Is It Necessary To Plate All Posterior Wall Fractures Of The Acetabulum?
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Abstract

Background: Posterior wall injuries represent the commonest type of acetabular fractures, it could be isolated fractures or - more commonly - associated with hip dislocation with varying degrees of displacement and comminution. Being intra articular injuries affecting the congruency and stability of the hip joint, 30% of patients with such injuries have poor outcomes. Accurate fracture reduction with stable fixation is the standard way for achieving satisfactory results. This study aims to evaluate the suitability and efficacy - in light of the clinical and radiological results - of using only screws for fixation of certain posterior wall fractures through a limited exposure using the Kocher-Langenbeck approach.

Patients and Methods: This study included 16 cases of displaced posterior wall fractures with single, sizable fragment or multiple, non comminuted fragments treated with open reduction and internal fixation using only screws through a limited exposure using the Kocher-Langenbeck approach. In 14 cases, fractures were associated with hip dislocation while the last 2 cases had isolated posterior wall injuries. Radiological assessment according to Matta and Heeg criteria and clinical evaluation according to Postel score were done post-operatively and throughout the follow-up period that extended for a mean duration of 18.9 ± 6.7 months.

Results: Clinically, satisfactory results (excellent and good) were reported in 14 cases representing 87.5% of the studied cases. 1 case was rated fair and 1 case was rated poor, so unsatisfactory results (fair and poor) were reported in 2 cases representing 12.5% of the studied cases. According to the modified criteria of Matta, 12 cases had excellent reduction, 4 cases had good reduction and according to the radiographic grading criteria by Heeg, 14 cases were excellent with a normal appearing hip joint compared to the healthy side, 1 case was fair with joint narrowing less than 50% compared to the other healthy side with no osteophytes and viable head, 1 case was rated as poor with advanced degenerative changes, head subluxation and severe avascular necrosis. No cases developed heterotopic ossification or implant failure.

Conclusions: Fixation by only screws through a limited exposure could be a simple and reliable fixation method for certain posterior wall fractures with less soft tissue dissection, intra-operative and post-operative complications with comparable clinical and radiological results to the more complex fixation methods using conventional reconstruction plates or locked plates.

Keywords: Posterior wall fractures, fixation using only screws, satisfactory results, limited exposure through Kocher-Langenbeck approach.

Introduction:
Acetabular fractures assume a great clinical importance and represent a challenge for orthopedic surgeons with high complication rates and poor outcome in 25-30% of patients (1). Fracture pattern, associated osteochondral damage to the femoral head and /or the acetabulum, associated neurovascular injury and hip dislocation at the time of injury are the factors that influence the final functional outcome (2,3).
Basically, displaced sizable acetabular fractures or fractures affecting stability of the hip joint should be treated surgically (4). Anatomical reduction and rigid internal fixation has become the standard method of treatment (5). Although various modalities of operative fixation have been evolved and refined, there are still controversies concerning the type of osteosynthesis (6).

Standard conventional internal fixation entails the use of an interfragmentary lag screws combined with a posterior buttress plate; however, primary plate osteosynthesis can lead to slight incongruency of the joint surface by fragment displacement due to eccentric loading while tightening the screws; so, locked plates were recently used to avoid such possible displacement (6,7). Reconstruction of the joint surface is better achieved with only screws inserted using the lag screws’ principles and techniques allowing anatomical reduction with good interfragmentary compression of the various fragments (6) but it is used in less than 30% of cases and there are few authors who discussed only screw fixation in acetabular fracture treatment (8).

**Patients and Methods:**

The procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000 and 2008. All patients gave informed consent before inclusion in the study.

**Clinical data:**

This prospective, case series study included 16 cases of posterior wall fractures of the acetabulum with no pre-operative neurological insult (Table 1), all cases were caused by high energy trauma resulted from car accidents (dash board injuries). The injury/surgery interval ranged from 2 to 21 days with a mean of 5.5 ± 4.5 days. All cases were young active males with a mean age of 29 ± 6.5 years. 2 cases representing 12.5% of the studied cases had isolated posterior wall fractures while 14 cases representing 87.5% of the studied cases had associated hip dislocation that was emergently reduced at time of presentation in 12 of the 14 cases while the remaining 2 cases had neglected fracture dislocation of their hips at time of surgery.

The inclusion criteria of the cases for this study were either displaced or non-displaced posterior wall acetabular fractures affecting stability of the hip joint after closed reduction of a previously dislocated joint when examined under general anesthesia in 90° of flexion, 20° internal rotation and 20° adduction. Fractures with displaced, single, sizable fragment or multiple, non comminuted fragments with an articular step or fracture gap of more than 3 mm were also included in this study. Cases with marginal impaction, highly comminuted posterior wall fractures, posterior wall fractures associated with other displaced complex acetabular injuries and cases associated with other ipsilateral or contralateral lower limp injuries were excluded from this study.

**Clinical evaluation:**

Complete and detailed history of the injury; its nature, initial management and duration till presentation for surgery with paramount importance given to the neurological condition of the patient (sciatic and femoral nerves). Post-operatively, Clinical results were assessed according to D’aubigne and Postel score (9) that includes pain, gait and range of motion with a maximum of 6 points for each and the total is classified as excellent (18 points), very good (17 points), good (15 or 16 points), fair (13 or 14 points) or poor (less than 13 points).

**Radiological evaluation:**

Meticulous assessment of plain X-rays AP view of the pelvis and both hip joints and a computed tomography (C.T) scan performed with 3 mm sagittal, axial and coronal cuts and 3D reconstruction of the involved hip joint was of paramount importance. CT could tell about post reduction congruency of the previously dislocated joint, comminution of the posterior wall and incarcerated fragments. In this study, fractures were categorized based on radiological appearance in both plain X-rays and the computed tomography (CT) scan into either (Fig 1):

(a) Fractures with single, non comminuted, sizable fragment affecting either the posterior or the postero-superior wall of the acetabulum with or without hip dislocation.

(b) Fractures with more than one, non comminuted, separated or non separated fragments affecting the posterior or the postero-superior wall with or without hip dislocation.

(c) Fractures with more than one separated fragment with a small comminuted part affecting either the posterior or the postero-superior wall with or without hip dislocation.

For post-operative assessment, iliac and obturator oblique views were also done in addition to the plain X-rays AP view of the pelvis and both hip joints and a computed tomography (CT) scan.
Table I: Characteristics of the studied cases:

<table>
<thead>
<tr>
<th>Cases</th>
<th>Age (Year)</th>
<th>Sex</th>
<th>Fracture characteristics</th>
<th>Associated dislocation</th>
<th>Injury/surgery interval (Day)</th>
<th>Number of fixation screws</th>
<th>Reduction quality according to Matta et al. criteria</th>
<th>Union time (Week)</th>
<th>Follow up period (Month)</th>
<th>Final radiological results according to criteria of Hoeg et al.</th>
<th>Final Postel score</th>
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Operative technique:
All cases were operated through a limited exposure using the Kocher-Langenbeck approach in the lateral position under spinal anesthesia. Image intensifier and complete set of pelvic and acetabular fixation instruments in addition to the basic sets were mandatory. Most of the studied cases (14/16 cases) were fracture dislocations with marked injury to the posterior stabilizing structures of the hip joint - mainly the posterior capsule and the lateral rotators except the quadratus femoris muscle - to the extent that the femoral head was directly under the splitted gluteous maximus muscle in cases with neglected, un-reduced dislocation (Fig 2-a) or the reduced femoral head was completely visible, palpable and exposed through the injured capsule and the short rotators of the hip joint (Fig 2-b).

Copious irrigation of the empty socket in the still-dislocated to remove debris or comminuted incarcerated fragments before reducing the head back into the acetabulum, the same was done while rotating the hip joint into internal and external rotation without dislocating the stable or previously reduced hips. Now, the displaced fragment could be easily approached for reduction and fixation through the soft tissue window in the upper part of the surgical wound without the need for any muscle cutting or massive dissection for exposing the entire length of the posterior column usually needed for conventional plating for posterior wall fractures. The displaced fragment with its remaining soft tissue attachments was everted - as much as possible - exposing its under surface and allowing better exposure of its cancellous bed with any debris or clotted hematomas finely curetted from both rough surfaces.

Through the soft tissue window, manipulating and directing the displaced fragment from above downwards to its bed using the spiked-ball pusher closing the fracture gap, then the fragment was provisionally secured in place using K-wires (Fig 3-a). Accuracy of reduction was assessed manually by palpating the coaptation of the displaced fragment to its bed with prober closure of the fracture line then confirmed radiologically using image intensifier in different views with different arcs of the C-arm (Fig 3-b).

After provisional fixation was achieved, the definitive fixation with at least 2 cancellous, 4 mm fully threaded screws with washers inserted using the lag technique or by using partially threaded cancellous screws (Fig 3-c). An optional, fully threaded additional screw without over drilling the near cortex was used as a holding screw (Fig 3-d) when fixing a sizable wall fragment. Screws were inserted tangentially in relation to the posterior rim to be sure that screws
were not endangering the articular surface of the acetabulum or the femoral head. Stability of the fixation was assessed by moving the hip in all direction then meticulous repair of the remnants of the posterior capsule and rotators to the greater trochanter in the area of the piriforms fossa or to the posterior border of the gluteus medius muscle with non-absorbable sutures was done. Finally, closure of the wound in layers over a suction drain after careful haemostasis.

Now, a stable fixation was achieved using this minimally invasive technique with all the surgical steps were done through the defect in the already injured posterior capsule and the upper lateral rotators without the need for cutting through - the usually intact - quadratus femoris (Fig 3-e) with a theoretical advantage of more preservation of the blood supply to the precious femoral head with less chances for development of avascular necrosis.

FIG 2: extensively injured soft tissues (posterior capsule and lateral rotators) in fracture dislocations
(a) the femoral head (marked by the white arrow) was directly seen just under the splitted gluteous maximus muscle in a 21 days neglected fracture dislocation hip with extensive injury to the posterior capsule and rotators except the quadratus femoris muscle.
(b) the classic picture of soft tissue injury in cases with fracture dislocations after reduction of the hip joint with a large defect (marked by the white arrows) that could be used as a window for manipulation, reduction and fixation of the displaced posterior wall fragment.
FIG 3: surgical technique
(a) provisional fixation by K-wires done through the soft tissue defect in the upper part of the wound without the need for cutting through the quadratus femoris muscle.
(b) reduction and orientation of provisional K-wires were assessed using image intensifier.
(c) the definitive fixation with 2 cancellous lag screws over washers with anatomical reduction of the fracture.
(d) a third, fully threaded, cancellous holding screw was added for better fixation.
(e) stable fixation with 3 screws (marked by the upper white arrow) was completely done through a small window in the defective muscles with complete preservation of the quadratus femoris muscle (marked by the lower white arrow)

Post-operative protocol and follow-up:
Neurological evaluation immediately after recovery from anesthesia was vital. For post-operative radiological evaluation, plain X-rays and CT that is more reliable for assessing reduction and detection of any articular incongruency, intra articular hard ware or incarcerated fragments were done in the first post-operative day. Suction drains removed the day after surgery and intravenous third generation cephalosporins were given for 7 days. Patients were kept on skin traction - with thromboembolic prophylaxis - in slight abduction and external rotation to protect the fixation and relax the repaired capsule and lateral rotators for 2 weeks then removed and patients started active and passive range of motion of the operated hip joint for another 2 weeks.

Patients started mobilized with absolute non weight bearing in the 5th week for another 4 weeks then partial weight bearing - as tolerated - for another 4 weeks then unprotected, full weight bearing was allowed from the 12th post-operative week. Clinical and radiological assessment was recorded at 1 month, 3 months, 6 months and 1 year after surgery throughout the follow-up period.

Statistical analysis:
Statistical analysis was performed using SPSS ver. 19.0 (SPSS Inc., Chicago, IL, USA). Statistical analysis was done using a two-tailed Student t test and p < 0.05 was considered statistically significant

Results:
Immediate post-operative plain X-rays (Fig 4) documenting the orientation and length of the screws and confirming the concentric, congruent reduction of the hip joint. Serial X-rays could detect any loss of fixation or secondary displacement, subluxation or redislocation of the hip, bending or actual failure of the screws or AVN of the head or degenerative changes in the next visits throughout the follow-up period that extended for a mean duration of 18.9 ± 6.7 months.
FIG 4: Immediate post-operative plain X-rays of different cases with at least two screws for fixation.

Compared to plain X-rays, CT scan was more informative and reliable for assessing reduction. According to Matta et al (10), a fracture gap or articular step were considered the same, a perfect or anatomical reduction was present when articular step or fracture displacement was 1 mm or less, a good or satisfactory reduction was present when articular step or fracture gap was 2–3 mm and poor or unsatisfactory reduction was present when articular step or fracture displacement was more than 3 mm. Other important points were added to these parameters including the concentric, congruent reduction of the head with absence of incarcerated fragments or hardware, intact inner and outer borders of the reduced posterior wall fragment denoting no loss of either cortico-cancellous (outer border) or osteo-chondral (inner border) fragments (Fig 5).

According to the criteria of Matta et al (10) for assessing the reduction, 13 cases - representing 81.25 % of the studied cases - showed excellent results (Fig 6-a), 3 cases - representing 18.75 % of the studied cases - showed good results (Fig 6-b) and no cases showed fair or poor results. Meanwhile, according to the added criteria for evaluation, 1 case was rated fair as there was a non anatomical reduction with a lost osteochondral fragment with an incarcerated fragment and a lost cortico-cancellous part from the reduced posterior wall (Fig 5-c).

During the next follow-up visits that extended for a mean duration of 18.9 ± 6.7 months, plain X-rays were used for evaluation (Fig 7), the operated hip joint was compared with the healthy side in the last follow-up and graded according to criteria of Heeg et al (4) as follows: 14 cases - representing 87.5 % of the studied cases - were excellent with a normally appearing hip joint compared to the healthy side, 1 case - representing 6.25 % of the studied cases - was fair with joint narrowing less than 50% compared to the other healthy side with no osteophytes and viable head, 1 case (representing 6.25 % of the studied cases) was rated as poor with advanced degenerative changes, head subluxation, femoral head and posterior wall avascular necrosis. Till the last follow-up, no cases developed loss of fixation or secondary displacement, heterotopic ossification, bending of the screws or true implant failure in the form of hardware breakage.

Absence of hip pain on standing and walking, in addition to disappearance of the fracture lines were sure indicators of complete healing. The mean healing time for the studied cases was 14.6 ± 1.8 weeks, the number of the screws didn’t affect the healing time but the size and condition of the fractured fragment and the age of the patient were important factors affecting healing time.

One case developed deep wound infection - with infrequently discharging sinus - 3 months postoperatively, this case had a fracture dislocation and was operated 2 days post injury, there was marked injury to the posterior capsule and the short rotators which made repair so difficult creating a dead space under the gluteus maximus muscle and a hematoma was formed in the 3rd post-operative day that was evacuated surgically in the theater then passed to infection that was treated by hard ware removal and meticulous debridement once a dependable union was detected. Infection subsided completely 6 weeks later with complete clinical and laboratory quiescence. There was just narrowing of the hip joint with no osteophytes and a still viable femoral head till the last follow-up (Fig 7-d).
FIG 5: CT criteria for assessment of reduction
(a) Post-operative CT images corresponding to (Figure 1- a) . Anatomically reduced fracture with no gap or articular step, no incarcerated fragments, no bone loss from the outer (cortico-cancellous) surface or the inner (osteo-chondral) surface of the reduced and fixed posterior wall.
(b) Post-operative CT images corresponding to (Figure 1- c) . Anatomically reduced fracture with a lost osteo-chondral fragment affecting the articular surface with a gap, no bone loss from outer (cortico-cancellous) surface of the reduced and fixed posterior wall.
(c) Post-operative CT images corresponding to (Figure 1- b) . Non anatomical reduction with a lost osteo-chondral fragment affecting the articular surface and a lost cortico-cancellous part of the reduced and fixed posterior wall with an incarcerated fragment.

FIG 6: CT assessment of reduction
(a) excellent reduction with no more than 1 mm gap with no articular step.
(b) good reduction with less than 3 mm fracture displacement and gap.
FIG 7 : follow-up plain X-rays - different views - of some of the studied cases :
(a) - (b) - (c) excellent results (N.B) probe length of screws in (a-b) and too long screws in (c).
(d) fair result in a case that was infected - with infrequently discharging sinus - 3 months post-operatively, sinogram was done and screws were removed with meticulous debridement once a dependable union was detected. Infection subsided completely after 6 weeks with clinical and laboratory quiescence. Although the head was healthy, viable till the last follow-up, there was narrowing of the hip joint indicating a fair result.
(e) poor result in a case with severe avascular necrosis of both the femoral head and the posterior wall fragment with subluxation of the hip joint with advanced arthritis.

The worst scenario occurred in one case that was presented 21 days after injury with a neglected hip dislocation with associated posterior wall fracture. MRI was done pre-operatively to assess the viability of the head that revealed avascular necrosis of the femoral head. This case developed subluxation of the hip joint and resorption of the posterior wall fragment with the screws' heads directly eroding the proximally migrated avascular femoral head producing severe pain and restricted movements. Screws were removed and the end result was advanced arthritis with a deformed, eroded, non-viable, sclerotic head (Fig 7-e). Apart from this case with documented pre-operative AVN, no other cases developed AVN throughout the follow-up period that extended for a mean duration of 18.9 ± 6.7 months.

Clinically, according to D’aubigne and Postel score (9), 6 cases were rated excellent and 8 cases were very good so; satisfactory results (excellent and good) were reported in 14 cases representing 87.5 % of the studied cases. 1 case was rated fair and 1 case was rated poor, so unsatisfactory results (fair and poor) were reported in 2 cases representing 12.5 % of the studied cases.

Discussion :
It is quite clear that many factors - other than the adequacy of reduction and mode of fixation - could affect the clinical results in posterior wall acetabular fractures; deep wound infection, avascular necrosis of either the femoral head or the acetabular fragment and the stability of the hip joint following repair of the soft tissues after open
reduction and internal fixation were all of critical importance, and the final outcome depends on fracture healing in a near anatomical position and the presence of a stable, concentrically reduced, congruent hip joint.

Being a synovial ball and socket joint, stability of the uninjured hip depends on the integrity and congruency of the articulating surfaces and the protective stabilizing cuff formed by the capsule and overlying muscles. In the 2 cases with isolated posterior wall fractures, the posterior capsule was quite intact and the displaced fragment still have a capsular attachment meaning that these injuries were pure bony injuries; so, reduction and bone to bone fixation could guarantee a prober repair of the posterior stabilizers of the hip joint. In the 14 cases of posterior wall fractures associated with dislocation, it was found intra-operatively that the dislocated head found its way either through the fracture site itself (in 9 cases) between the displaced fragment laterally and its bony bed medially or through a mid-substance injury of the myo-capsular cuff between the lateral edge of the displaced posterior wall fragment and the femoral attachment of the capsule and overlying muscles (in 5 cases) meaning that reduction and fixation of the bony fragment couldn't guarantee prober soft tissue repair and so, soft tissue preservation and repair is mandatory.

Restoring post-operative stability to the injured hip joint depends on restoring the posterior bony support by anatomically reducing and stably fixing the posterior wall in addition to a proper repair of the injured posterior capsule and overlying short rotators of the hip. Repair was much more easier and more reliable in cases operated after 7 to 14 days of injury than in cases operated early in the first 1 to 4 days after injury. This coincides with what was reported by Letournel and Judet (11) regarding the ideal time for surgery (between 12 and 16 days after injury).

Prober reduction and fixation of the fractured posterior wall with minimal dissection and prober soft tissue repair were the clues for the satisfactory clinical and radiological results in this study that were comparable and could be superior to the results of Mitzionis et al. and Im G. et al.(12,13). Satisfactory results could also be explained by the relatively younger ages of the included cases as well as a less complex patterns of fractures with minimal comminution.

Zhang Y, et al (14) reported that there were few biomechanical studies (15,16) have been done to identify optimum technique of fixation for posterior wall fractures and whether it is stable enough by using screws fixation alone for posterior wall fracture? or Is it necessary to combine with a buttress plate?. Other studies have attempted to examine the contact area and load distribution of intact, fractured, and repaired cadaveric posterior acetabular wall with different fixation methods (17-20).

In vivo assessment of mechanical stability of any fixation construct could be ascertained by the ability of such fixation to keep the reduced fracture till secure healing with no secondary displacement or implant failure. In vitro assessment - which is out of the scope of this study - depends on specialized biomechanical studies that could evaluate a selected method of fixation or compare two or more different methods of fixation by testing special models under specific conditions of loading.

This work highlighted a method of fixation for certain injuries of the acetabulum, so - logically - paramount importance was given to the mechanical stability of the fixation construct and its ability to keep the reduction and withstand stresses without secondary displacement or true implant failure - in the form of screw breakage or bending - till complete healing of these fractures occurs as internal fixation is always viewed as a race between implant failure and fracture healing.

Posterior wall fractures were not the same in all cases, fractures were obviously different regarding the site, size, the presence or absence of comminution, the degree and direction of displacement. Fractures with displaced, large, non comminuted fragment affecting the postero-superior border of the acetabulum were the commonest type between the studied cases, postero-superior fragments were characterized by a large surface area of cancellous bed allowing an easy, safe and reliable fixation by two or more interfragmentary screws. Fixation using only screws could have been used when the fractured fragment was single, non comminuted or mildly comminuted with a main fragment large enough to accommodate and hold at least two screws. This can go with what was reported by Zhang Y. et al. (14) whom reported that comminuted fractures affecting the posterior and/or the posterior- inferior aspects of the acetabulum parallel to the acetabular rim should be fixed using a reconstruction plate but non comminuted
posterior-superior fractures with a large cross-section can usually hold multiple screws (21). More recent studies done by Marintschev et al. and Jianyin et al. (22,23) reported that fixation of certain posterior wall acetabular fractures using only screws could significantly enhance biomechanical stability.

Fixation failure could describe loss of reduction or loss of fixation of a previously reduced fracture with secondary displacement or position change. It could be considered as an entity of implant failure as this fixation construct couldn't withstand stresses till union predominates the condition and protects the fixation. Actual or frank implant failure occurs with screws breakage or bending. In contrast to Stöckle et al. (6) whom used 3.5 mm cortical screws in their cases, fixation in this study was done using 4 mm cancellous screws and patients were strictly instructed to avoid full weight bearing for a minimum of 12 weeks.

Implant failure was not reported in any of the studied cases till the last follow-up while Stöckle et al. reported 2 cases with screw breakages occurred less than 3 months postoperatively, they explained this by premature weight bearing and recommended at least 3 months’ partial weight-bearing for patients whose acetabular fractures are treated with screws alone (6). Using 4 mm screws for fixation of a sizable, non comminuted fragment in the postero-superior or the posterior wall of the acetabulum and delaying full weight bearing till the end of the 3rd month effectively reduced the incidence of implant failure in this study and could be the key for a successful fixation of these injuries using only screws for fixation.

This study highlighted a limited exposure using the Kocher-Langenbeck approach with much more preservation of soft tissues. Using this limited approach markedly decreased the operative time, the blood loss intra-operatively or post-operatively in the suction drain with no need for either intra-operative or post-operative blood transfusion. Minimal dissection also insures and guarantees proper soft tissue repair which is a critical factor in the stability of the hip especially if fracture dislocation was present. the Carr et al (24) have demonstrated a small-incision and gluteal-splitting approach for the treatment of selected fractures involving the posterior acetabulum. The approach essentially involves the proximal portion of the Kocher-Langenbeck incision and it can be extended to a larger one if necessary.

Regarding the post-operative protocol for weight bearing: in the first two weeks, complete bed rest with skin traction. in the next 2 weeks, traction was removed and active and passive ROM was started. From the beginning of the 2nd post-operative month, patients were mobilized with absolute non weight bearing for another 4 weeks. Partial weight bearing - as tolerated - started from the beginning of the 3rd post-operative month and continued for another 4 weeks. Non-protected, full weight bearing was allowed after the end of 3rd post-operative month. Some authors recommended full weight bearing after 12 weeks postoperatively while others recommended up to 14 weeks of bed rest following only screws fixation of posterior wall fractures of the acetabulum (21).

This study was limited by the small number of cases with a relatively short term follow-up period. It was also limited by absence of control groups addressing other methods of fixation and the lack of any specialized biomechanical work comparing the selected method of fixation to other different methods; however, these limitations do not undermine the results achieved by this study.

**Conclusions:**
- Posterior wall fractures were not the same in all cases, fractures are obviously different regarding the site, size, the presence or absence of comminution, the degree and direction of displacement
- Fractures with sizable, non comminuted fragments affecting the posterior or the postero-superior border of the acetabulum which have a large surface area of cancellous bed that can accommodate and hold at least two inter-fragmentary screws could be easily and reliably fixed using only screws for fixation without the need for posterior plating, with less intra-operative and post-operative complications.
- Fixation by only screws could be a simple and effective method for treating certain patterns of posterior wall fractures of the acetabulum, with minimal soft tissue dissection ensuring more protection to the vascular supply of the femoral head, and improved functional outcome.

**Conflict of interest:**
There was no conflict of interest relevant to this work and no funds or grants were received.
References:


