

Outcome of Modified Stoppa Approach for Fixation of Acetabular Fractures.

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Authorship and contribution

Declaration:

Each author of this article fulfilled ALL 4 Criteria of Authorship:

1. Conception and design of case report
2. Drafting the manuscript or revising it critically for important intellectual content.
3. Final approval of the version for publication.
4. All authors agree to be responsible for all aspects of their research work.

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ABSTRACT

Objective: To determine the outcome of modified stoppa approach for fixation of acetabular fractures in terms of operative time, complications, radiological and clinical outcome criteria of Matta.

Method: This was a descriptive study conducted from 12th September 2018 to 12th January 2021 in Orthopedic Unit of Ghurki Trust Teaching Hospital Lahore. All patients with acetabular fractures meeting the inclusion criteria were operated via modified Stoppa approach. Outcome was assessed in terms of mean operative time, complications rate and Matta's radiological and clinical criteria at 16th week.

Results: The total number of patients in this study were 52. The mean age was 31.1±12.4 years. Male patients were 36(69.2%) males and female 16(30.8%). The fractures were associated type in 34(65.3%) and elementary in 18(34.6%) patients. The mean follow-up time was 4.8 months (range 6 to 11months). The mean operative time was 176.32±88.29 min. According to Matta's radiological criteria post operative anatomical reduction was achieved in 39(75%) cases, imperfect in 8(15.3%) cases and poor in 5(9.6%) cases. The clinical results were excellent in 13(25%) cases, good in 31(59.6%) cases and poor in 8(15.3%) cases. Superficial surgical site infection (SSI) was noted in 2(4.3%) patients and resolved with antibiotics.

Conclusion: Modified Stoppa approach is an effective and safe alternative to Ilioinguinal approach for acetabular fractures yielding satisfactory radiological and clinical outcome with minimal complications.

Keywords: Modified Stoppa approach, fixation, acetabular fractures, outcome, complications.

This article may be cited as:

Nadeem U, Khalid Z, Ali A, Abdullah T, Zaman AU, Javed S, et al. Outcome of Modified Stoppa Approach for Fixation of Acetabular Fractures. J Pak Orthop Assoc 2021;33(2):

INTRODUCTION

Acetabular fractures are intra-articular fractures that occur in the most vital and weight-bearing joints of our body.¹ These fractures are considered to be one of the most difficult to treat fractures because of peculiar region, unequal anatomical morphology and diversity of fracture configuration.² The exact epidemiology of acetabular is unknown.¹ Open reduction and rigid internal fixation of the involved fragments lead to better outcome as compared to conservative management advocated by Judet and colleagues in 1964.³ Elderly people sustained more acetabular fractures because of increased incidence of osteoporosis in this particular age group.^{4,5} Excellent outcome of acetabular fractures require accurate anatomical reduction, rigid fixation and

optimum rehabilitation.⁶ Different surgical approaches for acetabular fractures are classified as anterior, posterior, extensile or combined approaches.⁷ Every orthopaedic surgeon must know the indications, merits and demerits of each approach. The Ilioinguinal or modified Stoppa approach is adopted as anterior approach is the most frequently used approach now adays.⁸

The modified Stoppa approach (MSA) was first used by Rives J Rives JI in 1968⁹ and later by Stoppa RE in 1984 for inguinal hernia surgeries.¹⁰ Hirvensalo E in 1993,¹¹ and Cole JD in 1994¹² shared their experience of MSA for fixation of acetabular fractures. Kim HY from¹³ Korea exploring surgical outcomes of acetabular fractures reported anatomical reduction in 77.3% of their cases and termed MSA an

excellent alternative to conventional Iliioinguinal approach. The modified Stoppa approach is an Anterior Intra-pelvic (AIP) approach executed through an extra-peritoneal approach via rectus abdominis muscle and provides direct access to posterior column, pubis, posterior ramus, quadrilateral surface, pubic eminence, sciatic buttress, sciatic notch and anterior sacroiliac joint.^{11,12}

Acetabular fractures particularly complex bi-columnar fractures, pose a significant challenge to orthopedic surgeons. MSA can obviate the need for extensive dissection of neurovascular structures in Iliioinguinal approach and also facilitates direct fracture reduction. We could not find any local study of acetabular fractures fixed with this approach. The objective of our study was to determine the outcome of modified Stoppa approach for fixation of acetabular fractures in terms of operative time, complications, radiological and clinical outcome criteria of Matta.

METHODS

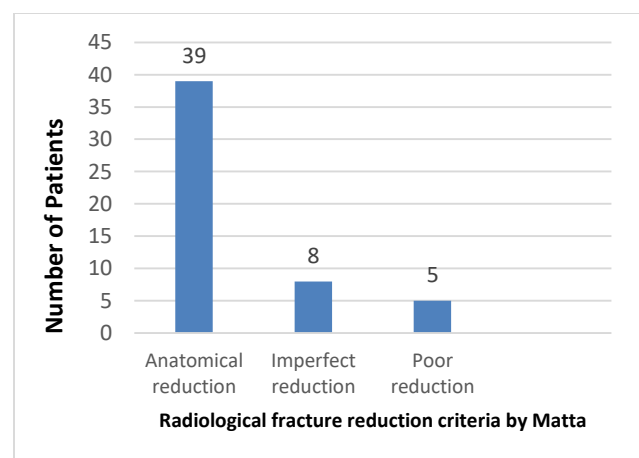
This descriptive study involved a total of 52 patients with acetabular fractures registered through emergency department and admitted to Orthopedic Unit of Ghurki Trust Teaching Hospital, Lahore from 12th September 2018 to 12th January 2021. All adults patients of either gender with displaced fractures through weight bearing dome, free fragment or fragments in the joint space, the roof arc angle < 45 degrees and displacement > 2 mm and presented within a week were included in our study. Patients with past history of peritonitis or pelvic cavity surgery were not enrolled. Patients having abdominal wall or peritoneal adhesion, or those who had major displacement of double column and iliac crest fractures were also excluded. The study was approved by the Ethical Committee of our hospital. Informed written consent was taken from all study participants. After following "Advanced Trauma Life Support (ATLS)" protocol,¹⁴ for initial assessment and resuscitation detailed imaging was done including AP and Judet views along with 3D computerized tomography (CT) reconstruction. Among selected cases, skeletal traction was done for the reduction of pain and maintenance of reduction. All fractures were categorized as non-comminuted acetabular fractures (>3 fracture fragments in involved weight-bearing area as per midsagittal CT scan) or comminuted fractures. Low molecular weight heparin was given to study participants at the time of admission. A uniform standard Modified Stoppa approach (MSA)¹³ to the anterior pelvis was employed in all study cases. All

the surgeries were performed by same surgical team in supine position on radiolucent table with facility of portable xray and image intensifier. In case if MSA was inadequate to achieve reduction or fixation, a lateral window was formed along the iliac crest for fixation of the high anterior column fractures or posterior column fractures with the help of lag screw. Follow-up was done at 2 weeks, 4 weeks, and monthly thereafter for 4 months. All cases were advised to start walking after 10 days post-surgery with the help of walker non weight bearing on operated leg.

Outcome was assessed in terms of mean operative time, complications rate and Matta's radiological and clinical criteria. Post operative fracture displacement of 0-1 mm was labeled as anatomic reduction, between 2-3 mm as imperfect and more than 3 mm as poor reduction. SPSS version 26.0 was employed for data analysis. Quantitative data like age, operation time, follow up duration and intra-operative blood loss were represented as mean and standard deviation. Frequencies and percentages were calculated for qualitative variables like gender, fractures type, radiological and clinical outcome. Data was presented in graph where necessary.

RESULTS

We operated 52 patients of acetabular fractures with modified Stoppa approach. The mean age was 31.1±12.4 years (range 21 to 69 years). Male patients were 36 (69.2%) males and female 16(30.8%). The fractures were associated type in 34 (65.3%) and elementary in 18 (34.6%) patients. Right sided acetabular fractures were present in 38 (73%) and left in 14 (26.9%). The mean surgical incision length was 10 cm (range 7 to 12 cm).



Graph I: Post operative radiological outcome as per Matta criteria.

Mean operation time was 176.32 ± 88.29 min (range 90 to 220 minutes) Mean follow-up period was 4.8 months (range 2 to 7 months). Mean intra-operative blood loss was 550 ± 215 ml (range 500 to 1000 ml). According to Matta's criteria, majority (75%.n=39) of our patients had anatomical reduction as shown in graph I. The clinical results were excellent in 13 (25%) cases, good in 31 (59.6%) cases and poor in 8 (15.3%) cases. Superficial surgical site infection (SSI) was noted in 2(4%) patients, heterotrophic ossification in 2(4%) and delayed union in 2 (4%) patients. SSI was managed with dressing and antibiotics. Conservative treatment was adopted for heterotrophic ossification. No nerve damage was observed post-operatively in our study.

DISCUSSION

The primary objective of acetabular fracture surgery is to correct the deformity and provide stable fixation for facilitation of early post operative rehabilitation and prevents traumatic arthritis of the affected joints.¹⁵ In this study radiological reduction was anatomical in 39(75%), imperfect in 8 (15.4%) and poor in 5 (9.6%) cases.(case I and II) The clinical results were excellent in 13 (25%), good in 31(60%) and poor in 8 (15.3%) cases. Letournel E and Judet R¹⁶ documented anatomical reduction through Iliioinguinal approach among 73% cases of acetabular fractures. Matta JM¹⁷ reported anatomical reduction in 74% patients while satisfactory and unsatisfactory reductions were reported in 16% and 10% patients respectively. Haris WH¹⁸ noted outcomes of acetabular fractures with modified Stoppa approach as good, fair and poor results in 84%, 9% and 7% cases respectively.¹⁸ Others have reported anatomical reduction upto 77% with the help of MSA in patients of acetabular fractures.¹³

Sagi¹⁹ treated 57 patients of acetabular fractures with modified Stoppa approach and documented good or excellent clinical outcome in 91% of his patients at one year follow up. Radiologically reduction was excellent in 70% cases, good in 22% and poor in 8%. Hirvensalo²⁰ operated 164 acetabular fractures with this approach and reported that 84% of his reductions were excellent, 9% fair and 7% poor. Majority(70%) of his patients had Harris hip score of ≥ 80 . Singh et al²¹ noted excellent radiological outcome as per Matta criteria in 80%,good in 16.6% and poor in 3.3% in his series of 30 patients. The Merle d'Aubigine hip score was excellent in 43.3%, good in 50% and fair in 6.6%.

Researchers have endorsed that reduction can be performed via lateral window in addition to MSA

or by adopting combination of approaches whenever required.³ Some authors have also reported linkage of reduction quality with outcomes of treatment in terms of better radiographic and clinical findings.²² It has also been shown that radiographic outcomes are somewhat better when compared with clinical outcome as was seen in the present study.^{23,24}

Damage to the involved joint cartilage is considered to be the most crucial factor linked with clinical outcome as it can induce degenerative changes even in the presence of anatomical reduction.¹³ Damage to the cartilage might be irreversible and might determine the outcome in patients of acetabular fractures. In our study partial weight bearing was not allowed for a couple of weeks following surgery.

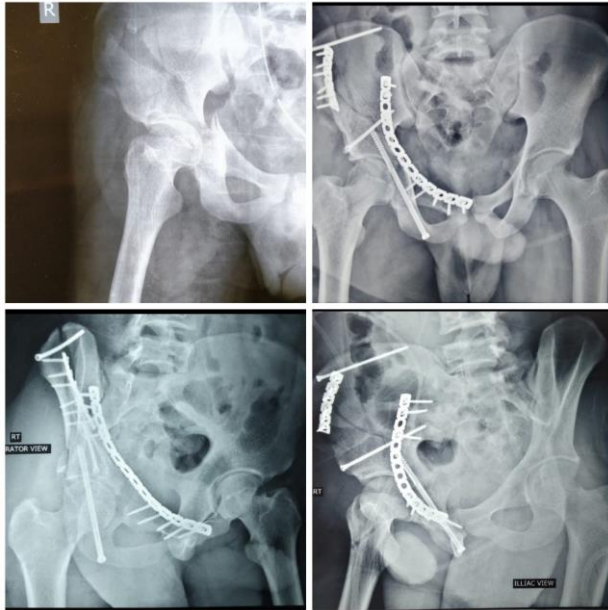


Case I: Pre and post op radiographs and incision closure of modified Stoppa approach.

The most common complications of acetabular fracture surgery are heterotrophic ossification, traumatic arthritis, nerve injuries, infections, avascular necrosis of the femoral head and non-union.²² In our study the overall complication rate was 13.0%. Letournel E and Judet R¹⁶ reported 9% complication rate in their patients operated via Iliioinguinal approach.¹⁶ Guo H²⁵ al from China reported no major complication of MSA for fixation of pelvic and acetabular fractures which is again showing safety of this approach. MSA is easy to perform especially in patients who are thin while severe obesity could be a contraindication. MSA demands subtle dissection among patients who have

intra-pelvic adhesions but it is much easier approach in term of performance when compared with other pelvic approaches.^{25,26}

Relatively small sample size and short follow up are some of the limitations of this study. More trials involving larger sample size, longer follow up and multiple centers are needed to confirm our results.



Case II: Pre and post op radiograph of acetabular fractures fixed with modified Stoppa approach.

CONCLUSION

Modified Stoppa approach is an effective and safe alternative to Ilioinguinal approach for acetabular fractures yielding satisfactory radiological and clinical outcome with minimal complications. This approach provides improved visualization which facilitates accurate fracture reduction and optimum stabilization. It is less invasive than other surgical approaches because the inguinal canal and femoral neurovascular bundles are not dissected.

Conflict of Interest: None

Grants/Funding: None

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