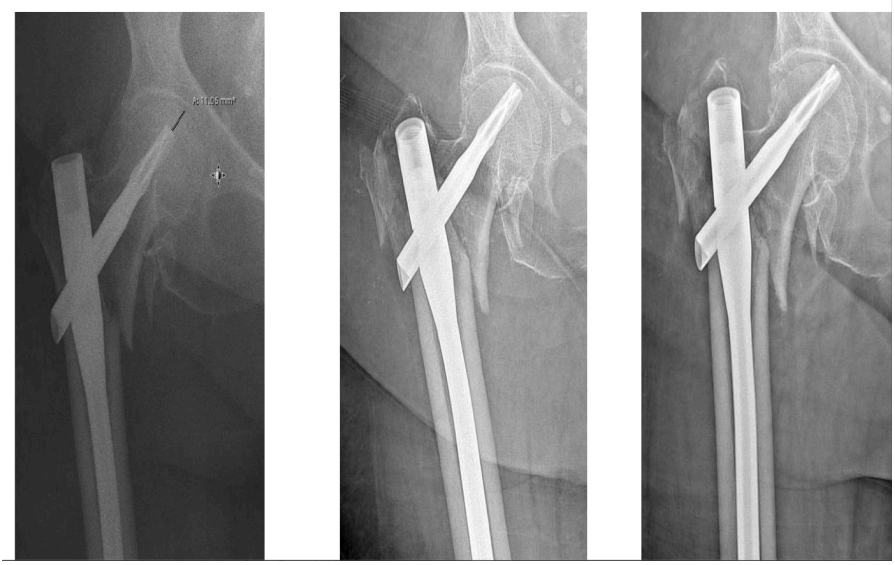
The Trochanteric Fixation Nail and Axial Migration: Tip-Apex Distance Revisited

*Stephen Flores, MD; **Adam Wooldridge, MD, MPH**; Dylan Homen, BS; Mark Jenkins, MD; Terrance Rodrigues, BS; Cyrus Caroom, MD;*
Texas Tech University Health Sciences Center, Lubbock, Texas, USA

Background/Purpose: Axial migration and eventual cut-out of a helical blade within the femoral head is a unique and rarely discussed mechanical complication seen with the trochanteric fixation nail system (TFN) in the treatment of proximal femur fractures. The use of the tip-apex distance (TAD) has previously been studied as a means to predict varus collapse and eventual cut-out in systems utilizing a lag screw design. The significance of theTAD in predicting axial migration and eventual femoral head perforation for helical blade designs has been brought into question by recent studies suggesting the need for further evaluation of this parameter in predicting helical blade cut-out.

Methods: A retrospective review of 455 proximal femur fractures treated with the TFN system from 2009 to 2013 at a single institution was conducted. Fractures were classified from plain films using the AO/OTA classification; postoperative films were rated on quality of fracture reduction, TAD (mm), Cleveland zone, and data were then analyzed for axial blade migration and cut-out in the femoral head, lateral migration, and peri-implant fracture.

Results: 324 patients met inclusion criteria. The mean follow-up was 4.5 months. The overall rate of mechanical complication was 15.7%. 16 patients (4.9%) had axial blade migration in the femoral head, 31 patients (9.6%) had lateral migration of the helical blade (10 mm), and 1 patient (0.3%) had peri-implant fracture. TAD less than 20 mm was a significant predicator of blade migration in the femoral head (P = 0.01). As compared to TAD of 20 to 30 mm, implants with TAD less than 20 mm had an odds ratio (OR) = 1.47 (P = 0.009) for medial migration.



See pages 47 - 108 for financial disclosure information.

Conclusion: Axial migration of the helical blade within the femoral head is a recognized complication of the TFN that can lead to medial perforation of the femoral head. This complication is seen more frequently than the varus collapse and superior cut-out associated with lag screw designs. Traditionally, a TAD less than 25 mm has been suggested to lower rates of cut-out with lag screw designs; however, helical blades have higher rates of medial migration associated with a TAD less than 20 mm. Placement of a helical blade with a TAD of 20-30 mm may decrease the rates of axial migration and cut-out.