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A Novel and Simple Method for stabilizing a Transverse Segment in a Posterior Wall Acetabular Fracture: Continuous Compression Staples, A Report of three Cases

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Learning Point of the Article:

Continuous compression implants can be used to provisionally reduce posterior column with posterior wall acetabular fractures and stabilize small pelvic bone fragments that may be difficult to hold with lag screws.

Abstract

Introduction: Continuous compression implants (CCI) are a fixation device formed from nitinol, a shape memory alloy. This alloy is durable enough to augment fixation and combined with its small footprint, versatile enough to insert into areas that are too small for K wires or lag screws to hold a provisional fixation.

Case Report: We used CCIs to successfully stabilize the transverse segments in three posterior column with posterior wall fractures.

Conclusion: CCIs can be used to provisionally reduce posterior column with posterior wall acetabular fractures and stabilize small pelvic bone fragments that may be difficult to hold with lag screws. These cases highlight a novel augmentation of the surgical treatment of posterior column with posterior wall fractures.

Keywords: Posterior column acetabular fracture, continuous compression staples, shape memory alloy.

Introduction

The posterior column acetabular fracture was originally coined by Letournel in the 1900 s. It is categorized by the separation of the whole posterior column [1]. Such fracture patterns are uncommon in adults younger than 60 years, in contrast to posterior wall fractures which are the third most common acetabular fractures in adults younger than 60 years and the fourth most common for adults older than 60 years [2, 3]. The posterior column fracture is commonly associated with impaction of the femoral head into the acetabulum [2], similar to the mechanism of posterior wall fractures. Posterior wall fractures can also lead to an unstable acetabulum that depends on the percent of the posterior acetabular wall involved. Posterior column with posterior wall acetabular fractures is typically fixed with open reduction internal fixation (ORIF) through the classic Kocher-Langenbeck approach [1]. Fixation is achieved using any combination of plates in bridge, buttress, or neutralization mode, spring plates, or lag screws [1]. However, achieving compression in small unstable posterior column fractures with plates and screws in the pelvis is difficult and can place important neurovascular structures at risk. For example, it is challenging to position lag screws or rim plates through a small fracture fragment while avoiding joint penetration [3]. Because of difficulties with using larger fixation devices on small fractures of the posterior acetabular column, we postulated that continuous compression implants (CCIs) can be used to augment traditional fixation devices in areas where larger implants may be too cumbersome.

CCIs are formed from nitinol, a shape memory alloy (SMA), 16–32 times more elastic than popular metals in orthopedics [4]. The CCI staple is manufactured with the distal limbs of the staple pointed toward the midline of the bridge (Fig. 1). However, when it is inserted into the patient, the holding device keeps these distal limbs straight. As the staple is ejected, the distal limbs regain their manufactured position and once again point toward the midline. Due to this shape memory

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