EARLY OUTCOMES OF PROXIMAL FEMORAL NAIL ANTIROTATION (PFNA) FOR UNSTABLE INTERTROCHANTERIC FEMORAL FRACTURES

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ABSTRACT

Objective: To analyze the early outcomes of treatment with proximal femoral nail antirotation (PFNA) in patients with unstable intertrochanteric femoral fracture.

Study Design: Retrospective cross-section study.

Place and Duration of Study: Pakistan Naval Ship (PNS) Shifa Hospital Karachi, from Jan 2015 to Dec 2016.

Methodology: Non-probability convenience sampling was used to include unstable intertrochanteric femoral fractures which were treated with proximal femoral nail antirotation. Outcomes were measured in terms of operating time, per-operative blood loss, postoperative weight bearing and complications.

Results: A total of 35 patients were analyzed. Mean age was 69.7 years (range 48-91, standard deviation (SD) ± 2.28). There were 18 males (51.4%) and 17 females (48.6%) patients. Majority of fractures were Arbeitsgemeinschaft für Osteosynthesefragen/Association for the Study of Internal Fixation (AO/ASIF) type 3-1-A-2.3 and were seen in 16 patients (45.7%). Average operative time was 39.8 minutes (range 20-85 minutes SD ± 12.38). Mean intra-operative blood loss was 27.7ml (range 15 to 45 ml SD ± 9.18). Two patients (5.7%) had superficial surgical site infection. Post-operatively 16 patients (45.7%) were mobilized full wight bearing with support and 18 patients (51.4%) were mobilized partial weight bearing. Results of current study are quite promising as all fractures subsequently healed without significant complications.

Conclusion: Proximal femoral nail antirotation is asuitable implant for unstable intertrochanteric femoral fractures as it is minimally invasive, has no significant blood loss and being intra-medullary early post-opweight bearing can be started.

Keywords: AO classification, Intertrochanteric femur fractures, Proximal femoral nail anti-rotation.

INTRODUCTION

Elderly patients are prone to fracture even after trivial injury resulting in increasing trend of hip fractures and the incidence of hip fractures has also increased in elderly as life expectancy has increased[1-3].

Intertrochanteric fractures represent about half of the hip fractures[4]. Conservative management and confinement to bed can lead to systemic and local complications including chest infection, pressure sores and deep venous thrombosis[5].

In order to achieve early recovery operative treatment is recommended, unless contraindicated. Choice of implant depends upon the fracture pattern. Fractures AO/ASIF group classifies these fractues in three types 31A1, 31A2 & 31A3 each having further 3 subtypes[6]. 31A1.1 through 31A2.1 are considered stable fractures and 31A2.2 through 31A3.3 are considered unstable fractures. Various intramedullary and extramedullary devices are in use for the treatment of intertrochanteric fractures[7], Dynamic Hip Screw (DHS) has been gold standard especially for 31A1 fracture[8], but there are higher complications reported with DHS in unstable (31A2 and 31A3) fractures e.g., prolonged surgery duration, bleeding, cut-out, malunion and non-union[9,10]. Therefore with advances in design, cephalomedullary implants have become popular for unstable fractures, however, there are variations in functional and radiological outcomes of different devices.

In 2004 PFNA was introduced by AO/ASIF for the treatment of unstable fractures particu-

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larly in the absence of medial buttressing to improve the rotational and angular stability which decreases the varus collapse.

The PFNA is intramedullary with a single spiral blade having large surface area which gives maximum purchase in cancellous bone especially in osteoporotic patients. PFNA blade decreases bone loss which occurs during drilling and reaming for sliding hip screw. Another advantage of PFNA is less invasive technique with stable fixation and less blood loss.

Biomechanical tests have shown that PFNA blade has higher cut out resistance as compared to other implants[10].

PFNA is a relatively new implant in our setup (figure), therefore this study was conducted to evaluate the early clinical results of PFNA in our population.

METHODOLOGY

This retrospective descriptive studywas done for the period from January 2015 to December 2016 in PNS Shifa Hospital which is a tertiary care armed forces hospital. Non-probability convenience sampling was used to include all patients presenting with intertrochanteric femoral fractures 31A2 and 31A3 and treated with PFNA during the study period. Patients with previous surgery on the same limb, revision surgery, neck of femur fractures and 31A1 fractures were excluded.

Out of the initially included 40 patients, 5 were subsequently excluded based upon exclusion criteria and 35 patients were finally inducted in the study. Data was collected on a proforma usinghospital record, outpatient clinical notes and X-rays. Demographic data, site, mechanism of injury were noted. Co-morbids, American Society of Anesthesiologists (ASA) grading, per-operative blood loss and operative time were also noted from anaesthesia notes. Data was analyzed using IBM SPSS version 20.0. Mean and SD were calculated for quantitative data i.e., age, blood loss and operative time, while frequencies were calculated for qualitative data i.e., gender, site, fracture type, ASA grading, post-op mobilization and compliations.

For surgery, patients were positioned supine on traction table. Reduction was doneunder fluoroscopy and confirmed on both Anterio-posterior (AP) and lateral views. Small 5 cm incision was given proximal to greater trochanter, 3.2mm guide wire was introduced though the tip of greater trochanter into the medullary canal of femur. Proximal femur was reamed with 17mm reamer, the canal diameter was measured at the level of isthmus and appropriate length of PFNA was introduced. The PFNA blade was inserted through the jig by light blows with the hammer. Blade position was considered good if it was central or inferior in Anterio-posterior view and central in lateral view[11-14].

Post operative radiographs were done on 1st postoperative day, 6 weeks after surgery and thereafter, at 3-month intervals in the outpatient clinic. The follow-up period was upto 6 months

Figure: Preoperative and post-operative radiograph of unstable intertrochnateric fracture treated with proximal femoral nail antirotation.

post op. Weight bearing as tolerated was advised considering the general health and comorbids. Post-operative outcome including weight bearing status and union were noted as well as those patients whose full record was not available were called to hospital for follow-up.

RESULTS

Thirty five patiens were analyzed. Mean age was 69.7 years (range 48-91 years SD ± 2.28).

There were 18 (51.4%) males and 17 (48.6%) females. Mechanism of injury in all patients was low-energy trauma by a mechanical fall. Majority of the fractures were AO type 3-1-A-2.3 seen in 16 (45.7%) patients followed by type 3-1-A-2.2 seen in 15 (42.9%) patients. Right side was fractured in 12 (34.3%) patients and left side in 23 (65.7%) patients. Twenty seven patients were ASA class 3 (77.1%) and 8 patients were ASA class 2 (22.9%). Average time of surgery was 39.8 minutes (range, 20-85 minutes, SD ± 12.38). Mean intra-operative blood loss was 27.7 ml (range 15-45 ml, SD ± 9.18). Closed reduction of the fracture was achieved in all patients. On Ist Post-Operative Day (POD) 16 (45.7%) patients were mobilzed full weight bearing with support, and 18 (51.4%) patients were mobilized partial weight bearing as tolerated. One patient (2.8%) was kept non weight bearing because of morbid obesity. All patients were full wight bearing at 6 weeks post-operatively. Two patients (5.7%) had superficial surgical site infection, but did not require debridement (table). Results of current study are quite promising as all fractures healed without any significant complication.

Table: Complications.

Complication	No. of patients
Superficial Surgical Site infection	2 (5.2%)
Per operative Fracture	None
Varus Collapse	None
Spiral blade Cut out	None
Implant Failure	None
Non-union	None
Mortality	None

DISCUSSION

Incidence of hip fractures is increasing in elderly population[15] with intertrochanteric fractures being one of the most common injury in elderly[16]. Stable internal fixation and early mobilization remains the main objectives in the treatment of intertrochanteric fractures, thus reducing the risk of morbidiy and mortality[17,18]. Unstable fracture pattern and poor bone stock are prone to fixation failure, technically difficult and real challenge to the surgeon while considering the implant[19]. Many implants have been designed over the years but all have significant complications especially in unstable fractures. With the recent advances in implant design, intramedullary implant PFNA has been introduced and found to be better implant in terms of less blood loss, operative time and post-operative weight bearing status as compared to conventional implant sliding hip screws.

Cho *et al*[20] compared Dynamic hip screw and Proximal femoral nail antirotation for fixation of stable type A1 intertrochanteric fractures and found less operative time, blood loss and postoperative pain in PFNA group. Similarly Weiguang *et al*[21], compared DHS and PFNA for stable fractures and concluded less orthopaedic and non-orthopaedic complications in PFNA group. In meta-analysis Ma *et al* reported higher incidence of re-operations in DHS group[22].

Biomechanically Strauss *et al*[23], concluded that helical blade is better than standard sliding hip screw as it has greater cut out resistance as compare to lag screw. Mereddy *et al*[24], conducted study over 62 patients treated with PFNA, they found no infection and non-union, all fractures healed. Similarly in our study all fractures healed without any non-union.

In different studies[24,25], authors reported better outcomes with PFNA in terms of less blood loss, early mobilization and less complications which are comparable with our results with less blood loss and complications.

CONCLUSION

PFNA is a suitable implant for unstable intertrochanteric femoral fractures 31A2 and 31A3 because ofbeing minimally invasive and especially becauseearly mobilization and weight bearing can be started which is a main objective of fixation. The minimal invasive technique requires less tissue dissection and therefore the blood loss is not significant. However further prospective multicenter randomized controlled trials should be done with follow-up of at least of 1 year to assess long term functional outcome of PFNA in our population.

CONFLICT OF INTEREST

This study has no conflict of interest to be declared by any author.

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