DOI: https://doi.org/10.53350/pjmhs2115123943

ORIGINAL ARTICLE

Outcome of Modified Stoppa Approach for Fixation of Acetabular Fractures

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ABSTRACT

Objective: The purpose of this study is to determine the functional and radiological outcomes of modified stoppa approach for fixation of acetabular fractures.

Study Design: Descriptive Study

Place and Duration: Study was conducted at Orthopaedic department of Ayub Teaching Hospital Abbottabad, Fauji Foundation Hospital, Rawalpindi and Islamabad International Hospital E-11/4, Islamabad for duration of two years form July 2019 to June 2021.

Methods: There were thirty patients of both genders who had acetabular fractures were presented. Included patients were aged between 18-55 years. Patients' age, sex, body mass index and cause of fractures were recorded after taking informed written consent. Types of acetabular fractures were also recorded. Modified stoppa approach was used to operate acetabular fractures. Outcomes were operative time, radiological and functional outcomes were assessed in terms of excellent, good, fair and poor results. Post-operative complications and patients' satisfaction was also calculated. We used SPSS 24.0 version to analyze complete data.

Results: Among 30 cases, majority of the patients 20 (66.67%) were males and 10 (33.33%) were females with mean age 29.4±10.37 years. Mean body mass index of the presented patients was 23.7±7.25 kg/m^2. RTA was the most common cause found in 17 (56.67%), followed by fall from height in 8 (26.67%) and 5 (16.67%) fractures had other causes. Anterior wall fracture was the most common type found in 14 (46.67%) cases. Mean operative time was 3.87±13.18 hours. As per radiological outcomes, frequency of anatomical reduction found in 21 (73.3%) cases, not perfect found in 5 (16.67%) cases and poor results found in 4 (13.3%) patients. Majority of the cases 18 (60%) had good results in functional outcomes, excellent results in 7 (23.3%), fairs results in 3 (10%) cases and poor in 2 (6.67%) cases. Post-operative complications found in 2 (6.67%) cases. Satisfaction rate among patients was 86.67%.

Conclusion: We found in this study that the use of stoppa approach for fixation of acetabular fractures was effective and safe method in terms of good radiological and functional outcomes. Except this less operative time and less number of complications were calculated with high number of customer's satisfaction.

Keywords: Acetabular Fractures, MSA, Complications, RTA

INTRODUCTION

Acetabular fracture is a significant orthopaedic injury that can be treated utilising a variety of surgical methods, including anterior, posterior, extensile and, a combination of these approaches, among others. The adoption of the right surgical technique is essential for accurate reduction. The ilioinguinal approach and the modified Stoppa method are two of the most common anterior procedures used in dentistry. In 1982, Rives et al. and Stoppa et al. published their findings on the modified Stoppa method, which was the first time it was employed in the treatment of inguinal hernias. According to Cole and Bolhofner [1-2] and Hirvensalo and colleagues [1-2], this technique was used to approach the anterior acetabulum and pelvic bone.

According to the findings of several studies [3-6], the modified Stoppa technique had clinical outcomes that were comparable to those of the ilioinguinal approach. There is evidence that treatment of anterior column acetabular fractures can be beneficial [1-3], and it may even be a superior option to the ilioinguinal method in some instances. Several years after its inception in Europe, the modified Stoppa method has gained favour due to the fact that it is less invasive and allows for better visualisation of the quadrilateral plate and posterior column [1, 2]. Direct (medial) buttressing of fractures that have a central protrusion of the femoral head as a result of their location is possible with this technique.

It has been commonly utilised to fix pelvic and acetabular fractures, but new investigations have shown that it is also useful in tackling most anterior acetabular fracture patterns. [7] Because of this, the risk to the adjacent neurovascular structures and other soft tissue-related problems such as infection is rather high, and this exposure is quite extensive. [8] It is less invasive and allows greater access to the quadrilateral plate, the medial wall of the acetabulum, and the sacroiliac joint with the modified Stoppa intrapelvic approach than with the normal Stoppa intrapelvic approach, which has a narrower window. To avoid severe bleeding, it is necessary to locate and ligate the corona mortis; nevertheless, this procedure carries the risk of injuring the obturator nerve and the superior gluteal artery. [9,10]

For the procedure, the modified stoppa approach allows direct access to the pubic bones as well as to the

posterior ramus, the quadrilateral surface, the pubic eminence, and the infrapectineal surface. Additionally, the sciatic buttress, the sciatic notch, and the anterior sacroiliac joint can be accessed with this method. Treatment of anterior acetabulum fractures can be accomplished without resorting to the ilioinguinal approach thanks to the authors' claim that this technique is superior mechanically.

In this study, we looked at the functional and radiological outcomes of the modified stoppa approach for the fixation of acetabular fractures in the thigh.

MATERIAL AND METHODS

This descriptive study was conducted at Orthopaedic department of Ayub Teaching Hospital Abbottabad and Fauji Foundation Hospital, Rawalpindi and Islamabad International Hospital E-11/4, Islamabad for duration of two years form July 2019 to June 2021. The study was comprised of 30 patients who had acetabular fractures. Patients' age, sex, body mass index and cause of fractures were recorded after taking informed written consent. Ineligible were those who had a history of peritonitis or had undergone pelvic cavity surgery, abdominal wall or peritoneal adhesion, or those who had major displacement of double column and iliac crest fractures.

The "Advanced Trauma Life Support (ATLS)" protocol was used for the initial assessment and resuscitation of trauma patients. 3D computerized tomography (CT) reconstruction was used to perform detailed imaging, which included AP and Judet views as well as AP. Skeletal traction was performed in a number of selected cases to aid in the reduction of pain and the maintenance of that reduction. All fractures were classified as either non-comminuted acetabular fractures (defined as more than three fracture fragments in the involved weight-bearing area as determined by a midsagittal CT scan) or comminuted fractures. At the time of admission, study participants were given low molecular weight heparin to take home. In all of the study cases, a standard Modified Stoppa approach (MSA) to the anterior pelvis was used, which was the same across the board. In the event that MSA was insufficient to achieve reduction or fixation, a lateral window was created along the iliac crest to allow for the fixation of high anterior column fractures or posterior column fractures with the aid of a lag screw in the case of posterior column fractures. Follow-up was performed every two weeks for the first four weeks, and then every month for the next six months. All patients were advised to begin walking with the assistance of a walker after 10 days post-surgery, with no weight bearing on the operated leg. Anatomic reduction was defined as post-operative fracture displacement of 0-1mm, imperfect reduction as between 2-3mm, and poor reduction as more than 3mm after surgery.

Outcomes were operative time, radiological and functional outcomes were assessed in terms of excellent, good, fair and poor results. Post-operative complications and patients satisfaction was also calculated. We used SPSS 24.0 version to analyze complete data.

RESULTS

Among 30 cases, majority of the patients 20 (66.67%) were males and 10 (33.33%) were females with mean age 29.4±10.37 years. Mean body mass index of the presented patients was 23.7±7.25 kg/m^2. RTA was the most common cause found in 17 (56.67%), followed by fall from height in 8 (26.67%) and 5 (16.67%) fractures had other causes. (Table 1)

Table 1: Characteristics of enrolled cases

Characteristics	Number	%age
Mean age (years)	29.4±10.37	
Mean BMI (kg/m^2)	23.7±7.25	
Gender		
Male	20	66.67
Female	10	33.33
Cause of Fracture		
RTA	17	56.67
Fall	8	26.67
Others	5	16.66
Total	60	100

Anterior wall fracture was the most common type found in 14 (46.67%) cases, T-type fractures found in 12 (40%) and both column fractures found in **4** (13.3%). (table 2)

Table 2: Types of acetabular fractures among all cases

Characteristics	Number	%age
Types of Fractures		
Anterior wall	14	46.67
T-type	12	40
Both column fracture	4	13.3

Mean operative time was 3.87±13.18 hours. As per radiological outcomes, frequency of anatomical reduction found in 21 (73.3%) cases, not perfect found in 5 (16.67%) cases and poor results found in 4 (13.3%) patients. (Table 3)

Table 3: Matta's radiological outcomes and operative time

Characteristics	Number	%age
Mean Operative time (hrs)	3.87±13.18	
Radiological outcomes		
Anatomical reduction	21	73.33
Not perfect reduction	5	16.66
Poor reduction	4	13.33
Total	30	100

Majority of the cases 18 (60%) had good results in functional outcomes, excellent results in 7 (23.3%), fairs results in 3 (10%) cases and poor in 2 (6.67%) cases. (Table 2)

Table 4: Post-operative functional outcomes

Characteristics	Number	%age
Functional Outcomes		
Excellent	7	23.3
Good	18	60
Fair	3	10
Poor	2	6.67

Post-operative surgical site infection was found in 2 (6.67%) cases. Satisfaction rate among patients was 86.67%. (Table 5)

Table 5: Post-operative complications and patients satisfaction

Characteristics	Number	%age
Complications (SSI)		
Yes	2	6.67
No	28	25.33
Satisfaction		
Yes	26	86.67
No	4	13.33

DISCUSSION

In addition to the difficulties involved with the surgical approach, as well as the presence of accompanying organ damage, acetabular fractures are also difficult to treat because of the intricate nature of the fracture itself. Using the modified Stoppa method for the reduction of acetabular fractures, this study looked at the clinical outcomes of participants. Surgery for acetabular fractures has two basic goals: first, to correct the deformity and then to give a stable fixation to allow for early post-operative rehabilitation, and second, to prevent traumatic arthritis of the affected joints.[11]

In this descriptive study 30 patients had acetabular fractures with ages 18-55 years were presented. Majority of the patients 20 (66.67%) were males and 10 (33.33%) were females with mean age 29.4±10.37 years. Mean body mass index of the presented patients was 23.7±7.25 kg/m^2. RTA was the most common cause found in 17 (56.67%), followed by fall from height in 8 (26.67%) and 5 (16.67%) fractures had other causes. Findings of our study were comparable to the previous researches.[12,13] Anterior wall fracture was the most common type found in 14 (46.67%) cases, T-type fractures found in 12 (40%) and both column fractures found in **4** (13.3%). Previous study of Al Adawy et al presented same results to our study.[14] In their study, Paksoy et al. discovered that the most prevalent presentation was associated both-columns fracture (54 percent), followed by transverse with the posterior column fracture (19 percent). [15]

In our study mean operative time was 3.87±13.18 hours. As per radiological outcomes, frequency of anatomical reduction found in 21 (73.3%) cases, not perfect found in 5 (16.67%) cases and poor results found in 4 (13.3%) patients. Same results related to radiological findings were presented in past studies.[16,17] It has been discovered that anatomical reduction leading to the congruent joint is associated with improved functional outcomes. However, because of the connectivity of the weight-bearing dome (which consists of more than three sections), anatomical reduction is problematic.[16,17]

Majority of the cases 18 (60%) had good results in functional outcomes, excellent results in 7 (23.3%), fairs results in 3 (10%) cases and poor in 2 (6.67%) cases. With a modified Stoppa method, Sagi[18] successfully treated 57 patients with acetabular fractures, with 91 percent of his patients reporting a favourable or excellent clinical outcome at one year follow-up, according to his findings. Radiological decrease was excellent in 70% of cases, good in 22% of cases, and poor in 8% of cases, respectively. Hirvensalo [19] used this strategy to operate on 164 acetabular fractures, and he reported that 84 percent of his reductions were good, 9 percent were fair, and 7 percent were poor. The Harris hip score of less than 80 was found in the vast majority of his patients (70 percent). In a study of 30 patients, Singh et al [20] found that 80 percent had excellent radiological outcomes according to Matta criteria, 16.6 percent had good outcomes, and 3.3 percent had poor radiological outcomes. 43.3 percent of patients had exceptional hip scores, 50 percent had good scores, and 6.6 percent had fair scores on the Merle d'Aubigine hip test.

Post-operative complications (surgical site infection) found in 2 (6.67%) cases. Satisfaction rate among patients was 86.67%. Among the most common consequences of acetabular fracture surgery are heterotrophic ossification, traumatic arthritis, nerve injuries and infections, as well as avascular necrosis of the femoral head and nonunion of the fracture.[21] A 9 percent obturator nerve damage rate has been reported following the modified Stoppa technique, according to Kima et al.[22] The Modified Stoppa technique for acetabular fractures is an effective and safe alternative to the Ilioinguinal approach, and it produces a satisfactory radiological and clinical outcome with minimum complications. This method enables enhanced visualization, which aids in the correct reduction of fractures and the optimal stability of the patient. Because the inguinal canal and femoral neurovascular bundles are not dissected, it is less invasive than other surgical techniques.

CONCLUSION

We found in this study that the use of stoppa approach for fixation of acetabular fractures was effective and safe method in terms of good radiological and functional outcomes. Except this less operative time and less number of complications were calculated with high number of customer's satisfaction.

REFERENCE

1. Cole JD, Bolhofner BR. Acetabular fracture fixation via a modified Stoppa limited intrapelvic approach: description of operative technique and preliminary treatment results. Clin Orthop Relat Res. 1994;305:112–23.
2. Hirvensalo E, Lindahl J, Bostman O. A new approach to the internal fixation of unstable pelvic fractures. Clin Orthop Relat Res. 1993;297:28–32.
3. Andersen RC, O'Toole RV, Nascone JW, Sciadini MF, Frisch HM, Turen CW. Modified Stoppa approach for acetabular fractures with anterior and posterior column displacement quantification of radiographic reduction and analysis of inter-observer variability. J Orthop Trauma. 2010;24(5):271–8
4. Sagi HC, Afsari A, Dziadosz D. The anterior intra-pelvic (modified Rives-Stoppa) approach for fixation of acetabular fractures. J Orthop Trauma. 2010;24(5):263–70.
5. Bastian JD, Tannast M, Siebenrock KA, Keel MJ. Mid-term results in relation to age and analysis of predictive factors after fixation of acetabular fractures using the modified Stoppa approach. Injury. 2013;44(12):1793–8.
6. Laflamme GY, Hebert-Davies J, Rouleau D, Benoit B, Leduc S. Internal fixation of osteopenic acetabular fractures involving the quadrilateral plate. Injury. 2011;42(10):1130–4.
7. Seyyed Hosseinzadeh HR, Eajazi A, Hassas Yeganeh M, et al. Modified ilioinguinal approach to the acetabulum and pelvis from beneath the inguinal ligament: a subinguinal approach. Hip Int. 2010;20(2):150-5.
8. Matta JM. Operative treatment of acetabular fractures through the ilioinguinal approach: a 10-year perspective. J Orthop Trauma.2006;20(1 Suppl): S20-9

9. Ponsen KJ, Joosse P, Schigt A, Goslings JC, Luitse JS. Internal fracture fixation using the Stoppa approach in pelvic ring and acetabular fractures: technical aspects and operative results. J Trauma. 2006;61(3):662-7
10. Sagi HC, Afsari A, Dziadosz D. The anterior intra-pelvic (modified rives-stoppa) approach for fixation of acetabular fractures. J Orthop Trauma. 2010;24(5):263-70
11. Mesbahi SAR, Ghaemmaghami A, Ghaemmaghami S, Farhadi P. Outcome after Surgical Management of Acetabular Fractures: A 7-Year Experience. Bull Emerg Trauma2018;6(1):37-44
12. Kim HY, Yang DS, Park CK, Choy WS. Modified Stoppa approach for surgical treatment of acetabular fracture. Clin Orthop Surg. 2015;7(1):29–38.
13. NadeemU, KhalidZ, AliA, AbdullahT, Zaman AU, JavedS, et al. Outcome of Modified Stoppa Approach for Fixation of Acetabular Fractures.J Pak Orthop Assoc 2021;33(2):
14. Al Adawy, A.S., Aziz, A.H.A., El Sherief, F.A. et al. Modified Stoppa as an alternative surgical approach for fixation of anterior fracture acetabulum: a randomized control clinical trial. J Orthop Surg Res **15,** 154 (2020).
15. Paksoy AE, Topal M, Aydin A, Zencirli K, Kose A, Yildiz V: Outcomes of surgical management of acetabular fractures treated with anterior approaches. Eurasian J Med. 2019, 51:257-61.
16. Kim HY, Yang DS, Park CK, Choy WS: Modified Stoppa approach for surgical treatment of acetabular fracture. Clin Orthop Surg. 2015, 7:29-38.
17. Kim JW, Shon HC, Park JH: Injury of the obturator nerve in the modified Stoppa approach for acetabular fractures. Orthop Traumatol Surg Res. 2017, 103:639-44. Accessed: April 23, 2020
18. Sagi HC, Afsari A, Dziadosz D: The anterior intra-pelvic (modified Rives Stoppa) approach for fixation of acetabular fractures.J Orthop Trauma2010; 24(5):263-270
19. Hirvensalo E, Lindahl J, Kiljunen V: Modified and new approaches for pelvic and acetabular surgery.Injury2007; 38(4):431-441
20. Singh S V, Chopra R K, Puri G, Pheroz M, Kumar S,Bansal A, et al.Clinico-Radiological Evaluation of Modified Stoppa Approach in Treatment of Acetabulum Fractures. Cureus 2020; 2(9): e10193
21. Borrelli J Jr, Goldfarb C, Ricci W, Wagner JM, Engsberg JR. Functional outcome after isolated acetabular fractures. J Orthop Trauma2002;16(2):73-81
22. Kima JW, Shonb HC, Parkc JH. Injury of the obturator nerve in the modified Stoppa approach for acetabular fractures. Orthop Traumatol Surg Res. 2017;103(5):639–44.