Is Fixing a Fracture Below a Short Nail Really Easier? A Multi-center Study of Peri-Implant Fractures.

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INTRODUCTION: Cephalomedullary nails are a commonly used implant for the treatment of intertrochanteric (31A3.1-3) femur fractures. Both long and short construct are used with no consensus on ideal nail length. Each implant has relative advantages and disadvantages, while the rate of peri-implant fracture is equivocal between constructs. Determining the clinical sequalae of fixing peri-implant fractures around short versus long nails may provide valuable information for surgeons choosing between these two options. The purpose of this study was to compare injury patterns and treatment outcomes following peri-implant fractures below short or long cephalomedullary nails.

METHODS: This was a multi-center retrospective cohort study that identified 58 patients referred for treatment of periimplant fractures around short or long cephalomedullary nails following a low energy trauma (n = 29 short, n = 29long). Fracture pattern, treatment strategy, operative details, and outcomes were compared between cohorts using Pearson chi-square for categorical and Mann-Whitney U for continuous variables. Multivariable linear regressions were conducted on select variables as discussed in the results. RESULTS:

Diaphyseal fractures were significantly more common in the short nail cohort (79% vs 24%, p <.001) while there were significantly fewer distal femur/peri-articular patterns in the short nail fracture cohort (20% vs 75% p <0.001). There was a significant difference in fixation strategy between cohorts, with most (75%) long nail patients undergoing open reduction and fixation (ORIF) while the majority (65%) of short nail patients underwent nail revision.

There were no significant differences between groups in terms of operative time, use of fluoroscopy, length of stay (LOS), or transfusion requirement, despite a significant difference in estimated blood loss (450 mL long vs 200 mL short, p =0.009). In terms of weight bearing status there was a significant difference between the cohorts with only 26% of short nail patients made non-weight bearing compared to 58% of long nail patients (p=0.019). Despite this different in weight bearing status there was no difference in discharge destination between the cohorts (skilled nursing facility vs home)

Finally, subgroup analyses were performed comparing ORIF amongst all patients to all other fixation strategies. Overall, 32 patients underwent ORIF only while the remainder underwent revision nailing or nail plate combination. There were no differences between ORIF and other fixation methods in terms of operative time, EBL, transfusion requirement or length of stay, however, other fixation strategies required more fluoroscopy time (127 vs 371, p=0.006) Furthermore, ORIF patients were more likely to have a total knee in place at time of injury (p=0.012), have restricted weight bearing following surgery (p<0.001), and discharge to a skilled nursing facility (p=0.009).

DISCUSSION AND CONCLUSION:

This is the largest series of peri-implant fractures nail to date and demonstrates consistent and predictable fracture patterns between cohorts with mostly diaphyseal fractures below short nails and metaphyseal fractures around long nails. Our results further show that the theoretical advantages of either short or long nail option is still subject to debate. Lastly, fixation choice may play largest role in the operative and clinical course with differences between ORIF and other fixation methods proving the most important for weight bearing status, disposition and x-ray time.