

Title:

A Randomized Controlled Trial of Locked Plating versus Retrograde Nailing for Periprosthetic Distal Femur Fractures

Introduction:

Periprosthetic fractures of the distal femur (PPDFs) above a total knee arthroplasty (TKA) are challenging to manage, with these injuries continuing to increase in prevalence due to the growth in the number TKAs performed and the aging and increasingly active population. There remains substantial controversy regarding the ideal fixation strategy for these fractures, with debate occurring between the use of locked plating (LP) and retrograde intramedullary nailing (RIMN). Both methods are generally accepted as viable options for the treatment of PPDFs, with contrasting advantages and disadvantages cited by their respective proponents and critics. Given this, we conducted an international multi-centre randomized controlled trial of LP versus RIMN for the treatment of PPDFs.

Methods:

Ninety-four patients with a PPDF amenable to both treatment groups were recruited from 13 trauma centres internationally and were randomized to either LP or RIMN. Patients were followed at regular intervals for a total of 2 years. The primary outcome measure was the timed up and go (TUG) test at 3 months. Secondary outcomes included the Knee Society Score (KSS), as well as rates of nonunion, malunion, re-operation and mortality. Fractures healing with > 5 degrees of malalignment in any plane or > 1 cm length discrepancy were defined as malunions. A sample size of 94 patients was calculated in order to detect a significant difference in TUG scores by means of an independent two-sample t-test.

Results:

A total of 94 patients were randomized, with 53 patients were randomized to LP and 41 patients to RIMN. Follow-up data for our primary outcome was available for 82% of patients. No significant differences were observed between groups in the results of the TUG test at 3 months (56.5 ± 57.0 seconds in LP group vs 50.0 ± 51.5 seconds in the RIMN group, $p = 0.62$), or any time point thereafter. Similarly, no significant differences were observed in KSS scores at any time point. Nonunion occurred in 3/40 (7.5%) of patients in the LP group at 1 year versus 0/30 (0%) patients in the RIMN group ($p = 0.25$). Malunion was less common in the LP group 4/43 (9.3%) vs the RIMN group 13/36 (36.1%) ($p = 0.003$). Reoperation occurred in 5/40 (12.5%) patients in the LP group at 1 year versus 1/30 (3.3%) patients in the RIMN group ($p = 0.23$). Mortality rates were similar in both groups at 1 year (13% LP group versus 14.3% RIMN group, $p = 1.0$).

Conclusions:

This multicentered randomized controlled trial of LP versus RIMN for the treatment of PPDFs did not demonstrate any significant differences between the two fixation strategies with respect to functional outcomes. Malunion was significantly more common in the RIMN group, but this did not compromise clinical outcome. Nonunion and re-operation occurred more frequently in the LP group, although the differences were not significant and both events were relatively infrequent. Both LP and RIMN are acceptable treatment options for the management of PPDFs above a TKA. Given the similar functional outcomes between the two groups and the decreased rate of nonunion and re-operation with RIMN, the authors' preference is to use RIMN for the treatment of PPDFs where possible.