Technical Note

Interference Screw Technique for Arthroscopic Reduction and Internal Fixation of Compression Fractures of the Tibial Plateau

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Abstract: Arthroscopic reduction and internal fixation (ARIF) is recommended as state-of-the-art treatment for patients with pure compression fracture of the tibial plateau. We describe a new technique for ARIF of pure compression tibial plateau fractures that uses a cannulated, bioabsorbable interference screw. After a guide pin is placed in the center of the compressed fragment and a tamp is used to elevate the fracture (with bone grafting as desired), the interference screw is advanced over the guide pin, resulting in both elevation and buttressing of the fracture. As compared with previously described techniques in which percutaneous buttress screws were used, ARIF attained with an interference screw via the tibial metaphyseal window allows substantially improved efficiency of surgical steps, improved preservation of the soft tissue envelope, definitive articular reduction under arthroscopic visualization, use of a bioabsorbable implant, and elimination of the need for fluoroscopy.

Key Words: Interference screw—Tibial plateau—Arthroscopy—ARIF—Compression—Fracture.

Arthroscopic reduction and internal fixation (ARIF) is recommended as “state-of-the-art” treatment for patients with pure compression fracture of the tibial plateau. This fracture pattern generally involves the lateral plateau (Schatzker type III), but the depression may involve any portion of the articular surface. During ARIF, percutaneous or even open surgery is required for placement of the cannulated buttress screws required for internal fixation. Thus, ARIF has been defined as “surgery where anatomic reduction and rigid internal fixation is achieved without (a large or submeniscal) arthrotomy.” We describe here a new technique for ARIF of pure compression tibial plateau fractures in which a cannulated, bioabsorbable interference screw is used. This technique eliminates the need for percutaneous buttress screw placement under fluoroscopic guidance and allows simultaneous fine-tuning of arthroscopic reduction during placement of the bioabsorbable internal fixation screw.

SURGICAL TECHNIQUE

The technique of ARIF of tibial plateau pure compression fractures has been described in detail and represents modifications of techniques suggested by Caspari et al., Jennings, and Buchko and Johnson. The overall technique is summarized, and details of the interference screw technique are emphasized. Thorough arthroscopic lavage is required to remove hemarthrosis and loose fragments. When possible, reduction of the fracture may be performed in a dry field to decrease the risk of fluid extravasation and reduce...
the subsequent potential for increased compartment pressure. In all cases, inflow pressure is kept to a minimum, and compartments of the leg are clinically monitored. Although pure compression fractures are contained lesions, fluid extravasation may occur as the result of associated capsular disruption.

Under arthroscopic guidance, an anterior cruciate ligament (ACL) guide is used to place a drill-tipped guide pin in the center of the compressed fragment through a small incision in the proximal anteromedial tibial metaphysis (Fig 1). (A lateral muscle splitting approach may be considered for lateral fractures.) A coring reamer is used to fully and circumferentially penetrate the tibial cortex while as little bone as possible is removed. A cannulated tamp, specially angulated so that the leading flat surface is parallel to the plateau (Arthrex, Naples, FL), is used to elevate the fracture site under direct arthroscopic visualization (Fig 2). The underlying metaphyseal bone and cortical disc serve as an autograft. In addition, the resulting defect may be grafted.

**FIGURE 1.** A spoon-tipped anterior cruciate ligament (ACL) guide (Arthrex, Naples, FL) is centered over the compressed fragment to allow accurate guide pin placement. A double-hooked meniscal retractor (left; Arthrex) retracts the lateral meniscus.

**FIGURE 2.** An angulated, cannulated tamp (Arthrex, Naples, FL) is used to elevate the compression fracture under arthroscopic visualization.

**FIGURE 3.** (A) The cannulated, bioabsorbable interference screw butresses the tibial plateau compression fracture via the metaphyseal window. (B) Arthroscopic view of the reduced compression fracture (originally illustrated in Fig 1).
The bioabsorbable screw length is measured from the base of the tamp, and the diameter is determined by adding 2 mm (or 3 mm in cases of osteoporotic bone) to the diameter of the coring reamer. The screw is then advanced into the metaphyseal window until the fracture is reduced (or slightly overreduced) under direct arthroscopic visualization (Fig 3). Fluoroscopy is not required. Because proximal advance of the interference screw results in elevation of the compression fracture, this technique allows precise fine-tuning of arthroscopic reduction concomitant with placement of internal buttress fixation.

Postoperatively, continuous passive motion (CPM), early range of motion, and delayed weight bearing have been described.1

DISCUSSION

Arthroscopic treatment of patients with tibial plateau fractures was first reported in 1985 by Caspari et al.3 and Jennings.4 Although few studies have compared the results of ARIF with those of open reduction internal fixation (ORIF), available studies have demonstrated that arthroscopic reduction is equivalent, and in some reports even superior, to open techniques.6,7

We recommend ARIF as the treatment of choice for patients with pure compression fracture of the proximal tibia. Previously, this treatment required placement of percutaneous, cannulated interference screws under fluoroscopic guidance.1 In comparison, the interference screw technique described here allows (1) improved preservation of the soft tissue envelope, (2) definitive articular reduction under arthroscopic visualization, (3) use of a bioabsorbable implant, (4) elimination of the need for fluoroscopy, and (5) substantially improved efficiency through the elimination of several surgical steps.

REFERENCES