Can the Use of Femoral Notch View Decrease Measurement Error of Distal Interlocking Screws After Retrograde Femoral Nailing?

David Zuelzer, MD; Jerad Allen, MD; Boshen Liu, MD; Joseph Hsu, MD; Eric Swart, MD; Paul Matuszewski, MD

Purpose: Prominent distal interlocking screws (DIS) after retrograde femoral nailing can lead to hardware irritation and secondary surgery. We sought to determine if different fluoroscopic views of the knee (anteroposterior [AP], notch, or tangential) could reduce the measurement error of screw placement during retrograde nailing.

Methods: Cadaveric lower limb specimens were used to simulate surgical procedures. 4 femoral nails were inserted in retrograde fashion (2 right, 2 left) utilizing standard technique. The DIS placed in each sample was either 2 mm short, flush, or 2 mm prominent to the medial femoral cortex. Standardized AP, notch, and tangential fluoroscopic views were obtained and compiled into an anonymous online survey and sent to 3 ACGME (Accreditation Council for Graduate Medical Education)-accredited residency programs. A total of 36 images were included in the survey. Respondents were asked to determine if the screw length on the survey was “too short”, “correct length”, or “too long.” Correct length was described as the screw tip being flush with the medial cortex.

Results: The final cohort consisted of 106 respondents (62% resident and 38% faculty). 30% of faculty were trauma fellowship-trained. Overall, respondents chose the correct length 46.75%, 52.47%, 44.37% of the time using AP, femoral notch, and tangential views, respectively. The femoral notch view was the most accurate at identifying overall screw length discrepancies compared to the AP (odds ratio [OR]: 1.26; confidence interval [CI] 1.07-1.48; P <0.005), whereas the tangential view was the least (OR: 0.91; CI 0.77-1.07; P <0.248). A stratified comparison, with the AP as the reference, shows femoral notch view was best at identifying screws that are placed flush (OR: 1.76; CI 1.29-2.40; P <0.001), and tangential view was best at identifying screws that are placed too short (OR: 6.81; CI 4.6-10.08; P <0.001). There was no difference between the residents and faculty at detecting screw length discrepancy (faculty: 49%, residents: 48%; P <0.43). No significant difference in accuracy was found between trauma faculty and residents (faculty: 51%, residents: 48%; P <0.33).

Conclusion: Differentiating lengths of distal interlocking screws on traditional imaging (AP/notch/tangential) is poor, ranging from 44% to 52% accuracy. Femoral notch view increases the odds of correctly judging screw length by 76% when compared to AP imaging. Adding the femoral notch view into standard clinical practice can minimize measurement errors and help reduce unnecessary surgery for symptomatic hardware.

The FDA has stated that it is the responsibility of the physician to determine the FDA clearance status of each drug or medical device he or she wishes to use in clinical practice.