MIIG™ 115 Minimally-Invasive Injectable Graft

Technique and Clinical Results Using Injectable Calcium Sulfate for Intraoperative Stabilization and Grafting:
A Case Report of Two Tibia Plateau Fractures

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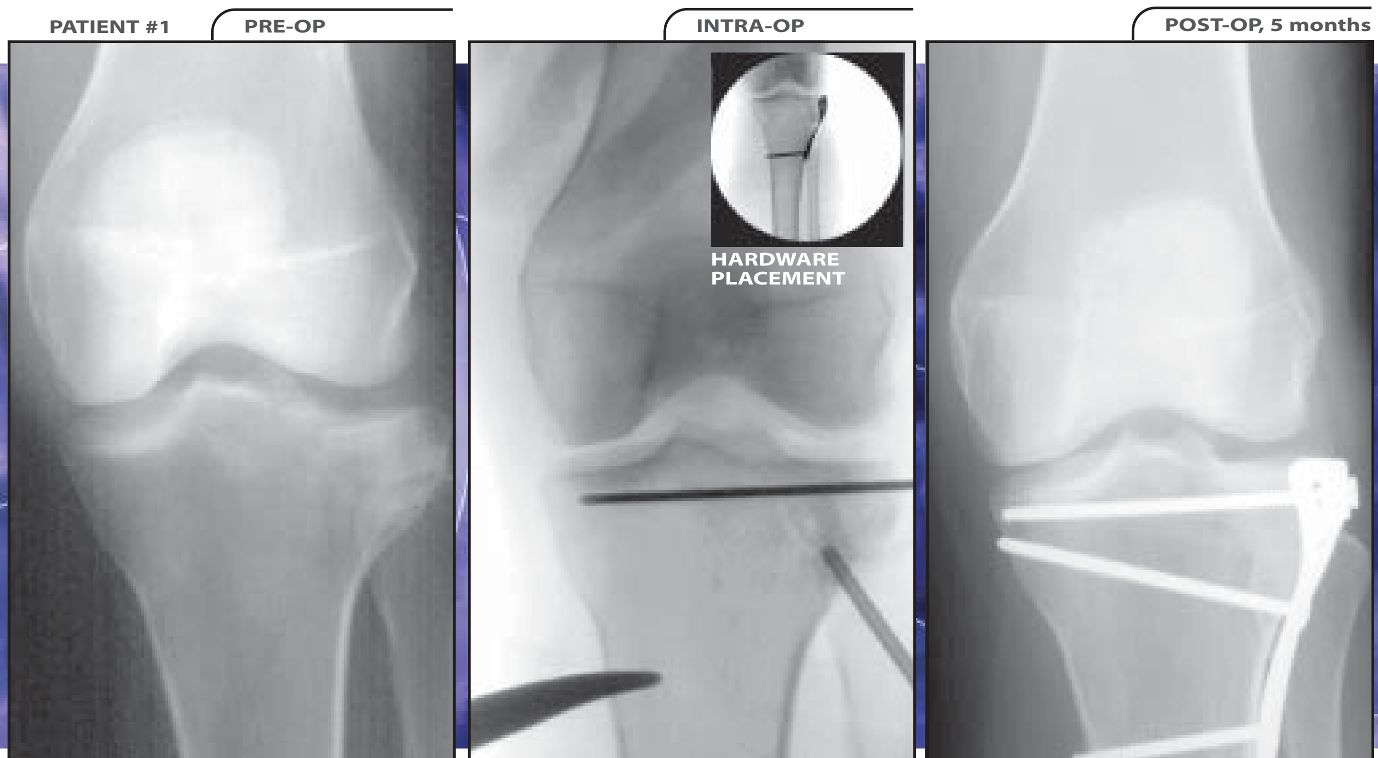


INTRODUCTION

Preoperative evaluation is vital to understand the location and degree of articular depression in tibia plateau fractures. Distraction CT scanning is useful to determine the fixation strategy and orientation of operative incision to avoid excess stripping of periosteum and damage to overlying soft tissues. Due to high incidence of meniscal pathology, MR imaging may be considered depending on the severity and type of fracture. Advances in percutaneous treatment techniques allow for articular disimpaction and reduction, provisional fixation, graft injection, and hardware placement – all done with minimally-invasive techniques.

PATIENT PROFILE

Patient #1 is a 24 year-old male who presented with severe knee pain and swelling following a snow boarding accident. This isolated injury presented with competent soft tissues and distraction CT scanning revealed a lateral condylar fracture with > 1.5cm of articular impaction.

Patient #2 is a 34 year-old female who presented to our emergency room following a motor vehicle accident. After thorough plain x-ray and CR evaluation, it was determined that the fracture pathology consisted of a lateral condylar fracture with significant articular impaction accompanied by fragments of the lateral articular surface.

SURGICAL METHOD

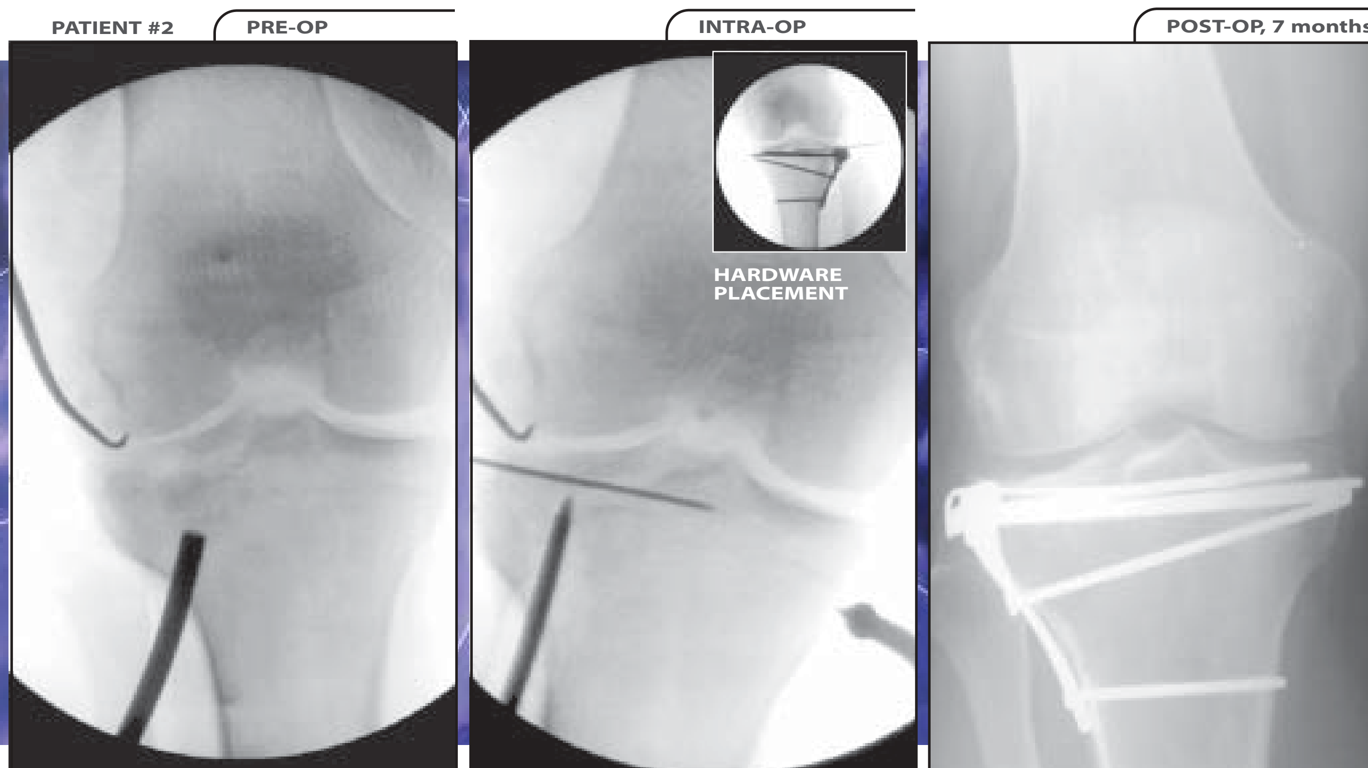
Care should be taken to plan a relatively straight full thickness incision directed over the site of condylar fracture such that soft tissue stripping with subsequent wound necrosis can be minimized. Access to the depressed surface can be obtained directly through the fracture line at the base of the condylar fragment. Once adequate exposure is obtained, a curved graft impactor is placed distal

to the fragments to facilitate disimpaction under fluoroscopy. Periosteal stripping should be limited to the subcondylar window only.

To stabilize the reduction, supplemental Kirschner wires can be utilized for provisional fixation of the condylar fragments. Once adequate and stable reduction is achieved, insert the MIIG™ 115 Graft injection needle into the compression defect. Positioning of the needle and appropriate reduction of the articular surface can be confirmed via fluoroscopy.

With provisional fixation hardware in position and the MIIG™ Graft delivery needle in place, mix the MIIG™ Graft using the mixing instructions provided in the kit. With fluoroscopy assistance, begin introduction of the MIIG™ Graft into the compression defect. Injection time is approximately two minutes.

Five minutes after injection, definitive fixation hardware may be placed with standard drilling or use of self-tapping screws. This can be performed through the hardened MIIG™ Graft without concern of disrupting the crystalline structure or changing the mechanical properties of the material.



POST-OPERATIVE RESULTS

In all cases, the MIIG™ Graft has been completely resorbed within six months with no loss of reduction. The metaphyseal voids have been completely replaced by normal host bone and subchondral remodeling has occurred without residual articular depression that can occur with traditional graft incorporation.

DISCUSSION

Injectable surgical-grade calcium sulfate appears to be ideal for contained metaphyseal defects such as those resulting from compression fractures in the periarticular region of long bones. Once hardened, the material stabilizes fragments during the procedure, which allows for final hardware placement without concern of loss of reduction. Subsequent bone repair is predictable and reliable. It should be noted, however, that the material is not a substitute for rigid internal or external fixation. It has been our experience that material which may inadvertently escape into the joint space during injection will resorb rapidly and does not require removal.

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US Patents 5,614,206; 5,807,567; 6,030,636 and additional patents pending.

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