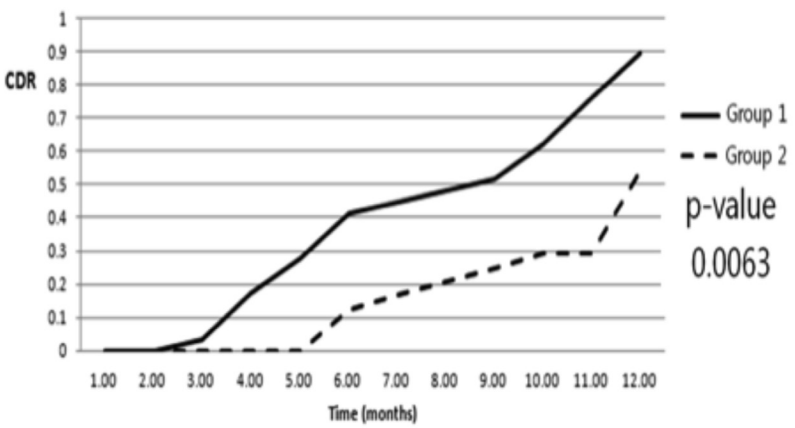
The Role of Appositional Screw Fixation in Minimally Invasive Plate Osteosynthesis for Distal Tibial Fracture

Yougun Won, MD[1]*; Hyung-Keun Song, MD*[2]*; Dong-Hyun Kang, MD*[1]*; Sung-Jun Kim, MD*[1]*; Kyu-Hyun Yang, MD, PhD*[1]*;*
[2]*Yonsei University College of Medicine, Seoul, Korea;*
[2]*Aju University College of Medicine, Suwon, Korea*

Purpose: Over the decades, minimally invasive plate osteosynthesis (MIPO) has been well established as a treatment of distal tibial shaft fractures. However, the effect of interfragmentary appositional screw fixation has not been adequately investigated.

Methods: In this IRB-approved study, we performed MIPO in 60 patients who were diagnosed as distal tibia fracture without displaced articular fragment between January 2002 and June 2012 in our hospital. 30 patients (group 1) of the 60 patients were treated with MIPO with appositional screw fixation and the other 30 (group 2) were treated without the screw. Radiographic results were assessed for time to initial callus formation, visible bridging callus formation in posteromedial cortex, and radiological union defined as the presence of a bridging callus in three cortices. Clinical union was defined when patients were fully weight bearing without significant local discomfort and radiographs demonstrated bridging callus formation. Clinical outcomes were assessed using the American Orthopaedic Foot & Ankle Society (AOFAS) Scores at the final follow-up examination. The marginal model using the robust sandwich estimate in the Cox proportional hazard model for recurrent event data was used to detect differences among cumulative detection rate curves. Statistical significance was defined when *P* value was less than 0.05.

Results: Mean follow-up was 20 months. In group 1, the rate of clinical union was significantly higher than that in group 2 in analysis of the 1-year cumulative detection rate (CDR) (figure). In group 2, the duration before initial callus formation and radiological union was significantly longer than in group 1 ($P = 0.044$, $P = 0.002$). Four nonunion patients in group 2 achieved union after placement of an additional bone graft and none of patients in group 1 were diagnosed with delayed union or nonunion ($P = 0.022$). None of the patients of both groups had malreduction, skin problems, or infection. Overall, the AOFAS score did not significantly differ between groups 1 and 2 ($P = 0.43$).



See pages 99 - 147 for financial disclosure information.

Conclusion: The group without appositional screw fixation had significantly extended healing time and higher incidence of nonunion and delayed union that required additional operation, thus significantly extending times for clinical union and radiological union.