

COMBINED STABILIZATION OF THE PELVIC RING DISRUPTION INCLUDING TECHNIQUE OF SACRAL BARS: A CASE REPORT

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The aim of this case presentation is to demonstrate that the technique of sacral bars, combined with anterior fixation with a plate, is an effective method of posterior pelvic stabilization in cases of severe pelvic ring disruption.

We are presenting a case of a young individual who sustained severe pelvic ring disruption (Type A III according to the Tile classification) with sacral fracture following compression injury of the lower torso. Initially, explorative laparotomy for splenic injury was performed, while surgery for pelvic stabilization was postponed for 5 days. The surgery for pelvic stabilization included fixation of the symphysis with a plate followed by posterior fixation with two sacral bars. No postoperative complications were noted. The patient was followed for a year post injury, and he made full recovery returning to complete preinjury level of activity.

Posterior stabilization with sacral bars in pelvic ring disruptions combined with anterior plate of the symphysis is safe and effective method for the treatment of this type of injury. *Acta Medica Mediana 2023;62(2): 88-93.*

Key words: pelvis, sacrum, disruption, sacral bars, fracture

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Introduction

Surgical stabilization of posterior pelvic disruption which is frequently combined with sacral fractures is still a challenge for both the spine and trauma surgeons.

Sacral bars, inserted following open reduction, represent a recognized method for fixation of sacroiliac joint disruption and/or sacral fractures with or without anterior pelvic ring disruption.

Sacral fractures are commonly classified with regard to the location of the sacral fracture. Type I fractures involve the sacral ala, type II fractures involve the sacral foramina, and type III fractures involve the central portion of sacrum (1). Roy-Camille has further sub-classified central sacral fractures. Operative stabilization of sacral fractures is indicated in the fractures that are displaced, that result in pelvic ring instability and

the sacral fractures with foraminal debris causing a neurologic deficit (2).

Approximately 10% of all patients who sustain pelvic fractures present with neurological deficit. Most neurologic injuries involve the L5 and S1 nerve roots of the lumbosacral (LS) plexus; however, a significant number of patients also experience sexual dysfunction secondary to nerve injury of the lower sacral nerves (3) (4).

We present a case of a 16 years old healthy male patient with bilateral sacrum fracture combined with anterior pelvic ring disruption (disruption of symphysis pubis and fracture of left pubic rami). The patient underwent open reduction and internal fixation with two sacral bars.

Case presentation

A 16 years old healthy male patient was brought by an ambulance to our Emergency department after being buried by a large quantity of mud predominantly in the region of abdomen and pelvis while working by a river, which caused compression-type injury to his lower trunk. On admission, the patient was alert and hemodynamically stable. Physical examination demonstrated many abrasions and tenderness in the upper abdomen, as well as abrasions, tenderness and instability in the region of the pelvis and the lower back bilaterally. Pelvic examination by compression demonstrated

instability in both planes, while at this point neurological status demonstrated no deficit. The extremities were without deformities and abnormalities.

Anteroposterior X-ray of the pelvis revealed bilateral sacrum fracture combined with anterior pelvic ring disruption (disruption of the symphysis pubis and fracture of the left pubic rami) (Figure 1). Ultrasonography illustrated free fluid in the pelvis, also some fluid around the spleen with direct ultrasonography signs of spleen injury. Contrast CT revealed a stable retroperitoneal hematoma, laceration of the spleen and a displaced bilateral fracture of the sacrum (Denis grade II-III), disruption of the symphysis pubis (APC III) and fractures of the left pubic rami. The pelvic fracture was classified as A III according to Tile's classification (Figure 2).

Initially, the patient was admitted in the Intensive care unit, following which, emergency laparotomy was conducted. The surgery for pelvic injury was performed five days following injury.

The surgical plan included anterior pelvic fracture reduction and plate fixation followed by posterior pelvic fixation using sacral bars (Figure 3).

We used the anterior Pfannenstiel approach with anatomical reduction followed by symphyseal plate fixation. After closure of the anterior wound in layers, the patient was brought to prone position. We made two curvilinear incisions, at the ilio-sacral level. After getting a clear view, we inserted two titanium bars that were pointed away from the foramina and introduced in the dense sacral bone. Because of the threatening hazard of damage to the neighboring neurological structure, only partial reduction was performed to fix the sacral fracture (partial but quite enough to keep the pelvis stable and to give good fracture union) (Figures 4 and 5). Our total operative time was 80 minutes including both anterior and posterior fixation.

Postoperative X-rays demonstrated satisfactory anatomical reduction (Figure 6). We had no postoperative complications and the patient was discharged from our hospital on the 7th postoperative day. The patient underwent regular postoperative rehabilitation protocol, regular follow ups were conducted one month, three months, six months and a year post surgery. He made a full recovery and returned to his regular activities and work six months post injury.



Figure 1. AP X-ray on admission, bilateral sacrum fracture combined with anterior pelvic ring disruption (disruption of the symphysis pubis and fracture of the left pubic rami)



Figure 2. Contrast CT on admission, displaced fracture of the bilateral sacrum (Denis grade II-III)



Figure 3. AP X-ray after fixation of the symphysis pubis



Figure 4. Open fixation on posterior pelvic ring with bars and screws introduced into sacral bone

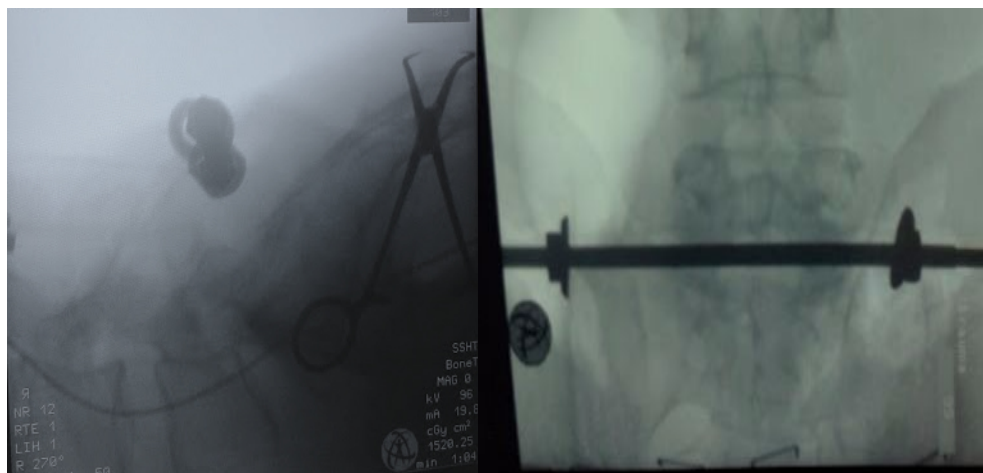


Figure 5. Profile and AP intraoperative X-ray of the pelvis after inserting the first bar and screw

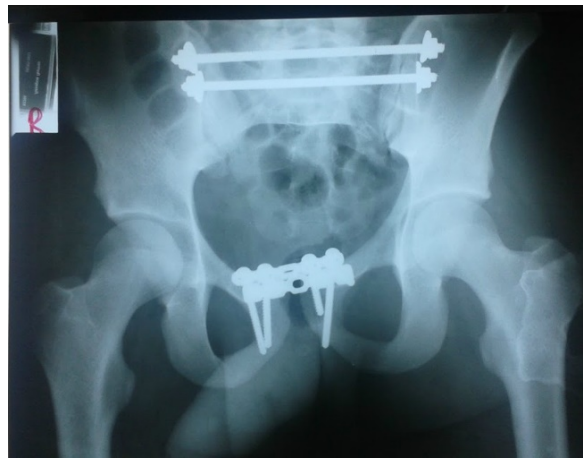


Figure 6. Postoperative AP X-ray showing excellent anatomical reduction of anterior and posterior pelvic ring

Discussion

Fixation of the sacrum with the technique of sacral bars has not been widely used in our hospital, nor in our country. This technique of fixation has its own advantages and disadvantages. The main advantage is stable fixation on the posterior component of the pelvic ring with the implant placed behind the distal lumbar spine and sacrum, thus avoiding potential injury to nerve roots and the central sacral canal that lie anteriorly (5).

The disadvantages of this procedure include: mal-reduction, breakage of bars due to limited biomechanical strength, LLD, instability, compressive neuropathy of sacral roots or cauda equina, injury to vascular or intestinal structures, lower back pain and infection (6, 7, 8, 9, 10).

Preoperative radiological evaluation must include AP and lateral X-rays, inlet and outlet views and CT, with/without 3D. Some surgeons already use intra-operative CT or navigation for percutaneous ilio-sacral bar placement (8, 11).

In order to reduce the damage of sacral roots and nerves, some surgeons use intra-operative monitoring with stimulus-evoked EMG, especially when introducing ilio-sacral screws (12).

Conclusion

Sacral bar osteosynthesis is a promising method for stabilization of fractures of the pelvic ring. Only with this method, a high interfragmentary compression is achieved, independent of the quality of the spongy bone of the sacral body (13).

The importance of this case presentation is in encouraging the surgeons in Macedonia and in the region, especially the ones who work in level one trauma care setting, or in bigger hospital that can deal with polytraumatized patients, to perform this kind of technique more often, but only with the right indications for this procedure. In conclusion, the use of sacral bars is a safe and effective method for posterior pelvic fixation and should be used with right indications.

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Prikaz bolesnika

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KARLIČNOG PRSTENA UKLJUČUJUĆI TEHNIKU
SAKRALNIH ŠIPKI – PRIKAZ SLUČAJA***Igor Merganoski^{1,2}, Simon Trpeski^{1,2}, Oliver Arsovski^{1,2}, Igor Kafrandžiev^{1,2}, Marko Spasov^{1,2}*¹ Univerzitetska klinika za traumatologiju, ortopedске bolesti, anesteziju, reanimaciju i urgentni centar, Skoplje, Republika Severna Makedonija² Univerzitet „Sveti Ćirilo i Metodije“ u Skoplju, Medicinski fakultet, Skoplje, Republika Severna MakedonijaKontakt: Igor Merganoski
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Cilj ovog prikaza slučaja jeste ukazivanje na to da je tehnika sakralnih šipki efikasna metoda posteriorne stabilizacije karlice u slučajevima ozbiljnog poremećaja karličnog prstena, kada se kombinuje sa prednjom fiksacionom pločom.

Predstavljamo slučaj mlade osobe koja je pretrpela teški poremećaj karličnog prstena (Tip A III prema Tile klasifikaciji), sa sakralnim prelomom, nakon kompresione povrede donjeg dela trupa. U početku je urađena eksplorativna laparotomija, zbog povrede slezine, dok je operacija stabilizacije karlice odložena za pet dana. Operacija stabilizacije karlice podrazumevala je fiksaciju simfize pločom, a potom posteriornu fiksaciju dvema sakralnim šipkama. Nisu zabeležene postoperativne komplikacije. Bolesnik je praćen godinu dana i potpuno se oporavio, vraćajući se na potpuni nivo aktivnosti, kao pre povrede.

Posteriorna stabilizacija sakralnim šipkama kod disrupcije karličnog prstena i kombinacija sa prednjom pločom simfize sigurna je i efikasna metoda za lečenje ove vrste povrede. *Acta Medica Medianae 2023;62(2):88-93.*

Ključne reči: karlica, sakrum, disrupcija, sakralne šipke, prelom

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