ORIGINAL ARTICLE

OUTCOME OF MODIFIED STOPPA TECHNIQUE FOR THE MANAGEMENT OF ACETABULAR FRACTURES

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Background: An acetabular fracture is a type of fracture that occurs within the hip joint, which is the most critical joint for bearing burden. To achieve the best outcomes, it is essential to restore the bone's original shape, securely set it in place, and begin rehabilitation immediately as possible. Objective was to evaluate outcome in terms of radiological and clinical outcome of modified Stoppa technique for the management of acetabular fractures. **Methods:** This descriptive study was conducted at Orthopaedic & Spine Unit, Hayatabad Medical Complex, Peshawar from January 2023 to January 2024. Fifty-three patients with acetabular fractures were managed with modified Stoppa technique. Outcome such as radiological and clinical were assessed after 8 months of the procedure. Numerical data was assessed with mean and standard deviation while categorical with frequency and percentage. Chi Square test was used for association keeping *p*-value significant at <0.05. **Results:** The mean age of participants was 44.62±11.69 years, with higher frequency of male patients. The mean operative time recorded was approximately 155.45±34.28 minutes, and the mean blood loss was 741.43±107.28 ml. Anatomical reduction was achieved in 39 (73.6%) of cases on the basis of Matta's criteria for radiological assessment, while clinical outcome was rated as excellent in 16 (30.2%). **Conclusion:** Modified Stoppa Approach is a safe and potent procedure for the management of acetabular fractures exhibiting radiological and clinical outcome up to the mark.

Keywords: Acetabular fractures; Modified Stoppa Approach; Radiological outcome; Clinical outcome

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INTRODUCTION

An acetabular fracture is a type of fracture that occurs within the hip joint, which is the most critical joint for bearing burden. To achieve the best outcomes, it is essential to restore the bone's original shape, securely set it in place, and begin rehabilitation immediately as possible.[1–3] It predominantly impact younger individuals engaged in high-velocity trauma. Following the implementation of mandatory seatbelt utilization, there has been a notable decrease in the incidence of acetabular fractures, now calculated at around 3 per 100,000 individuals. The incidence of acetabulum fractures has risen afterwards falls from heights, likely attributable to the growing incidence of osteopenia as well as osteoporosis.[4]

The Modified Stoppa approach is a notable improvement in the surgical treatment of acetabulum fractures, providing clear benefits. Derived from the original Stoppa approach, this technique utilizes a direct anterior approach to access the pelvis using a midline incision, allowing for excellent visibility and entry to the broken acetabulum.[5–7] The Modified Stoppa method offers the advantage of wider access to both the front and back parts of the acetabulum, allowing for complete reduction and stabilization of complicated fractures. This is especially beneficial in situations with displaced and comminuted fractures when accurate anatomical restoration is essential for the long-term function and stability of the joint.[8] This method has gained popularity for treating anterior column fractures. It is effective for most cases and offers great vision and access for quadrilateral plate and some areas of posterior column.[8,9]

In a study conducted in Pakistan included 52 patients. The percentage of males were high as compare to female patients who suffered acetabular fractures 69.2%, and 30.8%. Achievement of successful anatomical reduction was reported in 75% of patients.[10] Another study found that reduction quality and clinical outcomes were statistical significance based on the degree of comminution, however the radiography results did not demonstrate statistical significance.[11]

The management of acetabular fractures presents significant challenges, mostly due to the presence of concurrent major organ damage, as well as the complicated anatomy of the fracture itself and the technical difficulties associated with the surgical method for realignment.[12,13] Ensuring prompt and accurate stabilization of acetabular fractures is vital in order to achieve positive results. Nevertheless, the complex anatomical structure of the pelvis as well as

acetabulum has historically resulted in various complications attributed to the conventional ilioinguinal approach.[14] Successful management of acetabular fractures necessitates precise anatomical alignment, secure stabilization, and optimal rehabilitation.[15,16]

Given the intricate and unpredictable nature of acetabular fractures, it is essential to comprehend the role of the Modified Stoppa approach in achieving precise alignment, promoting functional recovery, and ensuring long-term stability of the joint. This understanding is vital for maximizing patient care and making informed surgical decisions. The goal of this study was to establish the functional and radiological outcome of modified Stoppa technique for the management of acetabular fractures

MATERIAL AND METHODS

This descriptive study was conducted from January 2023 to January 2024 at Orthopaedic & Spine Unit, Hayatabad Medical Complex, Peshawar after taking ethical approval from the hospital. A total of 53 cases with acetabular fractures were enrolled in the study using non probability consecutive sampling. The sample size was selected using openepi web-based sample size calculator, taking previous frequency of poor reduction on radiological findings 9.61%[10], absolute precision 5%, and confidence interval 95%. The inclusion criteria specified that all adult patients, regardless of gender, affected with displaced fractures involving the free fragments in the joint space, weight-bearing dome, roof arc angle <45 degrees, and displacement >2 mm, who presented within a week of injury, were eligible. Patients with previous history of peritonitis, peritoneal adhesions, pelvic cavity surgery, iliac crest injuries, and double column displacement were excluded. Prior to surgery, all patients underwent a thorough assessment following the Advanced Trauma Life Support (ATLS) protocol, which included detailed imaging with anteroposterior, and Judet views, as well as CT reconstruction. Skeletal traction was performed to manage pain and maintain reduction. The modified Stoppa approach (MSA)[11] was uniformly employed for all surgeries by the same surgical team in a supine position on a radiolucent table equipped with X-ray and image intensifier facilities. In cases where the MSA was insufficient for achieving fixation/reduction, a lateral window was formed along with the iliac crest to facilitate the management of high anterior column fractures/posterior column fractures using lag screws. Post procedure follow up was conducted after 8 months, radiological assessment was done using Matta's criteria.[17] Clinical assessment was done using Harris Hip Score.[18]

SPSS 24 was utilized for the statistical assessment of data. Mean and SD deviation were expressed for numerical data while frequency and percentages were expressed for categorical data. Chi Square test was used for assessing the association between categorical data keeping the value of *p*-significant at ≤0.05.

RESULTS

Fifty-three patients underwent MSA in our study. Mean age calculated was 44.62±11.69 years. Mean BMI was 24.64±2.22 kg/m^2. Mean duration of procedure was 155.45±34.28 minutes while mean blood loss was 741.43±107.28 ml. Frequency for male patients was 40 (75.5%) while 13 (24.5%) for female patients. Regarding the side of fracture, right side was involved in majority of the patients 28 (52.8%), left side was involved in 21 (39.6%) while bilateral in 4 (7.5%) patients. Radiological outcome was assessed using Matta's criteria, anatomical reduction was achieved by 39 (73.6%) patients, imperfect reduction in 10 (18.9%) patients and poor reduction in 4 (7.5%) patients. The clinical outcome was assessed using Harris Hip Score, excellent outcome was seen in 16 (30.2%) patients, good 29 (54.7%) patients, fair 6 (11.3%) patients while poor in 2 (3.8%) patients (Table-1). In our study post procedure complications were developed in 7.54% patients, which included wound infection 2 (3.8%), deferred union 1 (1.9%) and heterotrophic ossification 1 (1.9%). Table-2 presents the association of radiological and clinical outcome with diabetes. It was observed that non diabetic patients exhibited notably better radiological clinical outcomes as majority of non-diabetic cases showed notably higher anatomical reduction compared to diabetic patients (*p*=0.0001). Similarly, a higher number of non-diabetic patients exhibited better clinical outcomes as most of the patients showed excellent and good outcomes (*p*=0.0001).

Table-1: Radiological and clinical outcome

Radiological and clinical outcome		N	%
Radiological outcome	Anatomical reduction	39	73.6%
	Imperfect reduction	10	18.9%
	Poor reduction	4	7.5%
Clinical outcome	Excellent	16	30.2%
	Good	29	54.7%
	Fair	6	11.3%
	Poor	2	3.8%

Table-2: Association of radiological and clinical outcome with diabetes

Radiological and clinical outcome		Diabetes				*p*-value
		Yes		No		
		N	%	N	%	
Radiological outcome	Anatomical reduction	1	2.6%	38	97.4%	0.0001
	Imperfect reduction	5	50.0%	5	50.0%	
	Poor reduction	1	25.0%	3	75.0%	
Clinical outcome	Excellent	1	6.2%	15	93.8%	0.0001
	Good	1	3.4%	28	96.6%	
	Fair	4	66.7%	2	33.3%	
	Poor	1	50.0%	1	50.0%	

DISCUSSION

The study was conducted on 53 patients with acetabular fractures who went through modified Stoppa approach. Mean age of our patients was 44.62±11.69 years. Female patients had a lower frequency than male patients. A study conducted by Khoshabi K *et al*[19], found similar observations, they reported that mean age of their patients was 40±17.3 years while male patients had a higher frequency.

The aetiology for the fractures showed that automobile accidents turned out to the leading cause of fractures followed by fall. Literature shows that since acetabular fractures mostly occur due to high energy trauma in younger patients while a low fall in elderly patients can also lead to acetabular fracture due to their poor bone density[20]. Right side of the hip was involved in 52.8% of the patients while left side accounted for 39.6% and bilateral 7.5%, Khoshabi K *et al*[19] reported similar pattern for the side of fracture.

The ilioinguinal technique is the method most frequently utilized for anterior wall and anterior column fractures. Our study's surgical method, which we employed, is a modified Stoppa approach for anterior acetabulum injuries. Two major benefits of the modified Stoppa method are little bleeding and a brief surgery time. Giannoudis *et al*[21] reported that the mean surgical duration in their 30-case series was 190 minutes (40–315). Kelly *et al*[12] reviewed 8389 cases and found that the mean duration of surgery was 202.0±70.3 minutes, with an average blood loss of 898.6±612.7 ml. In our study, the average surgery time was 155.45±34.28 minutes, and the average blood loss was 741.43±107.28 mm.

During acetabular fracture surgery, the primary goal is to fix the deformity and provide solid fixation in order to facilitate early post-operative rehabilitation. Additionally, the procedure aims to prevent traumatic arthritis of the joints that are afflicted. The radiological reduction in this study was anatomical in 39 patients (73.6% of the total), imperfect in 10 cases (18.9% of the total), and poor in four cases (7.5%). A total of 16 patients (30.2%) had excellent functional outcome, twenty-nine patients (54.7%) had good, six patients (11.3%) had fair and 2 (3.8%) patients had poor functional outcome. A study conducted in Pakistan by Nadeem U *et al*[10] found similar results in their series of 52 patients, they reported that majority of their patients exhibited anatomical radiological reduction. Our clinical results are also similar to Nadeem U *et al.*[10] Singh S V *et al*[22] reported anatomical reduction based on Matta's criteria in 80% of their patients while 16.6% showed good outcome and 3.3% exhibited poor outcome.

Some of the common complications of MSA are nerve injuries, wound infections, heterotrophic ossification, femoral head necrosis and delayed union. In our series we found that only 7.6% patients had postoperative complications. Nadeem U *et al*[10] reported complications in 13% patients, Letournel E *et al*[23] observed complications in 9% patients.

We observed that patients with diabetes had unsatisfactory radiological and clinical outcomes. The rate of complications was also higher in patients with diabetes. To our knowledge no previous study has reported the association between radiological and clinical outcome with regards to diabetes.

Since our study was conducted on 53 patients who were followed up for 8 months, we consider our sample and follow up period short in size and duration respectively.

CONCLUSION

In conclusion, Modified Stoppa Approach is a safe and potent procedure for the management of acetabular fractures exhibiting radiological and clinical outcome up to the mark. This procedure yielded minimum complications post procedure which makes it a better alternative to Ilioinguinal approach.

Conflict of interest: There was no conflict of interest.

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AUTHORS' CONTRIBUTION

MS: Conceptualization of study design, write-up. AS: Literature search, data analysis. MI: Data collection. ZK: Data interpretation. SUH: Proof reading

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