

Deviated Quadrilateral Plate Acetabular Fractures – Antishear Screws and Reconstruction Plate Treatment with Modified Stoppa Access – Case Report

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Citation: Deviated Quadrilateral Plate Acetabular Fractures – Antishear Screws and Reconstruction Plate Treatment with Modified Stoppa Access – Case Report. SAJ Case Report 6: 304

Article history: Received: 09 July 2019, Accepted: 24 September 2019, Published: 26 September 2019

Abstract

Deviated fractures of the quadrilateral plate represent a challenge to the surgeon. Several forms of treatment have been described in the literature, with a recent focus on open reduction and internal fixation with buttress devices. We present a case of a young patient with fracture of the quadrilateral plate without involvement of the columns, treated with open reduction via modified Stoppa access and fixation using acetabular reconstruction plate and anti-shear screws. He presented a satisfactory result and returned to previous activities.

Keywords: Fracture; Acetabulum; Quadrilateral Surface; Anti-Shear Screws

Introduction

The gold-standard deviated acetabular fractures treatment is open reduction and internal fixation, with better functional results related to anatomical reduction and restoration of joint congruency [1]. Acetabulum fractures with deviation of the quadrilateral plate represent a challenge for surgeons due to its intra-pelvic position, multi-fragmentary and the associated medial subluxation of the femoral head. Fractures of the quadrilateral lamina are usually associated with columns ruptures, being their isolated deviation an unusual event and still further studies needed [2]. Several methods of fixation have been described [3-7] with some recent publications describing the method of lag screws [4]. We will describe a case report of a young patient with acetabular fracture in “T” with isolated deviation of the quadrilateral plate submitted to the fixation with plate and anti-shear screws through modified Stoppa [5].

Case report

A 22-year-old male patient, who was a victim of a motorcycle accident, went to an emergency service with pain and functional limitation in the right hip. Initial hip images and Judet incidences showed deviated fracture of quadrilateral plate (Figure 1,2 and 3). CT scan showed us more details about the fracture pattern as well as absence of deviation of the fractures of the anterior and posterior columns (Figure 4).



Figures 1: Anteroposterior radiograph of the hip showing rupture of both iliopectineal and ilioischial line



Figures 2: Radiograph of the hip showing rupture of the anterior column



Figures 3: Radiograph of the hip showing rupture of the posterior column



Figure 4: Axial CT scan showing the deviated quadrilateral plate

Open reduction was indicated for restoration of joint congruence and internal fixation with plate and screws. We used the modified Stoppa access route that allows us to mobilize and reduce the fragments within the true pelvis. The patient in supine position and skin incision above the pubic symphysis. Dissection through the linea Alba. With fluoroscopy, the fracture was reduced and stabilized with a pointed ball pusher, then we used a molded acetabular reconstruction plate (3.5mm) with 10 holes and adapted in the contour of the true pelvis, being fixed with 3 proximal screws and 2 distal screws. After the fixation, we used 4 extra-articular screws under the quadrilateral plate through the acetabular reconstruction plate, functioning as reduction and anti-shutoff devices.

Direct intraoperative visualization and postoperative radiography showed anatomical reduction of the fracture, considered as a maximum of 1mm of deviation between the fragments (Figure 5,6 and 7). The patient went home after 24 hours, maintaining proprioceptive non-bearing limb for 08 weeks, when partial load and physical therapy were initiated. It evolved with radiographic fracture consolidation after 03 months. Patient has returned to his previous daily activities and work. After a 1 year follow up, patient presented no complications and maintained his previous function.



Figures 5: Post operative radiographs with anatomical reduction and plate positioning



Figures 6: Post operative radiographs with anatomical reduction and plate positioning



Figures 7: Post operative radiographs with anatomical reduction and plate positioning

Discussion

Acetabular fractures with deviated fragments and / or multifragmentary involving the quadrilateral plate represent challenge to the surgical treatment. The specific anatomical structure involving the quadrilateral surface is not considered separately in the Letournel classification⁶ used for acetabular fractures. The quadrilateral plate is part of both anterior and posterior columns. T-type pattern represent 7% of the acetabular fractures. It involves a transverse fracture of both columns associated with a vertical fracture through the quadrilateral plate. Thus, there is no comparative analysis published specifically for this fracture pattern addressing different reduction methods and fixation techniques, presenting no specific algorithm or protocol for the treatment of quadrilateral plate fracture. In 2013, White, et al. published a systematic review in order to better discuss the treatment of this specific element of acetabular fracture, concluding that plate and screws are currently the most frequent method of fixation, encompassing different types of surgical techniques, implants and accesses with the objective of improving visualization and anatomical reduction of the fragments [7].

Regarding anti-shear devices as a form of fixation of the quadrilateral plate, Casstevens, *et al.* published a technical description of plate and screws for the stabilization of acetabular dome impaction [8]. They used the modified Stoppa access and fixed the fracture with reconstruction plate under the quadrilateral surface, the plate functioning as an anti-shear device. They showed good results and good rate of return to previous activities. Kistler, *et al.* published a work comparing synthetic hemipelvis fixation with anti-shear plates and traditional forms of attachment of transverse acetabular fractures, such as plates on the columns and traction screws [9]. They concluded that anti-shear plates approaching the anterior and posterior columns are biomechanically comparable and in some cases superior to the traditional forms of fixation in the synthetic hemi-pelvis model. Peter R, [10] published a retrospective study with the results of 13 elderly patients with osteoporotic fracture of the acetabulum treated with anti-shear plates to control the medial deviation of the quadrilateral surface, reaching 85% of good results and concluding that anti-shear devices are a good treatment option.

Regarding the fixation of the quadrilateral surface using anti-shear screws, a treatment method used by the authors, Karim, published in 2017 the description of the technique and its results with 40 patients, *et al.* All patients presented lesions associated with quadrilateral plate fractures, with double-columns involvement being the most common pattern (57 %). The most used access was the ilioinguinal, chosen according to the patient's fracture pattern. The most commonly used fixation devices were the 3.5mm acetabular reconstruction plate and the number of anti-shear screws for the quadrilateral surface ranged from 1 to 3, depending on the number of fragments and the reduction obtained. They presented 88% of good results in 12 months of follow-up. In comparison with our report, the access used was the anterior intra-pelvic (Stoppa modified), since there was no need to approach the columns because they were not deviated. The fixation was performed with a 3.5mm reconstruction plate and four anti-shear screws were used on the quadrilateral surface, conformation that presented a better reduction of the fragments. As published by Karin, et al. the patient returned to activities without limitations [4].

The fixation of the fractures of the acetabulum with deviation of the quadrilateral plate using anti-shear plate or plate with anti-shear screws, present good results according to descriptions and published works. This report differs from most of the studies because it is a "T" fracture with no deviation of the columns and with deviation exclusively from the quadrilateral plate, besides using anti-shear screws instead of plates, with good radiological, clinical and functional outcomes.

Conclusion

The case presented in this report illustrates a quadrilateral plate fracture without deviation of the columns treated with a recently described 4 technique of reduction and fixation with plate and anti-shear screws, an unusual pattern in the literature limited to few publications. The patient presented satisfactory outcome, enhancing this method of easy, safe and efficient treatment for fractures of the quadrilateral surface even without other associated lesions.

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