**Introduction**

Hip fractures are costly injuries from morbidity, mortality, and monetary standpoint. Approximately 20 billion dollars are spent on the management of hip fractures annually, and it is estimated that 300,000 cases of hip fractures will occur annually by 2030. Although common, treatment of femoral neck fractures with cannulated screws is not without limitations. Recent studies have demonstrated that non-union and subsequent re-operation can occur at a rate of nearly 15-20%. A new implant for treatment of these fractures called the Femoral Neck System (FNS) has emerged, however it is still novel and published literature is scant. In this study, we aim to analyze the re-operation and complication rates of the novel Femoral Neck System in comparison to CRPP for treating femoral neck fractures. Furthermore, we hope to present one year of clinical and radiographic data of patients undergoing fixation of femoral neck fractures with the FNS.

**Methods**

We conducted an IRB-approved retrospective chart review of our group’s Electronic Medical Records, followed by a prospective collection of data for one year clinical and radiographic outcomes of those treated with the FNS. Patients included in the study followed the following inclusion criteria: 1) Over the age of 18, 2) Presented with an acute Femoral Neck Fracture, 3) underwent internal fixation with either Percutaneous pinning or FNS 4) had at least 12 weeks of follow up. Patients were excluded if they had additional fixation placed around the FNS for extra stabilization of the femoral neck such as extra plates, screws, or devices.

At the 12 week follow-up, radiographic imaging and clinical evaluation was conducted to see if fracture union occurred or if any complications occurred since the procedure. We also recorded if the patient had pain with range of motion for both the FNS and Percutaneous Pinning group.

We also conducted a preliminary case series over our sample of patients that underwent internal fixation with the FNS, where we followed patients for a minimum of one year. We brought the patient back to the clinic and ordered repeat radiographs to see the progress of the prosthesis. We also measured barrel collapse by measuring from the medial end of the barrel to the medial tip of the bolt (Figure 1). The FNS construct allows for 20mm of controlled collapse, and anything less than 20mm was considered within normal limits. Then, the patients underwent range of motion tests and were given a Harris Hip Score (HHS).

**Results**

We were able to obtain follow-up data of at least 3-months on 101 patients that met inclusion criteria, 45 FNS patients, and 56 CRPP patients. The average age of both groups was comparable; 69 years for FNS and 74 years for CRPP groups. There were a total of 67 females (29/38: FNS/CRPP) and 35 males (17/18: FNS/CRPP).

***3-12 month follow up***

Of the 56 included patients that underwent CRPP, there were 9 (16.1%) patients with diabetes, 13 (23.2%) patients with Tobacco use history, and 1 (1.8%) patient with illicit drug use history. 48 (85.7%) were Garden 1 and 8 (14.3%) were Garden 2. Twenty-four (42.9%) patients were experiencing pain in the hip at the three-month follow-up. In this sample, there were 11 (19.6%) patients that experienced complications necessitating secondary surgery, with an average duration of 22 weeks following CRPP. Causes for secondary surgery following CRPP include: Painful hardware (2), Hardware loosening/screw pullout (2), non-union (3), uncontrolled fracture collapse (3) and AVN (1) (Table 1)

Of the 45 included FNS patients, there were 7 (15.5%) patients with diabetes, 11 (24.4%) patients that use Tobacco, and 1 (2.2%) patient that uses illicit drugs. 33 (73.3%) patients were Garden 1 fractures and 12 (26.7%) were Garden 2 fractures. Nine (20.0%) patients were experiencing pain in their hip at the three-month follow-up. Finally, in this sample, there were 2 (4.4%) patients that experienced complications with the device necessitating secondary surgery. One patient experienced a non-union, while another patient experienced uncontrolled collapse.

***12 month follow up***

18 (40.0%) of the FNS patients were at least one year from surgery. Of these, 10 (55.6%) patients were available for one-year follow-up data. We obtained Harris Hip Scores on all 10 patients and radiographic outcomes on 9 (one patient denied further radiographic evaluation). The average Harris Hip Score for the group was 93.3 (Range 77-100). 7 (70.0%) of patients received a Harris Hip Score of 90 or greater, indicating excellent results, with 3 (30.0%) receiving a score of 100. For the 9 patients, we were able to obtain radiographic outcomes, all 9 achieved radiographic union. Of the 9 patients, no patient had the collapse of their fracture over the 20mm of controlled collapse the FNS allows. The mean and median collapse measured was 3.74mm and 1.7mm, respectively (Range .1-15.3mm) (Figure 1).

**Conclusion**

It appears the utility of the FNS for treating femoral neck fractures is promising. In addition, monetary costs of the FNS system may be cost-effective due to the smaller incidence of reoperation found among the patients in our study. Furthermore, barrel collapse of the FNS stayed within the accepted 20mm in all patients evaluated at one year post-op suggesting the fixation of this implant is very stable.