Distal Femur Fracture Fixation: Two Implants for the Price of One

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INTRODUCTION: Distal femur fractures are common and complex injuries associated with high morbidity and mortality. Historically, either retrograde intramedullary nail (rIMN) or single lateral plate (SLP) fixation have been the treatment of choice, but outcomes have been suboptimal. The nail-plate combination (NPC) construct has arisen as a potential solution, with recent data showing improved outcomes compared to single fixation alone. Despite the reported benefits of NPC, some may push back on the larger upfront cost. This study investigates the overall cost effectiveness and utility of NPC compared to rIMN or SLP alone.

METHODS: This is a retrospective cost analysis of 197 patients who underwent either rIMN (37), SLP (77), or NPC (83) fixation of their distal femur fracture at a level 1 trauma center from 2019-2024. Partial articular injuries, pathologic fractures, multifocal femoral injuries, and critical bone defects were excluded. Cost data was obtained from the operative reports and the hospital's billing department. Wound care, rehab, skilled nursing, and durable medical equipment were not included in the cost comparison. EQ-5D patient reported outcome measures were collected retrospectively to generate utility gained. Total cost was divided by utility gained at final follow-up to calculate cost-utility.

RESULTS: NPC produced fewer and cheaper reoperations, with most being debridement of deep infections. Single fixation constructs produced higher and more expensive reoperation rates due to either nonunion or implant failure. Hospital length of stay was not statistically significant between groups ($p=0.918$). NPC was more expensive after the initial procedure (NPC \$12k, SLP \$9.3k, rIMN \$8.9k; $p<0.001$), but concluded the follow-up period with similar overall cost (NPC \$13.2k, SLP \$13.4k, rIMN \$11.5k; $p=0.319$). NPC had a greater return of health state (EQ-5D) by final follow-up compared to rIMN (-0.292 vs. -0.947; $p=0.038$). When calculating cost divided by improvement, there were no statistical differences in cost-utility by final follow-up amongst the three groups (all $p>0.05$).

DISCUSSION AND CONCLUSION: While NPC posed a greater upfront cost compared to rIMN and SLP, NPC patients suffered fewer and cheaper complications. Consequently, NPC proved to be as cost-effective as rIMN and SLP.