Arthroscopic-Assisted Reduction and Buttress Fixation of Tibial Plateau Fracture Using a Bioabsorbable Interference Screw

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Introduction

Arthroscopic-assisted fixation of tibial plateau fractures is not a novel concept. Studies have demonstrated equivalent and sometimes superior outcomes compared to open techniques in appropriately selected patients. Most arthroscopic-assisted techniques have relied on percutaneous screw or open plate and screw placement to achieve fixation.[1-3] For isolated depression-type tibial plateau fractures, we describe a technique that eliminates the need for percutaneous screw placement using an image intensifier and relies on arthroscopic visualization of reduction and a bioabsorbable implant to achieve buttress fixation of the fracture fragment.

Technique

The technique of arthroscopic-assisted fixation of pure depression-type tibial plateau fractures (Figure 1) has been previously described. Generally, these techniques require percutaneous or even open placement of screws to achieve fixation. This modified technique is an option for fracture patterns that are contained and amenable to less extensive soft tissue dissection.

A high contralateral portal is created, an arthroscope is positioned within the joint, and the plateau fracture is identified. Gravity inflow or a fluid pump on a low setting is utilized. This is preferred to minimize the potential problems associated with fluid extravasation and elevated compartment pressures. The lipohemarthrosis is drained, and any osteochondral fragments are removed. An anterior cruciate ligament (ACL) guide is used to drill a tunnel to the subchondral bone opposite the fracture fragment. A reamer is placed over the guide wire and the tibial cortex is circumferentially reamed. A tamp is then used to raise the depressed fragment. If the depression is posterior, the posterior cortex is 'hugged' with the elevator to ensure adequate reduction. Additional bone graft or

Figure 1. Anteroposterior (A) and lateral (B) plain radiographs and sagittal (C) and axial (D) computed tomography scan cuts demonstrating a pure depression-type posterior tibial plateau fracture in a 33-year-old female.

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Figure 2. Anteroposterior (A) and lateral (B) plain radiographs of the knee performed after arthroscopic-assisted reduction and buttress fixation using a bioabsorbable interference screw.

filler may be placed through the tunnel if necessary. The reduction is visualized and confirmed using the arthroscope. A bioabsorbable screw of appropriate length and diameter is advanced through the tibial tunnel (Figure 2). Reduction and fixation are subsequently confirmed with arthroscopic visualization.

We generally begin continuous passive motion and early range of motion immediately postoperatively. Weight-bearing is delayed for approximately six weeks or until radiographic evidence of healing is demonstrated.

Discussion

Pure depression fractures of the tibial plateau present an opportunity for surgical treatment that restores the articular surface without extensive soft-tissue dissection. Multiple authors have described arthroscopic management of tibial plateau fractures using percutaneous, cannulated interference screws under fluoroscopic guidance with good outcomes.[4-6] Lubowitz et al. have previously described a similar technique for arthroscopic reduction and interference screw fixation of compression fractures of the tibial plateau.[7]

By utilizing arthroscopic guidance, fluoroscopy is eliminated and definitive reduction is visualized. Additionally, commonly used instruments in ACL reconstruction allow for a technique that should be readily executed by many orthopaedic surgeons. A bioabsorbable implant eliminates concern for future hardware-related complications and provides a more biologically inert mode of fixation. Bioabsorbable screws have been used for treatment of physeal and epiphyseal fractures of the distal tibia in children and shown to have no increase in operative time, nonunion rate, number of unplanned secondary surgeries, or other complications compared with metallic screws.[8] Authors have previously demonstrated no significant difference in the results of knee joint stability or knee joint functional outcome between bioabsorbable and metallic interference screws after ACL reconstruction,[9, 10] and we would expect both implants to fare well with this technique. Importantly, there is a concern that once the bioabsorbable screw undergoes resorption, the area of reactive tissue left by the screw in the tibial bone tunnel may lead to a stress riser and vulnerability of the tibial plateau.[11] Patient-selection remains the most important variable in the success of this surgical technique. Bicondylar fractures, uncontained fractures, and fractures with fragments that cannot be adequately buttressed by a single bioabsorbable screw are more appropriate for open or traditional arthroscopic-assisted techniques. Depressed articular segments surrounded by intact cortices are ideal for this technique.

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