

# OUTCOME OF 3RD GENERATION SHORT CEPHALOMEDULLARY FIXATION OF UNSTABLE INTERTROCHANTERIC AND SUBTROCHANTERIC FEMUR FRACTURES IN A GERIATRIC POPULATION: PRELIMINARY RESULTS

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## INTRODUCTION:

Several stabilization techniques exist for intertrochanteric and subtrochanteric proximal femur fractures. While stable fracture patterns can reliably be treated with Dynamic Hip Screws, unstable fracture patterns have been notoriously more difficult to treat with extramedullary devices.<sup>1</sup> Alternatives include trochanteric nails such as the Gamma Nail (Stryker) and the TFN (Synthes). Earlier generation short trochanteric nails, while allowing fixation using minimal exposure, had complications including periprosthetic fractures at the tip of the nail. Because of these complications, many surgeons favored using longer nails.<sup>7</sup> Recent changes in implant design have tried to minimize the risk of periprosthetic fractures around short nails.<sup>8</sup> The purpose of this study is to determine the short-term outcomes of patients from our orthopaedic population who have had fixation with short trochanteric femoral nails.

## METHODS:

Institutional Review Board approval was obtained before initiation of the study. We performed a retrospective review of geriatric patients who were prospectively entered into our trauma registry. Between April 2005 and December 2007, we identified 53 consecutive patients who sustained an unstable pattern peritrochanteric or subtrochanteric proximal femur fracture that were treated surgically with a short (180 to 230 mm) cephalomedullary nail (Stryker Gamma 3 or Synthes TFN). Mean age was 82 years (range 68 to 98). All of the patients were ambulatory prior to their injury. Initial history and physicals, operative reports and radiographs were examined to confirm unstable fracture pattern and pre-operative function. Follow-up radiographs were also reviewed for evidence of malunion, or hardware failure. All surgeries were performed by trauma fellowship trained orthopaedic surgeons at Beth Israel

Deaconess Medical Center within 48 hours of admission after appropriate medical assessment. Post operatively, all patients followed a standardized hip fracture pathway including permitting full weight bearing immediately post-operatively. Follow-up complications were recorded such as length of surgery, length of hospital stay, mortality, deep venous thrombosis, pulmonary embolus, wound infections, non-union, re-fracture, and re-operation. The Social Security Death Index was also utilized to determine mortality.

## RESULTS:

Average follow up was 5 months (range 1-20 months) and the mean age was 82 years (range 68 to 98). Average surgical time was 50 minutes (range 27-90). Three patients (6%) were lost to follow up. Hospital stay averaged 6 days (range was 1-22). Mortality was 5% (3 patients) with all occurrences within 40 days of surgery (including one case of heart failure, one multi-system organ failure, and one patient with a severe GI bleed). There were no cases of intra-operative mortality. Surgical complications included one wound infection, treated with IV antibiotics and three patients requiring conversion to hemiarthroplasty after screw cutout from the femoral head. There were no fractures distal to the tip of the short implant during the period of follow up.

## DISCUSSION:

Unstable intertrochanteric and subtrochanteric hip fractures can be challenging to treat. The sliding hip screw, once the treatment of choice for most intertrochanteric fractures has had complications including screw cut out and excessive leg shortening with these fracture patterns.<sup>4</sup> Cephalomedullary nails have provided improved fixation for these fractures, but they require surgeons to be familiar with the equipment and capable of reducing these fractures in a closed manner. Because they are more minimally invasive than open approaches like the DHS, trochanteric nails can be more technically demanding.

The older generation cephalomedullary nails were made of stainless steel and had a very large distal locking screw, increasing the risk of a stress riser at the tip of the nail. Newer generation nails are made of titanium and are tapered distally with the locking screw being located more proximally on the nail in an attempt to decrease the stress riser.<sup>8</sup>

Pervez and Parker describe 4 cases of technical problems in their series of 35 patients with complex proximal femur fractures treated with long gamma nails.<sup>6</sup> In this study, two

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gamma nails broke with delayed union, requiring revision surgery. These fractures occurred at the tip of the nail and at the location of the distal locking screw. Despite these setbacks, Pervez and Parker maintain that the overall fracture healing complications are better with the gamma nail when compared to other contemporary implants. They suggest that improved strength and design of the gamma nail may improve results.

An advantage of the short gamma nail in selected fracture patterns is that it requires less reaming of the distal femur for proper placement. This may lead to decreased post-operative incidence of fat and pulmonary emboli. We report no instance of either emboli in our case series. In addition, the short gamma nail allows for shorter operative and fluoroscopy time, and necessitates less blood transfusion. Utrilla et al. found no significant complications with the use of short 3<sup>rd</sup> generation cephalomedullary nails at one year follow up when compared to sliding hip screws including increased periprosthetic fractures.<sup>8</sup>

## CONCLUSION:

Data from this case series shows that 3<sup>rd</sup> generation short trochanteric nails are a safe alternative to longer nails for stabilizing complex proximal femur fractures. Post-operative complications included one wound infection and 3 femoral head screw cutouts requiring conversion to hemiarthroplasty. .

Management of geriatric unstable intertrochanteric and subtrochanteric femur fractures with a short 3<sup>rd</sup> generation cephalomedullary device is a reliable technique with an incidence of complications similar to or less than alternative plating fixation or long intramedullary nails. Newer designs of the implants resulted in no periprosthetic fractures commonly seen with older devices and we feel that third generation cephalomedullary nails can be used effectively for treating these fractures.

Weaknesses of this study include short follow up and a small study group, however we expect to report our long term results in the near future.

## References

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