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 is an effective method of posterior pelvic stabilization in cases of severe pelvic ring disruption, when combined with anterior fixation with a plate.

We are presenting a case of young individual who sustained severe pelvic ring disruption (Type AIII according to 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.

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

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Introduction

Surgical stabilization of posterior pelvic disruption which are frequently combined with sacral fractures is still a challenge for both 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 those fractures that are displaced, those that result in pelvic ring instability, and those sacral fractures with foraminal debris causing a neurologic deficit (2).

Approximately 10% of all patients who sustain pelvic fractures present with neurologic 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 emergency service 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 upper abdomen, as well as abrasions, tenderness and instability in region of pelvis and the lower back bilaterally. Pelvic examination by compression demonstrated instability in both planes, while at this point neurological status...
demonstrated no deficit. Extremities were without deformities and abnormalities.

Anteroposterior X-ray of the pelvis revealed bilateral sacrum fracture combined with anterior pelvic ring disruption (disruption of symphysis pubis and fracture of 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 spleen and a displaced bilateral fracture of the sacrum (Denis grade II-III), disruption of symphysis pubis (APC III) and fractures of 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 consisted of 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 symphysial plate fixation. After closure of the anterior wound in layers, the 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, it was performed only partial reduction to fix the sacral fracture (Partial but quite enough to keep the pelvis stable and to give good fracture union) (Figure 4, Figure 5). Our total operative time was 80 minutes including both anterior and posterior fixation.
**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
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 up was conducted one month, three months, six months and a year post surgery. He made full recovery and returned to his regular activities and work six months post injury.

![Figure 6. Postoperative AP x ray showing excellent anatomical reduction of anterior and posterior pelvic ring](image)

**Discussion**

Fixation of the sacrum with the technique of sacral bars has not been widely used in our hospital as well as 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 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 by performing 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 (6-10).

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).

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 to encourage 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 technique of sacral bars is a safe and effective pethood for posterior pelvic fixation and should be used with right indications.
References

KOMBINOVANA STABILIZACIJA DISRUPCIJE KARLIČNOG PRSTENA UKLJUČUJUĆI TEHNIKU SAKRALNIH ŠIPKI – PRIKAZ SLUČAJA

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Cilj ove prezentacije slučaja je da se pokaže da je tehnika sakralnih šipki efikasna metoda posteriorne stabilizacije karlice u slučajevima ozbiljnog poremećaja karličnog prstena, kada se kombinuje sa prednjom fiksacijom pločom.

Prezentujemo slučaj mlade osobe koja je pretrpela teški poremećaj karličnog prstena (Tip AIII 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 5 dana. Operacija stabilizacije karlice podrazumevala je fiksaciju simfize pločom, a zatim posteriornu fiksaciju sa dve sakralne šipke. Nisu zabeležene postoperativne komplikacije. Pacijent je pružena pesnička povredom godinu dana i potpuno se oporavio, vraćajući se na potpun u nivo aktivnosti pre povrede.

Posteriorna stabilizacija sakralnim šipkama u disrupcijama karličnog prstena u kombinaciji sa prednjom pločom simfize je siguran i efikasan metod za lečenje ove vrste povrede.


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