

Experience and Outcomes of the SIGN Fin Nail in the Treatment of Fractures of the Femoral Shaft

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Purpose: The Surgical Implant Generation Network (SIGN) nail is a solid stainless steel intramedullary nail, produced for austere environments such as ours in a lower middle-income country. It does not require fluoroscopy or power tools and it has dynamic and static locking options through an external targeting jig. All surgical cases and their subsequent follow-ups are logged into an online surgical database. The standard SIGN nail has been shown to have good results in femoral fracture treatment. The fin nail variant uses distal flanges in lieu of distal locking, which interdigitate with the canal wall, giving rotational and longitudinal contact stability. These qualities appear to make the nail more user-friendly with a less steep learning curve and it reduces surgical time. There is also purportedly less of a distal stress riser. We looked to evaluate our early results of its use in our patients.

Methods: We treated 71 femoral shaft fractures over 18 months using the fin nail. 25 were anterograde (mainly for midshaft fractures), and 46 were retrograde, mainly for distal-third fractures of various configurations. The case mix includes fresh features as well as nonunion treatments. The ages of the patients ranged from 12 to 80 years, and there were 51 male and 20 female patients. Patients were followed up at 6 weeks, 3 months, and 6 months if required. 50 patients had follow-up radiographs logged on the database. Clinical outcomes logged on the database were «squat and smile», painless weight bearing, and knee flexion greater than 90°. Hip flexion could be estimated from squat and smile pictures. Implant breakage and complications such as infection are also logged.

Results: All patients with radiographic follow-up at 3 months showed radiographic evidence of union. 90% of patients with follow-up at 6 weeks had painless weight bearing. 88% had knee flexion greater than 90° at 3-month follow-up. Radiographically, only 3 patients (4%) showed loss of position with shortening and/or significant displacement at all follow-up way points. 2 of these patients underwent revision of nailing. 2 of the patients had breakage of locking screws; only 1 of these was among the revisions. There were no infections in the cohort. No incidences of peri-implant fracture were reported. All the patients who were able to perform «squat and smile» at 6-week follow-up also had evidence of radiographic union. Operating times for the fin nail were shown to be 20 minutes shorter on average compared to standard SIGN nailing for femurs.

Conclusion: The SIGN fin nail is a useful nail in resource-limited settings for the treatment of stable and unstable femoral fractures, and in our hands has shown encouraging results despite the relative inexperience of many of our surgeons and procedures carried out without the use of fluoroscopy. It cuts operating time and has a lower stress riser distally, with no significant loss of stability or inferior fixation, even in length-unstable fracture patterns.