Tension band wire for acetabular fracture fixation: a technical note

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ABSTRACT

Maintaining reduction of an acetabular fracture during internal fixation is difficult. A variety of clamps can be used to facilitate reduction, but they are cumbersome and may damage the sciatic nerve. We developed a simple and cost-effective technique for provisional reduction and fixation of acetabular fractures using 2 screws and a tension band wire.

Key words: acetabulum; bone screws; bone wire; fracture, bone

INTRODUCTION

Surgery is the standard treatment for displaced acetabular fractures. The posterior Kocher-Langenbeck approach is commonly used for fractures involving the posterior column. Nonetheless, reduction of acetabular fractures through this approach is difficult, because of limited exposure and proximity of vital structures making manipulation dangerous. Special bone-holding forceps (modified Farabeuf forceps, Jungbluth clamp, Matta clamp, etc) are needed to overcome these drawbacks. We developed a simple, cost-effective technique for provisional reduction and fixation of acetabular fractures using 2 screws and a tension band wire.

SURGICAL TECHNIQUE

Acetabular fractures involving the posterior column were treated with open reduction through the standard posterior and/or combined anterior and posterior approach (Fig. 1). Reduction of the posterior column fragments was achieved provisionally with the use of the Jungbluth clamp. Two 4.5-mm cortical screws with a hole at their base for passing an 18/20G stainless steel wire were placed on either side of the fracture using standard predrilling and tapping methods (Fig. 2). The 2 screws were offset so that the proximal screw was placed laterally and closer to the acetabulum, whereas the distal screw was placed medially and toward the sciatic notch side. The offset...
distance between the 2 screws was sufficient for a 3.5-mm stainless steel reconstruction plate to be negotiated through the space. A 3.5-mm Schanz pin was then drilled into the ischial tuberosity to act as a derotation tool. The arm teeth of the Jungbluth clamp were then engaged at the base of the inserted screws. This along with the Schanz pin enabled provisional reduction. An 18/20G tension band wire was then threaded through the holes in screws and a figure of 8 tension band wiring was performed. The Jungbluth clamp was then shunned along with the Schanz pin. A 3.5-mm stainless steel reconstruction plate was then placed over the tension band wire thus burying the knot and profile of the wire. It was fixed with 3.5-mm cortical screw by a standard technique. Bone union was achieved uneventfully at month 3 to 4. Patients had pain-free gait with full range of motion. No hardware-related problems were encountered.
DISCUSSION

The acetabulum is seated in an inverted Y structure between the anterior and posterior columns with a typical angular orientation. It is close to main neurovascular structures such as sciatic nerve, superior gluteal and femoral neurovascular bundle. This along with coverage by bulky strong muscles makes approaching, reducing, and maintaining acetabular fractures difficult. Instruments for provisional reduction include the Farabeufs forceps, the Matta clamp, pointed fracture forceps with ball spikes, the Jungbluth clamp, cerclage wires, and other devices. These heavy instruments pose a danger to the neighbouring sciatic nerve, and maintaining reduction while negotiating a plate is difficult. The use of a cerclage wire only as the final fixation implant is dangerous, as it passes through dangerous anatomic regions.

Our technique is simple to learn and cost-effective. It requires no extra hands to hold the reduction. It is supplementary to interfragmentary-intercolumnar screws, which are difficult to pass and require radiological control. It also provides compression across the fracture site, which is very important for bone union. Being a slightly convex structure, the column is suited for applying this tension band principle. The use of Farabeufs forceps or the Jungbluth clamp requires insertion of screws on either side of the fracture site. Our technique just goes a step further using the tension band wire to bridge these screws.

The wire passing through the screw hole prevents its loop from slipping over the screw head. As this modification of the screw may decrease its strength, a 4.5-mm cortical screw was used. The strength of this construct is sufficient to maintain the reduction until definitive plate fixation. The wire and its knot can be buried under the reconstruction plate to avoid soft-tissue irritation.

REFERENCES