



Original Article

CT-guided percutaneous sacroiliac stabilization in unstable pelvic fractures: a safe and accurate technique[☆]

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ABSTRACT

Objective: The use of open reduction and internal fixation (ORIF) for unstable pelvic injuries is associated with extensive blood loss, iatrogenic neurovascular injury, and infection. Moreover, the placement of sacroiliac (SI) screws is a blinded procedure, guided primarily by palpation and two-dimensional radiological screening, which demands expertise. The complex three-dimensional anatomy of SI joint and its proximity to neurovascular structure require a safe and precise technique. Computed tomography (CT)-guided SI joint stabilization allows an accurate intra-operative assessment of screw placement. This study demonstrated a technique of CT-guided closed reduction and screw fixation of the SI joint in unstable pelvic fractures.

Methods: This was a retrospective non-randomized cohort study conducted at a tertiary care hospital. Six patients with unstable pelvic fractures were operated; the anterior rim was stabilized first by ORIF with plate on the superior and anterior aspects of the pubic symphysis. Subsequently, the posterior stabilization was made percutaneously under CT guidance with a 7-mm cannulated cancellous screw.

Results: The mean operative time was 48 min (35–90 min), the mean effective radiation dose was 9.32 (4.97–13.27), and the mean follow-up was 26 months (6–72 months). All patients had satisfactory healing, with near-anatomic reduction and no complications, except in one case where the plate broke at 61 months post surgery, but no intervention was required. The mean VAS score at the final follow-up was 1.8, and all patients returned to their original occupation without any limitations.

Conclusion: CT-guided SI joint stabilization offers many advantages, including safe and accurate screw placement, reduced operating time, decreased blood loss, early definitive fixation, immediate mobilization, and fewer infections and wound complications.

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Estabilização sacroilíaca percutânea guiada por tomografia computadorizada nas fraturas pélvicas instáveis: uma técnica segura e precisa

R E S U M O

Palavras-chave:

Parafusos ósseos
Fixador externo
Fixação de fraturas, interna
Fraturas ósseas
Ossos pélvicos

Objetivo: O uso de redução aberta e fixação interna (RAFI) em lesões pélvicas instáveis está associado a hemorragia ampla, lesão neurovascular iatrogênica e infecção. Além disso, os parafusos sacroilíacos (SI) são colocados às cegas – o procedimento é guiado principalmente pela palpação e triagem radiológica bidimensional, o que exige especialização. A complexa anatomia tridimensional da articulação SI e sua proximidade à estrutura neurovascular requerem o uso de uma técnica segura e precisa. A estabilização da articulação SI guiada por tomografia computadorizada (TC) permite uma avaliação intra-operatória precisa do posicionamento do parafuso. Este estudo demonstrou uma técnica, guiada por TC, de redução fechada e fixação da articulação SI com parafusos em fraturas pélvicas instáveis. **Métodos:** Trata-se de um estudo de coorte retrospectivo, não randomizado, realizado em um hospital terciário. Seis pacientes com fraturas pélvicas instáveis foram operados. A borda anterior foi estabilizada primeiro por RAFI com placa nos aspectos superior e anterior da sínfise púbica. Então, a estabilização posterior foi feita de forma percutânea, guiada por TC, com um parafuso esponjoso canulado de 7 mm.

Resultados: O tempo médio de cirurgia foi de 48 min (35-90 min); a dose média efetiva de radiação foi de 9,32 (4,97-13,27) e o seguimento médio foi de 26 meses (6-72 meses). Todos os pacientes apresentaram cura satisfatória, com redução quase anatômica e sem complicações, exceto em um caso em que a placa quebrou 61 meses após a cirurgia, sem a necessidade de intervenção. O escore EVA médio no seguimento final foi de 1,8 e todos os pacientes retornaram às suas ocupações originais sem quaisquer limitações.

Conclusão: A estabilização da articulação SI guiada por TC apresenta muitas vantagens, incluindo um posicionamento seguro e preciso do parafuso, redução do tempo de cirurgia, diminuição da perda de sangue, fixação definitiva precoce, mobilização imediata e redução no número de infecções e complicações da ferida cirúrgica.

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Introduction

Unstable pelvic fractures are usually associated with high impact energy trauma with mortality and morbidity rate as high as 10% and 52%. The causes of mortality mostly are: excessive haemorrhage, thromboembolic disease, decubital sepsis and multiorgan failure (MOF).¹ Non-surgical treatment is mostly disappointing as it is associated with frequent malunion, late low back and sacral pain and leg length discrepancy. Early definitive management reduces risk of immediate complications, morbidity and mortality. Most frequently used methods are open reduction and internal fixation (ORIF) of both anterior and posterior injury. These procedures require extensive surgical exposure and hence cannot be applied in the acute stage of treatment, particularly in multiple injuries. The most common complications are extensive blood loss, iatrogenic neurological and vascular injury and postoperative infection. In addition, the placement of sacroiliac screw is a relatively blinded procedure, guided primarily by palpation, which requires significant expertise.² Percutaneous iliosacral screw fixation under fluoroscopic control is another method of stabilizing the unstable posterior pelvic ring.³ Advantages of this method include minimal invasion of compromised soft

tissue, limited blood loss and decreased infection rates. On the other hand, it lacks precision for fracture stabilization in deeper layers. The potential dangers of injury to the L5 nerve root anterior to the sacrum, the S1 nerve in its neural canal and the iliac vessels remain.⁴ These shortcomings are overcome by CT-guided percutaneous fixation. It offers the advantage of direct visualization of the course of the screws, increasing accuracy of screw placement and decreasing rate of wound problems. It enables early rehabilitation and mobilization of the patient and reduces the risk of complications too. This procedure requires an experienced surgeon and well-coordinated team.^{5,6} The purpose of this article is step by step demonstration of operative technique for CT-guided Sacroiliac fixation to improve the accuracy of screw placement and reduce complication rate.

Materials and methods

Six patients with unstable pelvic injury presented to our hospital with disruption of pubic symphysis and sacroiliac joint injury. Scrotal haematoma was present in two patients, one having associated extra-peritoneal bladder injury and other with lacerated wound over perineum. Another patient

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