

**Lateral Tibial Plateau Fracture Fixation: Back to Basics**

Florence Unno, MD<sup>1</sup>; Georg Osterhoff, MD<sup>2</sup>; Reza Firoozabadi, MD, MA<sup>3</sup>; Sean Nork, MD<sup>4</sup>

<sup>1</sup>Vancouver General Hospital, University of British Columbia, Vancouver, British Columbia, CANADA;

<sup>2</sup>Zurich University Hospital, Zürich, SWITZERLAND;

<sup>3</sup>Harborview / University of Washington, Seattle, Washington, USA;

<sup>4</sup>Harborview Medical Center, Seattle, Washington, USA

**Background/Purpose:** Split-depression lateral tibial plateau fractures are typically treated with a combination of articular reduction and lateral plating. The split component of the fracture is usually managed with buttress plating, and the osseous metaphyseal defect after elevation of the articular surface can be managed with allograft, autograft, or a bone void filler such as an injectable calcium phosphate cement. Locking plates have been used increasingly in these fracture patterns despite a lack of supporting evidence. Both locking plates and bone void fillers have significant economic implications. The purpose of this study was to report the results of split-depression tibial plateau fractures treated with low-profile non-locking small-fragment buttress plating combined with densely packed cancellous allograft bone as an efficient as well as economic alternative to other implants and bone substitutes.

**Methods:** This was a retrospective review of skeletally mature patients with operatively treated split-depression lateral tibial plateau fractures with a minimum of 6 months follow-up. Four patients who received a calcium phosphate injectable compound and three patients who were treated with a locking plate were excluded. The remaining 69 patients with an average age of 50 years (range, 18-81) were treated with a 3.5-mm nonlocking precontoured stainless steel lateral tibial plateau plate combined with allograft bone to fill the cancellous subarticular void. All fractures were treated with an open approach, direct visualization of the articular reduction, and buttress plating using cranial rafting cortical screws. Postoperative activity recommendations included 12 weeks of protected weight bearing. The immediate postoperative and final radiographs were reviewed to evaluate the articular reduction and the coronal plane alignment. The 6-month radiographs were reviewed to evaluate fracture healing, maintenance of the articular reduction, and any articular subsidence, with 2 mm set as the threshold.

**Results:** An accurate reduction of the articular surface was observed in 93%. All fractures healed and there was no displacement of the metaphyseal split component. At final follow-up, medial proximal tibial angle stayed satisfactory in all but one patient, indicating maintenance of the coronal plane alignment. In over half of the fractures, additional subchondral Kirschner wires or minifragment screws were placed cranial to the lateral plate and the associated 3.5-mm rafting screws. In 46% of the fractures there was an associated lateral meniscal tear, typically a peripheral detachment amenable to primary repair. The average amount of crushed cancellous allograft bone used to fill the metaphyseal void was 27 cm<sup>3</sup> (range, 10-75 cm<sup>3</sup>). Three patients (4.3%) had subsidence of >2 mm, and two patients had minimal subsidence (<2 mm).

**Conclusion:** The use of a nonlocking precontoured stainless steel buttress plate with rafting

cortical screws and densely packed cancellous allograft resulted in predictable healing of displaced split-depression lateral plateau fractures. Articular subsidence was observed in 4.3% of fractures and there was only one case of secondary valgus malalignment. Despite increased popularity of more expensive locking implants and calcium phosphate injectable cements, a strategy based on articular reduction principles, optimization of the cost of implants, and protected weight bearing resulted in maintenance of reduction through healing in the vast majority of split-depression tibial plateau fractures.