



Surgical management of acetabular fractures associated with pelvic ring disruption

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Case Report

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Statistics

Figures	03
Tables	00
References	12

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Abstract

Introduction: Combined injuries are more common than previously believed, with an incidence of 15.7% of all pelvic trauma victims. These types of injuries are different from isolated acetabular or pelvic injuries regarding injury severity scores, haemodynamic status, blood transfusion requirements, and higher mortality rates reaching up to 13%. The aim of this study is to discuss the different techniques of management when these injuries co-occur.

Methods: The study conducted a prospective analysis of the outcomes of 240 patients with combined injuries presented to our hospital in the period from December 2013 and November 2021.

Results: The radiological outcome was assessed using Matta score for both acetabular and pelvic fractures while, Majeed and Merle Aubigne score were used for clinical assessment at the final follow up.

Conclusion: Both components of injury should be managed properly without compromise of either one of them. Anatomical reduction should be the goal for both components trying to fix both through a single approach.

Keywords: Acetabular fractures; Pelvic ring disruption; Combined injuries

INTRODUCTION

The studies concerned with combined pelviacetabular injuries are quite rare inspite of the close anatomical relationship between the pelvic ring and the acetabulum [1]. Associated pelviacetabular injuries are more common than previously thought, reaching up to 16 % of all pelvic trauma victims [2]. When an acetabular fracture and a pelvic ring injury occur simultaneously, each component has a synergistic effect on the other creating a special injury pattern having higher injury severity scores, higher possibility of haemodynamic instability, higher transfusion requirements, longer hospital stay and its mortality rates had been reported to be between 1.5% and 13%. Therefore, both components of these injuries should be managed properly without compromise of either one of them [2-4].

CASE PRESENTATION

240 patients were involved in this prospective study (169 men and 71 women) with an age range of 19 to 61 years, with a mean age of 40.9 years, who underwent surgery in our department between December 2013 and November 2021. All patients underwent clinical and radiological examinations at the time of their initial admission. Pedestrian accidents (37.5%), motor vehicle accidents (54 %) and fall from height (8.5%) were the causes of injury in our study. Hemodynamically unstable patients were managed according to trauma control protocol starting with emergency primitive measures (e.g. pelvic binder and C clamp) up to definitive surgical intervention [5].

However, in our study we excluded haemodynamically unstable patients whom can't be controlled by primitive measures and need more advanced measures (e.g. selective embolization or even retroperitoneal packing).

Skeletally mature patients were included while; Open injuries and neglected fractures (after three weeks) were excluded.

All patients included in the study underwent the same preoperative radiological evaluation including plain X ray pelvis (anteroposterior, oblique Judet views, inlet and outlet) and CT (coronal, axial, sagittal and 3D).

The time elapsed from the trauma date to the surgical procedure ranged from 1 day to 13 days with a mean of 6 days.

Acetabular fractures were classified according to Letournel (Fig.1). During the acute stage the pelvic component was classified according to Young-Burgess classification systems (that depends on the mechanism of injury) which help to

predict associated injuries (Fig. 2). While, during decision making we relied on Tile's stability classification and according there were 130 cases of B type and 110 cases of C type [6-8].

Owing to the variability in pelvic ring injuries seen in associated pelviacetabular injuries, the indications for pelvic ring fixation are limited to unstable pelvic ring injuries. In our study all cases underwent fixation for both components.

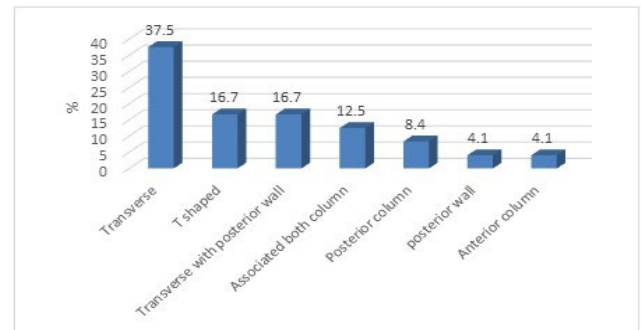


Fig. 1. Number of patients according to Letournel classification

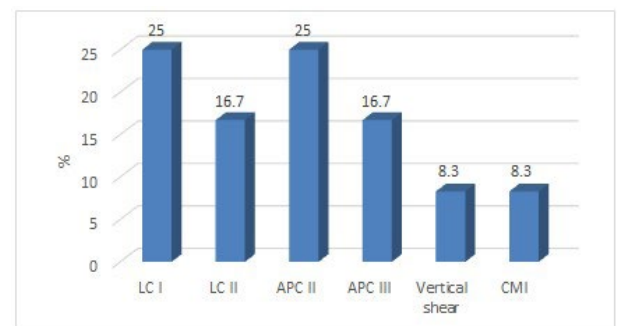


Fig. 2. Number of patients with pelvic ring disruption according to Young's classification

OPERATIVE DETAILS

During decision making regarding approach choice both components should be considered as separate entities to choose the optimal approach for one component and determine how that approach fits with the other component.

When possible, we tried to complete all interventions using a single anterior approach (modified stoppa approach) to enable simultaneous access to both components.

Single posterior (Kocher Langenbeck) approach was used only for fractures including the posterior acetabular elements (e.g. posterior wall, posterior column and transverse with posterior wall).

In patients with acetabular fractures that cannot be reduced by single anterior approach (e.g. highly displaced associated both column fractures in which a single anterior approach is insufficient to reduce and fix the posterior acetabular

elements), combined anterior and posterior approach was the ideal choice.

After selection of the ideal approach for managing the acetabular component, the pelvic component should be in mind to determine if that approach fits well with it.

Reduction and fixation of the posterior pelvic ring is the corner stone and usually the first step then proceeding to acetabular components and finally the anterior pelvic ring if needed.

In our series for the acetabular component; single anterior approach (modified stoppa approach) was used in 130 cases allowing access of both pelvic and acetabular elements, 51 cases were operated using single posterior approach (Kocher Langenbeck approach), combined anterior and posterior approaches (combined modified stoppa and Kocher Langenbeck approach) were used in 59 cases.

While for the pelvic component; 169 cases were operated using anterior approach for the posterior pelvic ring simultaneously during approaching the acetabular fracture using modified stoppa approach, 71 cases were managed by percutaneous ileosacral screw.

POSTOPERATIVE MANAGEMENT AND FOLLOW UP

Anticoagulant subcutaneous injection (LMWH 40 mg) was given for 2 weeks. All patients were examined postoperatively for neurovascular status and limb length then encouraged mobilizing to a chair as soon as possible.

Postoperative radiographic evaluation of all cases was done using plain x-ray (AP, obturator, iliac, inlet and outlet views) and the quality of reduction was scored using Matta scoring system (Fig.3) [9, 10].

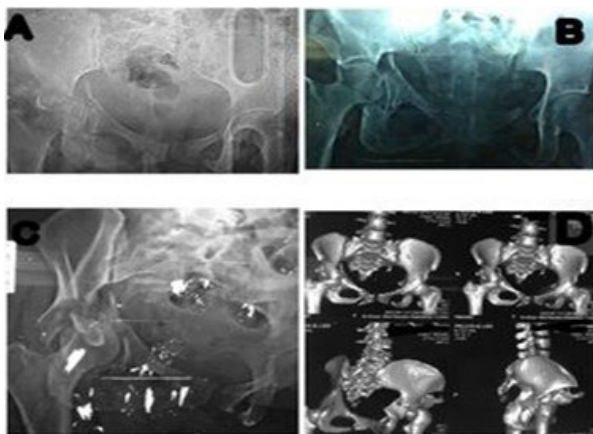


Fig. 3. Female, 42 years, MVC with ABC fracture acetabulum and contralateral SI disruption. A, B, C: AP, iliac and obturator views. D) 3D views of CT

Initially, patients were followed up every two weeks in the first month, and subsequently, each month. At each visit, regular X-rays were taken. Duration of follow up for every case is ranging from 9 months -12 months.

Partial weight bearing with walker was allowed at 2 months and full weight bearing at 3 months and this was guided by radiographic evaluation of satisfactory union of the fracture.

RESULTS

10 cases (4%) showed unsatisfactory reduction, 100 cases (42%) had satisfactory reduction and 130 cases (54%) had anatomical reduction, while for pelvic ring injuries 167 patients showed excellent reduction (69.5%), 65 patients had good reduction (27%), and 8 cases had fair reduction (3.5%) according to Matta scoring system for acetabular and pelvic ring injuries.

The clinical outcome at the final follow-up, according to Majeed criteria, revealed that 81 cases (33.75%) had an excellent outcome and 159 cases (66.25%) had a good outcome [11].

Using the Merle D'Aubigne criteria, hip joint function at the final follow-up showed that 111 cases (46.25%) had an excellent outcome, 99 cases (41.25%) had a good outcome, and 30 cases (12.5%) had a fair outcome [12].

Regarding complications, 3 patients developed infection 2 of them were superficial infection of anterior approach and they were appropriately treated by frequent dressing while, debridement and lavage was used to treat the other patient who had a deep posterior approach infection along with antibiotic treatment according to culture and sensitivity following which infection settled down. 1 patient developed deep venous thrombosis on the 6th postoperative day despite of using DVT prophylaxis protocol for all patients. Patient with DVT was referred to vascular surgery consultant and started therapeutic protocol for DVT.

DISCUSSION

Unfortunately, there is little consensus in the literature about the best method of classifying such injuries but we classified these injuries according to the stability of pelvic component and the congruity of the acetabular fracture into four categories;

- Injuries with stable pelvic ring and congruent acetabulum
- Injuries with unstable pelvic ring and congruent acetabulum
- Injuries with stable pelvic ring and incongruent

acetabulum

- Injuries with unstable pelvic ring and incongruent acetabulum

In our study all patients were in category IV. Most of the acetabular fractures were of the transverse type and most of the pelvic injuries were of LC I and APC II according to Young Burgess Classification and of B type according to Tile classification.

According to time from the date of trauma to the operative intervention we divided our cases into 2 groups; the patients in the first group (180 cases) had surgical management during the first week. Patients in the second group (60 cases) underwent surgical management after the first week.

There was significant association between the preoperative delay and Matta scoring for both acetabular and pelvic components ($p < 0.05$).

We divided our cases into two groups to ensure whether

there was a relationship between the quality of reduction and the clinical outcome; first group, included the patients with anatomical reduction of both pelvic and acetabular components which were 130 cases and second group included the patients with non anatomical reduction of both pelvic and acetabular components or either which were 110 cases.

There was significant association between Merle D'Aubigne and Majeed scoring system and the radiologic outcome ($p < 0.05$).

CONCLUSION

Associated pelviacetabular injuries require wise preoperative planning to manage both elements properly. Anatomical reduction was always our target through a single approach when feasible proceeding fixation from posterior to anterior. The earlier to manage these injuries the better in terms of anatomical reductions and the anatomical reduction of both injuries the better clinical outcome.

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