The Use of a T-Plate as “Spring Plates” for Small Comminuted Posterior Wall Fragments

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Summary: In the treatment of posterior wall fractures of the acetabulum, a modified distal radius T-plate can be substituted for one third tubular spring plate for fixation of thin, small, or comminuted posterior wall fragments. This technique is described as well as a case series of 33 patients with various posterior wall acetabular fractures.

Key Words: acetabular fracture, posterior wall, internal fixation, spring plate

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INTRODUCTION

In certain acetabular fracture patterns, the posterior wall fragment can be very thin or quite small (less than 5 mm) and cannot be adequately secured with an overlying 3.5-mm reconstruction plate. In such cases, the use of a spring plate has been advocated, which is usually made from a one third tubular plate that is contoured to provide a compressive force on the small fragment over which a standard 3.5-mm reconstruction plate is applied.1,2 The joint reactive force vector across the hip is 2.35 times body weight with the posterior wall bearing 24% of this load.3 The small spring plates serve to distribute force over the small fracture segments and also help avoid intra-articular penetration of screws that may have been used to secure such fragments close to the articular surface. In the event of greater comminution or longer rim fragments, multiple one third tubular plates have been used. Because the one third tubular plate has a relatively thin profile and width, multiple plates are needed for extended fragments or comminution.

In the present report, we propose a technical modification whereby the contact area for a spring plate can be increased easily and without having to resort to multiple plates. Using a distal radial T-plate in the same manner as the spring plate, the area of contact nearest the articular surface is broadened. A standard overlying 3.5-mm reconstruction plate can be used as with one third tubular plates. We report on the technique and our small case series of 33 patients.

TECHNIQUE

This technique is indicated in acetabular fractures with a small posterior wall fragment that requires stabilization and cannot be entirely contained with the standard 3.5-mm reconstruction plate. The T-plate chosen can be either a standard T-plate or angle T-plate. The plate can be sized by removal of the proximal end (Fig. 1). The distal “T” portion can be slightly bent and the remainder of the plate gently curved to match the contour of the posterior wall. The plate will initially be convex, but when the fixation of the stem to the bone is performed, the plate will naturally flatten and provide the “spring” effect, in the same manner that occurs with one third tubular plates (Fig. 2). The plates should be independently attached to the pelvis with a screw before having an overlying reconstruction plate applied. Additional fixation, especially in the case of extensive comminution, can be achieved by removal of the distal portion of the T-plate to create multiple prongs to aid in securing the fragments (Fig. 3A).

Like any pronged spring plate, care should be taken to ensure that the prongs are not beyond the osseous edge of the bone into the labrum or femoral head, which would result in abrasive wear. Other potential complications associated with spring plates in general include overcontouring leading to inadequate buttressing of the wall fragments as well as errors in sizing the plate that can result in extension into the greater sciatic notch and irritation of the rotators and sciatic nerve. Correct placement of the reconstruction plate is also important to avoid excessive loading of the thinner spring plate.

CLINICAL SERIES

During the time period of 2003 to 2008, we performed the previously described technique on 33 patients ranging from 18 to 79 years of age who required this type of plate because of very thin, small, or comminuted posterior wall fragments (Table 1). We did not have a control group using one third tubular plates for comparison. All fractures had a posterior wall element, but the overall fracture patterns included simple posterior wall, extended posterior wall, superior posterior wall, posterior wall with posterior column, transverse posterior wall, and T-type with posterior wall. The mechanisms of injury were motor vehicle crash, motorcycle...
crash, and falls. Patients were followed until healing with a mean follow-up of approximately 3 years (range, 0.5–5 years). Examples of postoperative results are shown in Figure 3A–C. One patient of 33 (3%) had fixation failure using this method. In the patient with failure, he was a significant substance abuser of a gas inhalant and was reported to be walking and crawling on his comminuted posterior wall in the early postoperative period.\(^4\) He also failed his proximal

FIGURE 1. A standard or angled distal radius T-plate is gently curved to match the contour of the posterior wall and then bent along the stem to produce the “spring” pressure. The plate can be sized to the correct length by scoring the proximal end of the plate (A) followed by deformation of the end plate (B) until failure and separation of the piece (C).

FIGURE 2. Pelvic model with simulated posterior wall fracture demonstrating the use of the modified T-plate in conjunction with an overlying reconstruction plate. (A) The T-plate maximizes contact area over the small posterior wall fragment. (B) The T-plate is low profile, even with an additional overlying reconstruction plate.
humeral fracture fixations. He developed heterotopic bone and expressed no desire to stop his substance abuse. He was subsequently treated with multiple resection arthroplasties and felt satisfied for his level of activity.

**DISCUSSION**

Spring plates have been a valuable tool for the stabilization of small fragments of posterior wall fractures.1,2 Although this study does not directly compare our technique with the use of one third tubular spring plates, the need for more than one plate entails more time, potentially more dissection, additional hardware, and may complicate the contouring of the overlying 3.5-mm reconstruction plate. Using a single plate with an extended contact area on the small fragments may be more convenient and more practical than multiple one third tubular plates. Because this technique has not been previously described, we present our experience and feel it is a reasonable adjunct for stabilization of posterior wall fragments. We reinforce the tenets that they should only be used with an overlying 3.5-mm reconstruction plate and should have independent fixation to the posterior bone to limit the chance of migration.

**REFERENCES**