

Incidence of Rotational Malalignment After Intramedullary Nailing of Tibial Shaft Fractures: Efficacy of Low-Dose Protocolled Bilateral Postoperative CT Assessment*Nils Jan Bleeker, MSc; Job N. Doornberg, MD, PhD; Ruurd Jaarsma, MD, PhD;**Megan Cain, MD, BsC; Kaj T.A. Lambers, MD**Flinders Medical Centre, Adelaide, AUSTRALIA*

Purpose: Intramedullary (IM) nailing is the treatment of choice in the vast majority of tibial shaft fractures due to minimal surgical approach, superior fracture healing, and rapid functional recovery. However, a major pitfall may be rotational malalignment. The aim of this prospective cohort study was to determine the incidence of rotational malalignment and to evaluate the efficacy of protocolled bilateral postoperative CT assessment of rotational tibial alignment. Our hypothesis is that protocolled CT rotational measurements after tibia nailing are an effective way to diagnose rotational malalignment allowing for early correction.

Methods: Between 2009 and 2016 we prospectively included 156 patients (112 male [72%], 44 female [28%], mean age 41 years) with a unilateral tibial shaft fracture. As per hospital protocol, patients underwent routine low-dose bilateral postoperative CT to assess rotational malalignment. 46 (29%) were compound fractures and in 33 patients (21%) the fracture was part of multitrauma. According to AO/OTA classification, there were 106 simple (68%), 29 wedge (19%) and 21 complex fractures (14%). Seven were proximal third tibial fractures (4%), 103 fractures in middle-third shaft (66%), and 46 fractures (29%) in the distal third tibia. Rotational malalignment was defined as a rotation greater than 10° as compared to the uninjured side.

Results: 56 patients (36%) had postreduction rotational malalignment of 10° or more, including 8 patients (5%) with a rotational malalignment $\geq 20^\circ$ and 2 patients (1%) with a malrotation $\geq 30^\circ$ as compared to the uninjured side. Of the patients with rotational malalignment, the tibia was externally malrotated in 29 patients (52%) and internally malrotated in 27 patients (48%). Three patients (2%) underwent revision surgery to correct the malrotation as detected on CT scan.

Conclusion: This study reveals a high incidence of rotational malalignment following tibia nails (36%), with a surprisingly low revision rate (2%). A subsequent study should aim to assess clinical relevance of rotational malalignment in terms of functional outcome and gait analysis. For now CT rotational provides a platform for early recognition and correction of malrotation secondary to tibial IM nailing.