fracture. The incidence of acetabular fracture is 3 per 1,00,000 [3].

Percutaneous screw fixation offers several potential advantages, including reduced soft tissue trauma, decreased operative time, and minimized blood loss compared to open surgical approaches. Additionally, allows preservation of the periosteal blood supply, which is critical for fracture healing [4].

Fluoroscopic guidance provides real-time imaging during the procedure, aiding in accurate screw placement and minimizing the risk of intraoperative errors [5]. This imaging modality allows the surgeon to assess the position and trajectory of the screws in relation to the fracture fragments, optimizing fixation stability and alignment [6].

Understanding the clinical and radiological outcomes of this approach is essential for guiding treatment decisions and further improving patient outcomes [7-8]. Therefore, this prospective study aimed to evaluate the clinical and radiological outcomes of percutaneous screw fixation of anterior column acetabulum fractures under fluoroscopic guidance [9].

## Methods

This prospective study was conducted in the Department of Orthopaedics, SGRRIM&HS, Dehradun. Total 21 patients were included in surgery. Clinical and radiographic examinations were conducted on admission to the hospital. Surgery in the form of percutaneous fixation of anterior column of acetabular fracture by minimal approach was carried out under general or spinal anaesthesia.

## Outcome Analysis

The study group were followed up at post-operative day 1, 1 month, 2 month, 4 month and 6 month.

Clinical outcome analysis was done for the efficacy on the basis of radiological assessment and Merle D Aubigne score at each visit.

## Positioning

Supine is the best position for ease of reduction, orientation and understanding of the acetabular geometry.

## Fracture Reduction

Fracture reduction is achieved by manual traction of the affected limb by applying a force contrary to the direction of fracture displacement, usually perpendicular to the direction of fracture<sup>[10]</sup>.

## Screws

6.5 or 7mm partially threaded cancellous cannulated screws (CCS) are mostly used for being more strong.

## Preop Preparation

Bowel preparation for better visibility under fluoroscopy which can be done by using stool softener or charcoal tablets.

## C Arm Position

C arm is positioned on opposite side to the surgeon. Desired fluoroscopy views (i.e. combined obturator oblique and iliac oblique view) are taken and position and degree of tilt noted and are to be reproduced while performing the actual procedure<sup>[11]</sup>.

## Entry Point at Skin

At confluence of two lines- one along the longitudinal axis of femur (passes through 11 o' clock position of right acetabulum or 1 o' clock on left side) another line along the superior pubic ramus through inferior iliac spine laterally<sup>[12]</sup>.

## At Bone

Entry point is marked at the outer side of ilium i.e, approx. 3-4 cm proximal to superior acetabular margin, just posterior to inferior gluteal line and over the Gluteus Medius pillar.

## Results

Males were involved in 14 cases (66.7%) followed by 7 females (33.3%) when divided on basis of sex. Bimodal age group distribution was observed, when divided on basis of age groups, involving less than 30 years age group and more than 60 years signifies that age.

Road traffic accidents was responsible for majority of cases, in 21 patients, 18(85.7%) patients were having injury due to road traffic accident and rest 3(14.3%) were having injury due to fall from height.

On basis of Judet and Letournel classification people, 10 patients were having involvement of anterior column, 4 patients were having involvement of both anterior and

posterior column, 3 patients have posterior hemitransverse involvement with anterior column, 2 patients were having transverse pattern fracture, one case of each posterior wall and t type pattern.

Steep learning curve was observed as mean duration of surgery of was 25.6 minutes with standard deviation of 11.80 minutes which on graphical representation depicted declining pattern.

The Mean  $\pm$  S.D. (Mean  $\pm$  standard deviation) Merle D Aubigne score 4.05 $\pm$ 1.07 was observed on post-operative day one, which increased to 14.19 $\pm$ 1.33 after 2 month post operatively. Further follow up at 6 month, score of 17.14 $\pm$ 0.91 was attained with p value 0.001.

Excellent results were found on basis of Merle D Aubigne scoring with 18(87.5%) cases showing excellent results, and 2 (9.5%) cases with good results and 1 (4.8%) fair results. Patient with good and fair results were having associated injuries. None of the patient had unsatisfactory results. Patient with loss of reduction had fair score but gradual improvement was observed in subsequent follow ups.

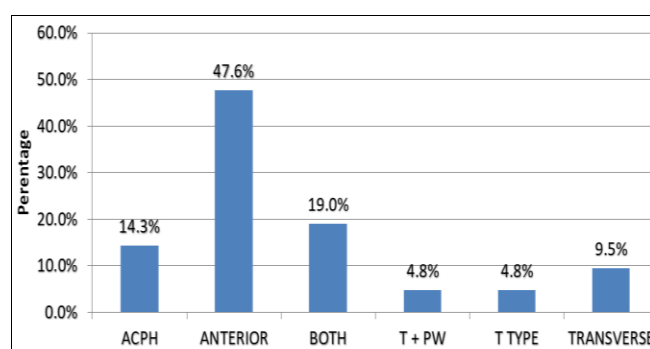


Fig 1: Distribution on basis of classification

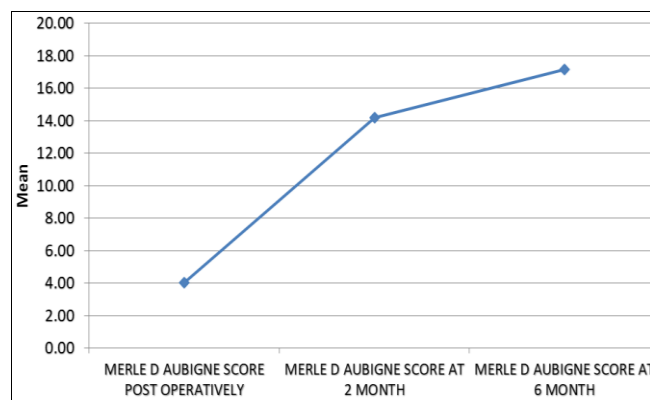


Fig 2: Graphical representation of analysis of Merle D Aubigne score

## Discussion

Incidence of acetabular fracture may vary in population. The present study shows that out of 21 patients, 66.7% patients were males and 33.3% were females.

In the present study mean age was calculated to be 41.71 $\pm$ 13.16 years with youngest of age 21 and oldest of age 68.

Maximum time duration required was 55 minutes and minimum time required was 15 minutes with average time accounting 25.6 minutes. It was observed during the initial 5 cases time required was around 45 $\pm$ 4 minutes and the latter stage of study in last 5 cases was 19 $\pm$ 6 minutes. This signifies that this surgery requires experience and good surgical skills.

In study by El-ashhab *et al.*,<sup>[13]</sup> Operation time for the screw

fixation was on average 45 minutes (25-90 minutes). Merle scoring accounts few parameters as Pain at the joint, range of motion or mobility and ability to walk with or without help of assistance. High score suggests better results and vice versa. In our study out of total 21 cases, average score on day one was 4.04.

Low score was observed because maximum patients were having pain while walking but 15 of our patients were out of the bed and were able to walk with toe touch weight bearing. In study conducted by Mohamed *et al.* [14] 32 patients out of 40 were mobilised with toe touch weight bearing. In study by El ashhab *et al.* [13] 16 patients out of 20 were mobilised on post-operative day one.

It was observed that patients with single column involvement and minimal displacement had better clinical outcome. Patient with less than excellent score were associated with other injuries. El-ashhab *et al.* [13] showed that out of 20 patients, 13 had excellent score and 7 patients had good score.

Post-operative results according to union of the fracture were excellent as the all fractures were united without pseudo arthrosis. Two patients presented with post-operative stiffness at hip joint, with one patient having loss of reduction, none of the patient presented with infection, implant breakage, neuro vascular damage, screw prominence, or any other significant complications.

In our study maximum duration of stay was 9 days and minimum duration was of 4 days, with mean stay of 9 days. In study by Mohamed *et al.* [14] average hospital stay was 8 days. Duration of stay signifies extent of early recovery and decreased post-operative debilitating manifestations.



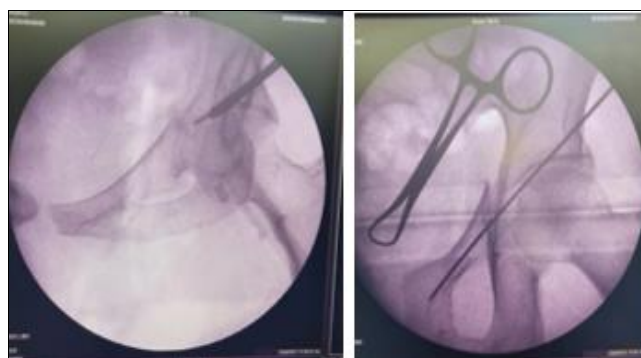
**Fig 5:** Patient positioning



**Fig 6:** C arm positioning - Judet views (combined Obturator outlet view)



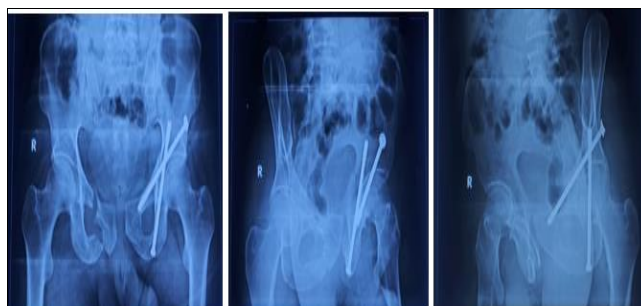
**Fig 3:** Pre op xray Pelvis with both hip -AP



**Fig 7:** Intraoperative C arm images



**Fig 4:** Instrumentation used



**Fig 8:** Post op AP, Iliac view, Obturator view



**Fig 9:** Patient sitting, partial weight bearing Post op 2<sup>nd</sup> month

### Conclusion

Based on our study we conducted that percutaneous fixation of anterior column of acetabulum by use of cannulated cancellous screw has excellent results assessed in terms of pain, mobility and ability to walk. Thus, we conclude from the study that in patients with anterior column of acetabular fracture, percutaneous screw fixation proves to be excellent procedure for management of such fractures with almost no complication. Thus, it must be considered as one of the standard treatment modality for management of anterior column of acetabulum in un-displaced or minimally displaced fractures or fracture amenable to reduction.

### Limitations of the study were

1. Small sample size limited the outcomes which could be reason of minimal complications observed.
2. Patients were followed up for at least 6 months, longer follow up is needed to observe delayed complications like post traumatic arthritis.
3. This technique is not suitable for comminuted, grossly displaced fractures. In such patients open reduction internal fixation still remains the gold standard treatment.

### Conflict of Interest

Not available

### Financial Support

Not available

### References

1. Rockwood CA. Fractures of the acetabulum. In: BucholzRW, Heckman JD, Court- Brown C, eds. Rockwood and Green's Fracture in Adults. Vol. 2 6<sup>th</sup> ed. Philadelphia, PA: Lippincott Williams and Wilins; c2006. p. 1665-1714.
2. Judet R, Judet J, Lanzetta A, Letournel E. Fractures of the acetabulum: classification and guiding rules for open reduction. Arch Orthop. 1968;81(3):119-158.
3. Letournel E. fractures of the acetabulum: a study of a series of 75 cases. Clin Orthop Relat Res. 1994;(305):5-9.
4. Saterbak AM, Marsh JL, Turbett T, Brandser E. Acetabular fracture classification of Letournel and Judet: a systematic approach. Iowa Orthop J. 1995;15:184-196.
5. Suzuki T, Smith WR, Mauffrey C, Morgan SJ. Safe surgical technique for associated acetabular fractures. Patient Saf Surg. 2013;7(1):7.
6. Matta JM, Anderson LM, Epatien HC, Hendricks P. Fractures of the acetabulum: A retrospective analysis. Clin OrthopRelat Res. 1986;205:230-240.
7. Matta JM. Fractures of the acetabulum: Accuracy of reduction and clinical results in patients managed operatively within three weeks after the injury. J Bone Joint Surg Am. 1996;78(11):1632-1645.

8. Briffa N, Pearce R, Hill AM, Bircher M. Outcomes of acetabular fracture fixation with ten years' follow-up. J Bone Joint Surg [Br]. 2011;93-B:229-236.
9. Dailey SK, Archdeacon MT. Open reduction and internal fixation of acetabulum fractures: does timing of surgery affect blood loss and OR time. J Orthop Trauma 2014;28:497-501.
10. Garofalo R, Mouhsine E, Borens O, *et al*. Percutaneous retrograde screwing for stabilisation of acetabular fractures. Injury 2005;36:1330-1336.
11. Anthony EB, Frank BW, Justin JM, Richard MA, Cyril M. Percutaneous Fixation of Anterior and Posterior Column Acetabular Fractures. Orthopedics. 2014;37:675-678.
12. Caviglia H, Vatani N, Cambiagi G, Abella E, Galatro G. Minimal invasive osteosynthesis of posterior column in acetabular fracture. EFFORT. 2016;1750:159.
13. El-ashhab G Mohamed, El Karamany M Mamdouh, Halawa M Abdelsamie, Elsaka S Hassan. Percutaneous Screw Fixation of Acetabular Fractures BMFJ; c2019, 36(2). DOI: 10.21608/bmfj.2019.14308.100
14. Mohamed S El-Attar, Mohamed Nagy Elalfy SherifAidy. Percutaneous Fixation of Acetabular Fractures by Columnar Screw. ARC Journal of Orthopedics. 2020;5(2):20-28.

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