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Original Research Paper

Orthopaedics

COMPARISON OF OUTCOME OF INTERTROCHANTERIC FRACTURES TREATED WITH DYNAMIC HIP SCREW VERSUS PROXIMAL FEMORAL NAIL

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ABSTRACT We retrospectively analysed 148 patients with intertrochanteric femoral fracture treated using either the dynamic hip screw or the proximal femoral nail & compared functional and radiological out come. Patients with PFN($n = 74$) had recovered their pre-operative walking ability significantly($p < 0.05$) more frequently at the six-month analysis than those with DHS($n = 74$).Peri-operative or immediate post-operative parameters did not vary between groups. Functional outcome was analysed using Harris Hip Score and radiological findings were compared at 3, 6, and 12 months postoperatively. The DHS permitted a significantly larger compression at the fracture site during the follow-up evaluations, but union at the fracture site was comparable between the two groups.3 major failure of reduction were reported in each group, resulting in a total of 6 revision operations. We can conclude from our study that the PFN results in sooner postoperative recovery of walking ability as compared to DHS in short-term.

KEYWORDS : Intertrochanteric Fractures, Dynamic Hip Screw, Proximal Femoral Nail

INTRODUCTION

Increased age of the population has led to rising incidence of intertrochanteric femoral fractures in past few years.[1,2] The aim of treatment remains strong fixation which permits rapid & early post-op mobilisation. The quest for satisfying this aim has led to developments of many intramedullary nails. The status of dynamic hip screw as gold standard has been challenged due to these nails.The pros and cons of the Gamma nail have been analysed in prior studies.[3] Literature concerning comparison of PFN versus DHS are few and scare.[4,5] Also, the primary aim of these studies was targeted towards technique and results or the overall patient rehabilitation.[6] The pertinent question remains that does there exist a difference in the outcomes of patients treated with these 2 implants. Hence, we planned he study to evaluate the patients' post-operative recovery in patients with intertrochanteric femoral fracture after use of either DHS or PFN in a retrospective study of 148 patients.

Patients and Methods

Between August 2016 and May 2019, 148 patients with extracapsular intertrochanteric femoral fractures who were treated with the dynamic hip screw or the proximal femoral nail were analysed. Patients were included only after signed informed consent and ethics clearance. Inclusion criteria was all patients with extracapsular intertrochanteric femoral fractures and only those with pathological fracture or multiple injuries were excluded. Routine protocol included radiographs of pelvis with bop hips AP and Lateral view. Since it was a retrospective study there was no way to determine which implant was used for which patient. Capability to walk was divided into 3 categories: capable of walking independently without any external aids, capable of walking independently but with the help of crutches or frame and capable of walking only when being supported by atleast one more person. All the patients who utilised a walking stick were still considered as independent walkers.

Standard operative protocol was followed for all patients. Technique and precautions mentioned in the instruction manual supplied by the manufacturer were properly followed. All patients were injected with prophylactic and post-op intravenous antibiotic. Plain anteroposterior (AP) and lateral radiographs were done post-operatively, and evaluated for quality of reduction and implant positioning. Reduction qualified to be good if the medial continuity at the calcar was reinstated. The perfect position for the Richart Screw for the DHS and was considered as being centro-central on the AP and lateral radiographs (Figs 1 and 2).

Fig. 1a: Post-operative Antero-posterior radiograph of Right sided Intertrochanteric femur Fracture treated with Proximal Femoral Nail

Figure 1b – Post-operative Lateral radiograph of Right sided Intertrochanteric femur Fracture treated with Proximal Femoral Nail

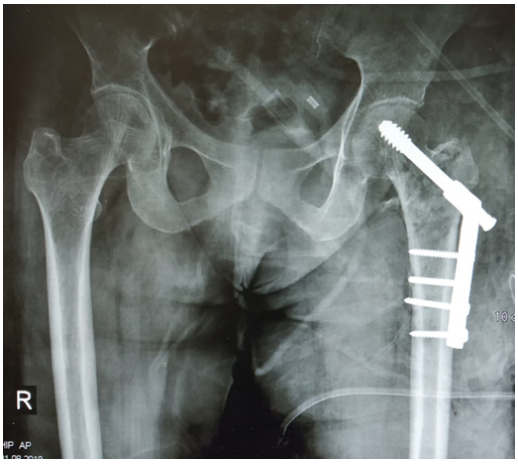

Figure 2a: Post-operative Antero-posterior radiograph of Left sided Intertrochanteric femur Fracture treated with Dynamic Hip Screw

Fig 2b: Post-operative Lateral radiograph of Left sided Intertrochanteric femur Fracture treated with Dynamic Hip Screw

Weight-bearing as per pain tolerance was allowed from the first post-operative day. The same post-op rehabilitation protocol was followed regardless of mode of fixation/type of implant.

The patients were discharged from Hospital after dose of intravenous antibiotics and mobile painlessly. Follow-up analysis was done at 3,6 and 12 months post-operatively. Routine AP and lateral radiographs of the hip were done as part of standard routine protocol. All alterations in the implant position and fracture alignment, on comparison with the immediate post-operative radiographs were noted. Capability to walk was noted at each visit. The statistical analysis was performed using GraphPad Software for Windows.

The Odds ratios was calculated with confidence intervals (CI) set at 95%. P values were calculated with independent samples *t*-test and Fisher's exact test; values of $p < 0.05$ were considered to be significant.

RESULTS

As per records, the mean blood loss for the surgeries was 289 ml (70 to 1100ml), and the mean number of transfused blood units (350 cc/unit) during the stay was 1.6 (0 to 5). Most commonly (140 out of 148, 95%) spinal anaesthesia was used. Fracture reduction was classified as good in 101/148 patients (68.24%), and the implant position was considered ideal in 119 (80.4%) of the radiographs. The patients were discharged at a mean of 7 days (3 to 18) post-operatively. One death was noted during the hospital stay from aspiration. Nine complications were noted at the follow-up visit. There were 3 cases of displacement of the fracture in both groups. All six patients needed revision surgery. One post-op PFN patient was diagnosed with heterotopic ossification. Yet this anomaly had no impact on the post-op rehab and capability of walking was recovered at six months. There was no incidence of superficial or deep wound infections, or deep vein thromboses. At follow-up of six months, 131 (88.5%) of the original 148 patients were evaluated. Of the 17 ineligible patients, one died during hospital stay and another six died during follow-up period. 10 patients were lost to follow-up. The six patients who required revisions were excluded, and hence the eventual analysis was performed for 121 patients.

The mean compression at the fracture site, evidenced by femoral neck shortening, was 3.1 mm (0.5 to 26), with a statistically significant difference between the groups. The mean femoral shaft shortening was 2.9 mm (0.7 to 21), when measured from the AP radiographs.

At 6 months follow-up, 42 (28.37%) patients were capable of walking independently, 62(41.9%) required external aid in the form of crutches, and 27 (18.2%) were incapable of independent walk. We found out that the recovery of walking capability was attained more frequently in those patients who were operated with a PFN (79.7%) compared with those operated with a DHS (57.2%) This difference was statistically significant ($p = 0.040$).

At 3 months follow up, it was noted that the functional outcome calculated by utilising the Harris hip score in patients operated with DHS implant scored an average of 34.41 in comparison to those operated with PFN implant who fared better with a score of 54.51 and this finding had statistical significance ($P=0.001$).

Scores increased to 63.2 and 88.1 for patients with DHS and PFN implants respectively at 6 months follow up ($P=0.001$). But at 12 months follow-up, the average Harris hip score for the patients in the DHS group increased to a value of 88.67 in comparison to the patients with PFN implant which in turn increased to 91.07. There was no statistically significant difference between the two groups ($P=0.31$).

DISCUSSION

The principle of DHS is backed by its biomechanical properties which are supposed to enhance fracture healing.[11] Currently, the Gamma nail (Stryker Howmedica, Freiburg, Germany) reports the lengthiest follow-up studies.

The intial design of the nail had reported risk of both intra-operative and post-operative complications in several studies[13,14] despite the fact that satisfactory healing rates have been reported.[12] Some Recent meta-analyses have recommended the use of DHS for the treatment of intertrochanteric fractures.[15,16] The PFN which was developed as a viable alternative to the Gamma nail appears to have lesser associated complications.[17]

One randomised controlled trial of the PFN involved 168 patients, wherein several intra-operative, radiographic and clinical parameters were analysed and compared between the DHS and PFN after a one-year follow-up.[18] Comparable to our results, 87 (51.8%) of patients were capable of walking independently.

Although there was no statistically significant difference between mean pre- and post-operative scores of function and mobility between the two treatment groups, it was found that there was an increase by 1.5 times in the score for social function during follow-up in the PFN group compared with the DHS group. Also, there was greater reduction in the score for mobility in the patients treated with PFN. But the statistical significance of this finding, as well as the power of the study, were not found.[18] The conclusions from that study that can be drawn state that the use of DHS implant may allow more patients to return to their previous level of activity.[18] In contradistinction, patients in our study operated with a PFN recovered their pre-operative walking capability at six months significantly more frequently than those treated with a DHS. It proposes that the use of a PFN may lead to early restoration of function in the elderly population in comparison to a DHS. Possible justification maybe that the significantly larger impaction of the fracture in the DHS group causes shortening of the femoral neck. It is plausible that substantial compression at the fracture site may alter the hip biomechanics and inhibit the recovery of the capability to walk. Post-op mobilisation was similarly successful for both groups eventually, which suggests that the differences between the implants are not significant in the long term. Furthermore, the lack in the PFN group of the kind of compression seen in the DHS group did not appear to limit the fracture healing.

Irrespective of the implant which was used around 90% of patients had good functional scores at 12month follow-up. This finding of our study is in agreement with the results from retrospective studies done by Banan et al,[19] Al-Yassari et al[20] and Simmermacher et al[8] who also observed recovery of pre-operative mobility in approximately 40% to 50% of the patients operated with PFN. Similarly, studies report comparable results in the use of DHS and a Gamma nail.[14,21] It therefore seems rational to expect around half the patients with an intertrochanteric fracture to recover their pre-operative functional status at the time of fracture healing, regardless of the implant used. Still, some studies quote superior results.[4]

With regards to other parameters, failure of fixation of the fracture occurred in similar number of patients in both groups. The femoral shaft fracture at nail tip is a known complication linked with the intramedullary nails in the treatment of proximal femoral fractures. We had no such complication in our patients but a shorter follow-up may account for it. A common issue in previous studies, similar to ours, is the attrition rate due to withdrawal. This could in part be attributed to the geriatric population under study. In our study, 17 patients lost to follow-up had expired or were too ill to return to Hospital. Even though the attrition rate may introduce some amount of bias in the analysis, when the overall recovery is evaluated, the results analysis is not changed.

CONCLUSION:

We can safely conclude that utilising the PFN implant in the treatment of intertrochanteric femoral fractures tends to have a positive impact on the speed of recovery of walking, on comparison with patients operated with DHS implant. The explanation for this lies in the well reinstated anatomy of the hip. The basis for future larger sample size studies lies in determining the superlative implant for the management of these fractures.

Conflict of Interest: None

Acknowledgements: None

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