Subtrochanteric Femur Fractures Treated With Femoral Nail: The Effect of Cerclage Wire Augmentation on Complications, Fracture Union, and Reduction: A Systematic Review and Meta-Analysis of Comparative Studies

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Objective: To perform a systematic review and meta-analysis of subtrochanteric femur fractures treated with an intramedullary nail, augmented with or without cerclage wiring, comparing the risk of reoperation, nonunion, loss of fixation, and implant failure; fracture reduction and time to union.

Data Source: A systematic review according to Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines was performed through MEDLINE, EMBASE, PubMed, Web of Science, and Scopus databases using a combination of controlled vocabulary and keywords on September 30, 2020.

Study Selection: All comparative (prospective and retrospective) studies of subtrochanteric fractures managed with intramedullary nail, that compared the addition of cerclage wire to without in patients 16 years of age or older were included. Pathological, atypical bisphosphonate, and segmental fractures were excluded, as were non-English literature.

Data Extraction: Data from each study were independently recorded by 2 investigators.

Data Synthesis: Agreement was obtained on 18 studies (all retrospective) for final inclusion, with 378 patients receiving cerclage wire and 911 without. A random-effects meta-analysis was used to analyze the pooled aggregate data.

Conclusions: There is no statistically significant advantage in using cerclage wire with femoral intramedullary nail when treating subtrochanteric femur fractures regarding risk of reoperation, nonunion, loss of fixation, and implant failure or time to union. An advantage favoring cerclage wire was seen for accuracy of fracture reduction. Cerclage wiring was used more often in cases associated with high-energy trauma. Given the relatively small number of events available to be modelled, a clinical benefit for cerclage wiring may still exist for certain fracture types.

Key Words: femur, hip fractures, femoral neck fractures, femoral nail, cerclage wire

Level of Evidence: Therapeutic Level III. See Instructions for Authors for a complete description of levels of evidence.

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INTRODUCTION

Subtrochanteric femur fractures have a predisposition for varus deformity[1,2] and are a challenge to treat because of anatomical and biomechanical reasons.[3] Cephalomedullary femoral nails have become the preferred modern implant choice.[4,5] Despite contemporary surgical techniques, subtrochanteric fractures have high rates of malreduction,[4–6] with associated complications including delayed union, nonunion, loss of fixation, and implant failure.[7,8] Reoperation rates for implant or fracture related complications in large series have ranged between 9% and 10%.[9,10]

With certain fracture patterns, in particular spiral or oblique fractures, clamp assisted reduction ± cerclage wiring are valid treatment options before femoral intramedullary nailing when closed reduction has failed.[4,10–12] The advantages of open reduction techniques are improved reduction while reaming and inserting the intramedullary nail. If cerclage wire is used, reduction may be maintained and there may be improvements in the overall stability of the construct. Although minimally invasive techniques have been developed to insert cerclage wire, a biological insult with the open approach and application occurs.[13,14] Theoretically, this has

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