Early implant survivorship for femoral neck fractures treated with the femoral neck system

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INTRODUCTION:

The femoral neck system (FNS) is a relatively new fixed angle implant designed to treat basilar, transcervical, and subcapital femoral neck fractures. It was first developed in 2018 as a minimally invasive option to provide improved angular stability and rotational stability when compared to traditional methods. Several biomechanical studies have shown that the FNS is comparable to CS and DHS fixation when looking at stiffness, load to failure, and cyclical loading. There is limited clinical literature regarding FNS outcomes due to the novelty of the implant and lack of its widespread use. The aim of this study is to describe the radiographic and short-term clinical outcomes of the FNS implant at our level one trauma center.

METHODS:

Retrospective chart review was performed on all orthopedic trauma patients who sustained an isolated femoral neck fracture at our level one trauma center between May 2019 to July 2023. Patients were included in our cohort if their fracture was fixated with the FNS and had at least a minimum of 2 month follow up. Injury radiographs were reviewed to identify garden classification. Intraoperative and postoperative radiographs were used to measure tip to apex distance (TA) as well as translation and step off seen on AP and lateral radiographs. Radiographic measurements were standardized and calibrated off of the known FNS bolt diameter. All radiographs were reviewed with one of the trauma fellowship-trained senior authors. Failure was defined as gross mechanical failure, refracture, loss of reduction, or reoperation.

RESULTS:

The FNS was utilized to treat 77 femoral neck fractures in 77 patients. 44 patients (57.1%) were female, and the mean ± standard deviation of age was 62.9 ± 19.2 years old (range, 23-97 years old, Table 1). Patients had an average follow-up of 2.0 ± 1.0 years (range, 2 months to 4 years). Regarding classification of the femoral neck fractures, 33 FNFs (43.2%) were classified as a Garden 1. The mean Tip to Apex distance in mm was 21.7 ± 7.1 (range 8.2-39.3), fracture translation distance on the lateral postoperative radiographs was 0.49 ± 1.13mm (range 0-5.7) and the fracture step-off on anterior to posterior postoperative radiographs was 0.34 ± 0.87mm (range 0-3.9). Of the 77 implanted FNS, 20 (22%) required supplemental fixation (e.g. staples, screw). At the final follow-up, 15.6% of the FNS (12 total) went on to failure, 11 of which were converted to a total hip arthroplasty. The average time to failure of 5.8 ± 5.7 months (range, 20 days to 22 months). Of the 12 failed, one was a garden 1 and two were a garden 2, the remainder were garden 3 or 4. Average Tip to apex distance of the failed group was 22.4mm, compared to 21.4mm for the intact group (p=0.61). Average translation on the lateral was 0.79mm for the failed group, compared to 0.45mm for the intact group (p=0.27). Average step off on the AP was 0.54mm for the failed group, compared to 0.33mm for the intact group (p=0.38).

DISCUSSION AND CONCLUSION:

This study is currently the largest single center study reporting the outcomes of the FNS system with 77 patients. Fixation failure was observed in 15.6% (12 patients) which is slightly higher than historical rates of cannulated screw and DHS fixation methods.