

The Results of Posterior Percutaneous Transiliac Plate Fixation in Posterior Pelvic Ring Injuries

Posterior Pelvik Halka Yaralanmalarında Posterior Perkütan Transiliak Plak Tespiti Sonuçları

Emre GÜLTAÇ¹, Fatih İlker CAN¹, Cem Yalın KILINÇ¹, İsmail Gökhan ŞAHİN¹, Rabia Mihriban KILINÇ², Nevres Hurriyet AYDOĞAN¹

¹Muğla Sıtkı Kocman University, Faculty of Medicine, Department of Orthopedics and Traumatology, Muğla
²Muğla Sıtkı Kocman University, Faculty of Medicine, Department of Radiology, Muğla

Öz

Sakrum kırıklarının teşhisi ve tedavisi günümüzde halen zorlayıcı olabilmektedir. Literatürde sakral kırıkların tedavisi için çeşitli cerrahi yöntemler bildirilmiştir. Çalışmamızın amacı kliniğimizde posterior perkütan transiliak plak ile tedavi edilen hastaların fonksiyonel sonuçlarını incelemektir. Haziran 2013 ile Eylül 2020 tarihleri arasında posterior pelvik halka yaralanması nedeniyle cerrahi tedavi uygulanan ve en az 6 aylık takip süresi olan 56 hasta retrospektif olarak incelendi. Postoperatif 6. ayda demografik veriler, radyolojik görüntüler, Pelvik Sonuç Skorları (POS) ve Kısa Form-36 (SF-36) sonuçları analiz edildi. Hastaların 6. ay muayenesinde saptanan POS verileri incelendiğinde ortalama pelvik sonuç skoru 32 (26-37) ve SF-36 sonuçları 80 (48-90) olarak bulundu. Ortalama cerrahi işlem süresi 32,2 dakika ve ameliyat sırasında alınan ortanca floroskopi çekim sayısı 2 (1-6) idi. Posterior perkütan transiliak plak tespiti yapılan hastaların 6. ay muayenelerinde fonksiyonel sonuçları tatmin ediciydi. Bu teknik ile ameliyat süresinin kısa ve floroskopi maruziyetlerinin düşük olduğu görüldü. Kısa bir öğrenme eğrisine sahip olan bu tekniğin sakrum cerrahisinde güvenle kullanılabileceğine inanıyoruz. Bu nedenle pelvik cerrahi konusunda tecrübesi olmayan cerrahlar için bu yöntem daha kolay ve daha uygun bir yöntem gibi görünmektedir.

Anahtar Kelimeler: Floroskopi, Fonksiyonel Sonuçlar, Operasyon Süresi, Posterior Perkütan Transiliak Plak, Sakrum Kırığı

Abstract

The diagnose and treatment of sacrum fractures are still difficult to manage. Various surgical methods have been reported for the treatment of sacral fractures in the literature. The aim of our study is to examine the functional results of patients treated with posterior percutaneous transiliac plate in our clinic. 56 patients who underwent surgical treatment for posterior pelvic ring injury between June 2013 and September 2020 and who had a minimum 6-month follow-up were retrospectively analyzed. Demographic data, radiological images, Pelvic Outcome Scores (POS) and Short Form-36 (SF-36) results in the 6th postoperative month were analyzed. When the POS data detected at the 6th month examination were examined, the mean pelvic outcome score was found to be 32 (26-37) and the SF-36 results as 80 (48-90). The mean duration of the surgical procedure was 32.2 minutes, and the median number of fluoroscopy shots taken during surgery was 2 (1-6). The functional results of the patients who underwent posterior percutaneous transiliac plate fixation were good at the 6th month examinations. With this technique, it was observed that the operation time was short and fluoroscopy exposures were low. We believe that this technique, which has a short learning curve, can be used safely in sacrum surgery. For that reason, this method seems to be an easier and more convenient method for surgeons who are not experienced in pelvic surgery.

Keywords: Fluoroscopy, Functional Results, Operation Time, Posterior Percutaneous Transiliac Plate, Sacrum Fracture

Introduction

70% of body weight is transferred through posterior pelvic ring, therefore posterior pelvic fractures can cause serious disorders. Sacrum fractures are difficult to diagnose and treat (1). Various surgical methods have been reported for the treatment of sacral fractures in the literature (2-4). The aim of the treatment of posterior pelvic ring is to restore the integrity and correlation of the bony

ring. Internal fixation is the preferred surgical intervention of unstable posterior pelvic ring injuries (3). Today, although percutaneous screw fixation is the most commonly used surgical method in sacroiliac joint dislocations or sacrum fractures, it has some negative aspects due to its vulnerability to complications such as iatrogenic neurovascular injuries and excessive fluoroscopy exposure to the surgeon. Therefore, in addition to percutaneous sacroiliac screw, posterior percutaneous plate applications are also performed in suitable patients in our clinic. The aim of this study is to examine the functional results of patients treated with posterior percutaneous transiliac plate in our clinic.

Material and Method

Ethics committee approval was obtained from Muğla Sıtkı Koçman University Human Researches Ethics Committee (22.07.2020/158). Patients who underwent surgical treatment for posterior pelvic ring injury between June 2013 and September 2020 in our clinic and who had a minimum follow-up of 6 months were retrospectively analyzed. Unstable

| | ORCID No |
|-------------------------|---------------------|
| Emre GÜLTAÇ | 0000-0003-1943-2199 |
| Fatih İlker CAN | 0000-0001-5880-5336 |
| Cem Yalın KILINÇ | 0000-0003-2568-0500 |
| İsmail Gökhan ŞAHİN | 0000-0002-6274-6102 |
| Rabia Mihriban KILINÇ | 0000-0002-6845-5496 |
| Nevres Hurriyet AYDOĞAN | 0000-0002-1837-2676 |

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Adres / Correspondence : Emre GÜLTAÇ
Muğla Sıtkı Kocman University, Faculty of Medicine,
Department of Orthopedics and Traumatology, Muğla
e-posta / e-mail : emregultac@yahoo.com

posterior pelvic injuries (type C) were included in this study. Demographic data, radiological images, Pelvic Outcome Scores (POS) and SF-36 results at the 6th postoperative month of the patients included in the study were evaluated. Functional results, pain, neurological deficit, urological deficit and presence of sexual deficit were examined.

Preoperative and postoperative radiographs, computed tomography (CT) images, surgical notes, clinical follow-up notes and physical examination notes kept at clinic follow-ups were retrospectively analyzed (Figure 1,2). Gender, age, type of trauma, duration of surgery, exposure to fluoroscopy, preoperative and postoperative complications were investigated.

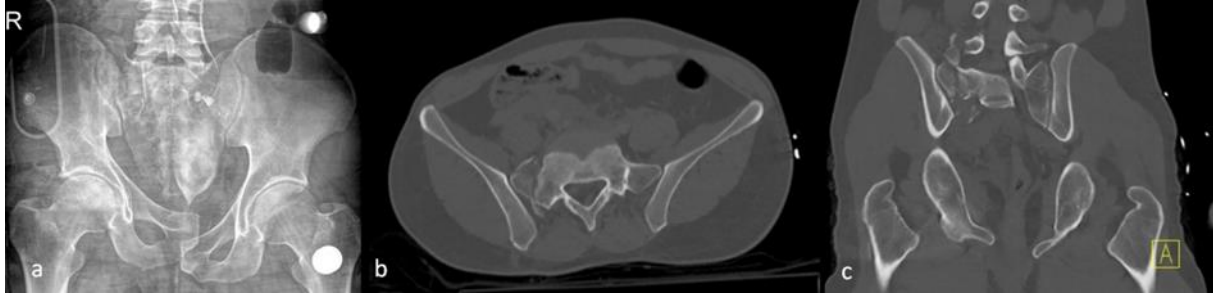


Figure 1. a. AP pelvis x-ray of a patient suffering from Tile type C pelvic ring injury. b. Axial CT view of the patient. c. Coronal CT view of the patient

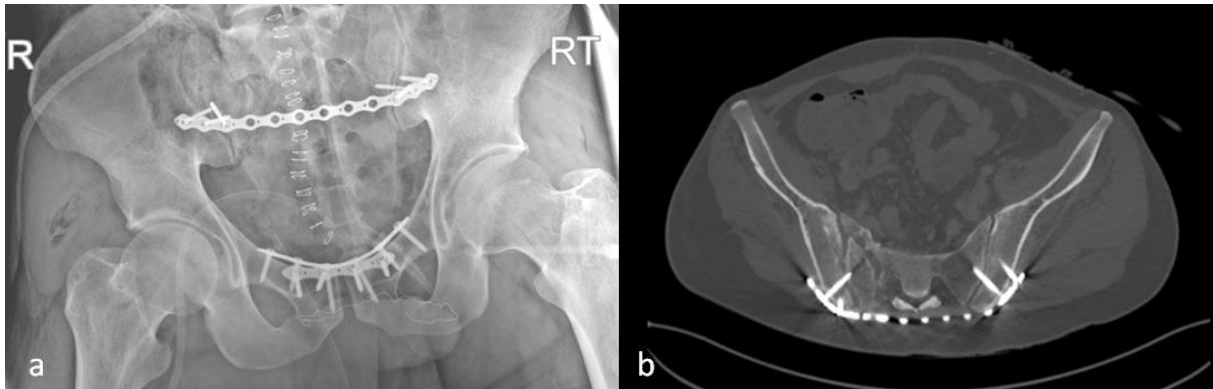


Figure 2. a. Postoperative AP x-ray of the patient b. Postoperative pelvic CT axial view of the patient

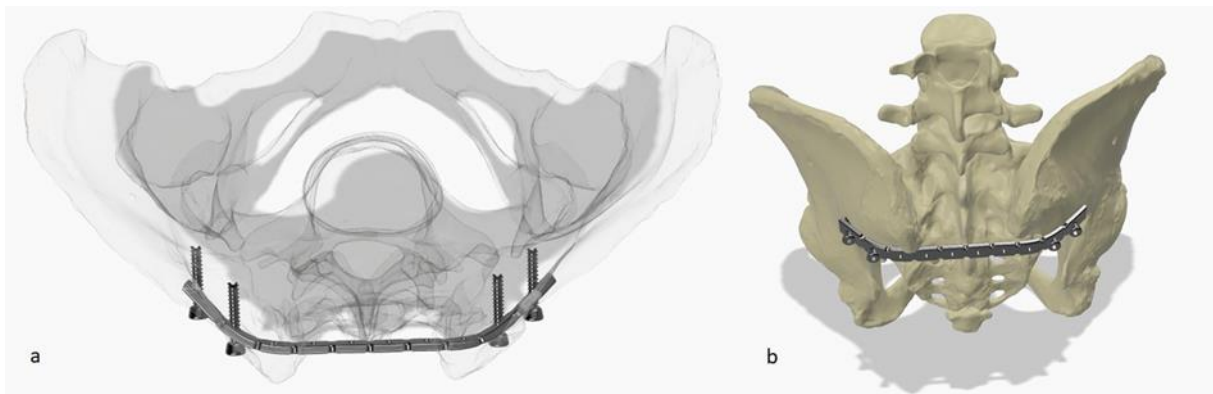


Figure 3. a. b. 3D schematic view of posterior percutaneous transiliac pelvic plate application

Posterior pelvic ring fractures were fixed with posterior percutaneous transiliac plate osteosynthesis (Figure 3). Patients were operated under general anesthesia in prone position. Traction was applied to obtain and maintain the reduction of the posterior pelvic ring fractures. Bilateral 5-cm vertical skin incisions above both posterior superior iliac spines were used. A periosteal elevator was used to prepare submuscular tunnel between the incision sites. A pelvic reconstruction plate was bent

in order to the fit anatomically. After the plate was placed, the posterior pelvic ring was fixed by placing at least 2 cortical screws on each side of the plate.

In the postoperative period, non-weight bearing exercises were allowed until postoperative 8 weeks. Supported mobilization and weight bearing were allowed after 8 weeks. The Pelvic Outcome Scores (POS) and SF-36 results of the patients included in the study were evaluated during the postoperative 6th month clinical follow-ups.

Statistical analysis was performed with SPSS software version 22.0 (SPSS Inc, Chicago, Illinois). A p value of <0.05 was considered significant for all statistical tests. Chi-square test was used for determining categorical variables. Fisher's Exact Test was preferred for the analysis of the relationship between categorical variables.

Results

36 (64.3%) male and 20 (35.7%) female patients were included. Average age was 47.3 years (18-83 years). 48 patients had additional traumas such as maxillofacial injuries, intra-abdominal injuries and upper/lower extremity fractures. The most commonly observed concomitant orthopedic injury was transverse process fractures of 5th lumbar vertebrae. The main causes of the sacrum fractures were high energy traumas such as motor vehicle accidents and fall from height.

When the relationship of the 6th month pelvic outcome scores and demographical data were investigated, no statistically significant difference was found between age and POS outcomes ($p=0.863$). The correlation between the 6th month SF-36 scores and age were also evaluated and no statistically significant relationship was observed ($p=0.640$). Average time to surgery was approximately 2 days after the initial trauma. The mean surgery duration was 32.2 minutes. In addition, the median number of fluoroscopy shots taken during surgery was found to be 2 (1-6).

The 6th month follow-up data was analyzed in terms of POS and SF-36. The mean pelvic outcome score was 32 (26-37) and the average SF-36 score was 80 (48-90). When the results evaluated according to the SF-36 (Rand-36) scoring system were examined in detail, it was observed that the average score of physical function was 81 (std. ± 16). The average score of emotional well-being was measured as 79 (std. ± 13). When the pain subgroup of the SF-36 scoring system was evaluated, an average of 80 (std. ± 14) points was observed in our study group. As the radiological evaluation of the reduction was performed according to Pelvic Outcome Scoring System, we observed very good results in 69%, good results in 19%, fair in 9% and poor in 3% of the patients.

In the preoperative period, lumbosacral plexus damage was detected in 2 patients and L5 nerve root damage was detected in 3 patients. The deficits in all of these patients were resolved within the postoperative first year without any surgical intervention. In the postoperative period, a superficial wound infection developed in one patient and healed without complication with soft tissue debridement. Deep vein thrombosis developed in one patient and resolved with medical treatment. Implant removal was performed in three patients due to minor complaints.

Discussion

Posterior pelvic ring injuries are high-energy traumas which may cause serious mortality and morbidity (5). The gold standard surgical method in the treatment of unstable Tile Type C fractures is internal fixation (6, 7). Posterior percutaneous transiliac plating, fixation with percutaneous sacroiliac screw and iliolumbar sacral bar are some of the surgical options for internal fixation. Nowadays, posterior percutaneous transiliac plating and fixation with percutaneous sacroiliac screw are the most preferred fixation methods (8, 9).

In our study, the mean pelvic outcome score was 32 (26-37) when the POS data detected in the 6th month examination of patients with Type C unstable posterior pelvic injuries were examined. As the SF-36 results of the same patients were evaluated, the average score was found to be 80 (48-90). The clinical results of the posterior percutaneous transiliac plating technique are quite successful according to the overall categorization of aforementioned scoring systems.

During fixation with the percutaneous sacroiliac screw, iatrogenic neurovascular damage may be encountered (10). Neurovascular damage was not detected in any of the patients included in our study. Considering this complication, plating can be more advantageous than screwing in terms of neurovascular damage.

Percutaneous sacroiliac screw application can be challenging in the presence of sacral dysmorphism or obesity (11). In such cases, we believe that it would be more appropriate to prefer posterior percutaneous transiliac plate applications instead of sacroiliac screws. In our daily practice in our clinic, we prefer posterior percutaneous transiliac plate application in patients with sacral dysmorphism or morbidly obese patients.

Percutaneous sacroiliac screw application has a steep learning curve due to the difficulties (10). Posterior percutaneous transiliac plate application is a relatively easy surgical method with a relatively short duration of surgery and less exposure to fluoroscopy than percutaneous sacroiliac screwing (12). In a study investigating the methods that can be selected in the surgical treatment of posterior pelvic ring injuries, sacral plate fixation and sacral screwing were compared, and it was emphasized that sacral plating was clearly superior in terms of duration of surgery and the number of fluoroscopy shots. No statistically significant difference was found between the two methods in terms of patient satisfaction scores (13).

The steep learning curve can also cause high fluoroscopy exposure. In the study performed by Chen et al., the mean fluoroscopy exposure was 2.89 in the plate group and 22.1 in the screw group (12). In our study, the median number of fluoroscopy shots taken during surgery was found to be 2 (1-6).

We believe that the posterior percutaneous transiliac plating technique is a preferable method in terms of fluoroscopy exposure.

According to our study, transiliac plate fixation seems to be a preferable surgical technique which has good functional results with low fluoroscopy exposure rates and short operation time. We also believe that transiliac plate fixation seems to be an easier and more convenient method for surgeons who are not experienced in pelvic surgery.

Ethics Committee Approval: Ethics committee approval was obtained from Muğla Sıtkı Koçman University Human Researches Ethics Committee (22.07.2020/158).

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