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CLINICAL

The Clinical and Radiological Outcomes of the Cephalomedullary Femur Nailing in the Intracapsular Neck Femur Fractures.

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ABSTRACT

Purpose- To study the clinical and radiological outcomes of the cephalo-medullary femur nailing in intra-capsular neck femur fractures. Background- fracture neck of the femur is still a challenge for modern orthopaedic surgeons due to the intra-articular nature of the fracture and the vulnerable blood supply of the femur neck leading to avascular necrosis of the femur head. These fractures are mostly surgically treated due to the risk of nonunion, avascular necrosis, and complications associated with prolonged bed rest. Materials and Methods- This is a retrospective study that evaluated clinical and radiological outcomes of intra-capsular neck of femur fracture treated with cephalo-medullary nailing. Patients in the age group 30 to 60 years with clinically and radiologically diagnosed intracapsular neck femur fractures mainly transcervical and basicervical variety, associated ipsilateral subtrochanteric or shaft femur fractures, presented early to the hospital (within 7 days) were included in this study. Patients presented late (more than 7 days), Subcapital variety of the neck femur fracture, comminuted neck femur fractures, pre-existing hip deformities such as Covavara or Coxavalga, and any compound fractures of the femur neck were excluded. Patient-rated outcome measure scores (Harris hip score) were evaluated at the 1, 3, and 6 months. Results- We evaluated 30 patients with a mean age of 47.7±6.5 years (32-59 years). The postoperative Harris hip score at the last follow-up visit was 76.77±7.34. The postoperative follow-up was 6 months. 77% of patients had fair to excellent clinical scores and 70% (n=21) of the patients showed radiological union. The complication of avascular necrosis of the head of the femur was seen in 6.6 % of patients (n=2). Conclusion- The use of cephalomedullary nail for the treatment of intracapsular neck femur fracture yields satisfactory clinical and radiological results and is a safe and effective option.

KEYWORDS

Title- The Clinical and Radiological Outcomes of the Cephalomedullary Femur Nailing in the Intracapsular Neck Femur Fractures.

Introduction

The intracapsular neck femur fracture (ICNF) remains a puzzling fracture for orthopedic surgeons in terms of treatment and outcomes, even after the development of advanced surgical techniques and implants. These fractures are known to cause a high rate of non-union (10-30%), osteonecrosis of the head of the femur (10-45%), and reoperation (5-45%) [1][2]. The incidence of nonunion is significantly reduced by early anatomical reduction, impaction of fractures, and rigid internal fixation [3] The treatment modality for femur neck fractures is based on the age of the patient, duration of the injury, the activity level of the patient, degree of displacement and degree of osteoporosis [4]. The

prognosis is still being studied, as the patient presents several weeks after the injury, often with resorption of the neck and rarely with radiological signs of avascular necrosis of the femoral head.[3,4] A fracture that could be fixed by means of interfragmentary compression (lag effect) shows absolutely no movement between the fracture fragments.[6] In contrast, a fracture that has only been splinted will always demonstrate the movement between the fragments even if of only microscopic dimensions [7-9]. In proximal femoral nailing, a cephallomedullary nail, the interfragmentary compression is achieved by head screws and splinting is given by an intramedullary nail in the femoral shaft. [4,8]

Materials and Methods-

Patients in the age group 30 to 60 years with clinically and radiologically diagnosed intracapsular neck femur fractures, mainly transcervical and basicervical variety, associated ipsilateral subtrochanteric or shaft femur fractures, presented early to the hospital (within 7 days) treated with cephalomedullary femur nail during 2019 to 2020 were included in this study. All surgical stabilizations were performed by trained surgeons. Ten patients were excluded from the study due to severe comminution at the posteromedial part of the femur neck (5), sub-capital ICNF (4), and compound fracture neck of the femur (1). These patients were treated with total hip replacement in the young and hemiarthroplasty in older patients, canulated cancellous screws, and external fixator respectively, and their evaluations were excluded. The 30 included patients treated with cephalomedullary femur nails were evaluated in this study.

This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by the Ethics Committee of the BJ Government Medical College and Sassoon Hospital, Pune, India. All the medical records were reviewed for demographic data, relevant clinical and radiological findings, follow-up patient-reported outcome (PROM) scores [Harris Hip score], range of motion of the hip joint, complications of the surgery, and post-operative radiographs for evidence of union of the fracture. Follow-up functional scores were graded as poor, fair, good, and excellent.

Results-

This study included 30 patients with an intracapsular neck femur fracture. The Mean age of the study sample was 47.7 years (standard deviation – 6.49 years), with the highest at 59 years and the lowest at 32 years. There were 23 (77%) males and 7 (23%) females in the study subjects. 1 sample belong to the age group 31 to 35, 4 samples were from the age group 36-40, 5 samples were from 41-45, 9 samples were from the 46-50 years age group followed by 7 subjects in 51- 55 years age group, 3 samples were from age group 56-60. 23 (77%) subjects were having a history of road traffic accidents (RTA), while 7 (23%) subjects were having a history of domestic falls. 16(53%) subjects were having left side while 14 (47%) were having right side fracture neck femur. 14 (47%) of subjects were having basic cervical fractures followed by 12 (40%) subjects with a trans-cervical type of fracture neck femur.1(3%) of subjects were having transcervical neck femur fractures with ipsilateral shaft femur. 3 (10%) subjects were having basicervical neck femur fractures with ipsilateral subtrochanteric femur fractures. The mean duration of surgery to insert the proximal femur nail was 76.80 minutes with a standard deviation of 8.84 minutes, with a maximum of 93 minutes and a minimum of 54 minutes. Average blood loss during PFN insertion surgery was 76.83 ml with a standard deviation of 59.60 ml, with a maximum of 320 ml and a minimum of 40 ml. On application of paired t-test, there was an increase in mean Harris hip score at the regular interval following surgery and the difference was statistically highly significant ($p = 0.000$). 16 (53.3%) subjects were having no complications following surgery, pressure sore (4), shorting of limb (4), DVT (1) & screw cut out (2), and infections (2) were reported in subjects following surgery. The average duration for full weight bearing on the operated joint was 71.73 days with a standard deviation of 10.73 days, with a maximum of 96 days and a minimum of 56 days. 12 (40%) subjects were having fair results following surgery while 10 (34%) with good results. 1(3%) subject had excellent results. 7(23%) subjects had poor results according to Harris hip scoring (Table1, Fig:2, Table2, Fig:3). Total 21 patients showed union of fracture at last follow-up (Fig: 4a, 4b). 13 (43.3%) subjects were having no late complications following surgery, non-union (9), knee stiffness (5), avascular necrosis with non-union (2) & AVN (1) were reported in subjects following surgery.

Figure1: fracture classification of the intracapsular neck femur.

Table 1: Harris Hip score at various follow up visits.

Figure 2: Harris Hip Score at 3 follow up visits.

Table 2: Paired differences at 1-3 and 3-6 month of Harris Hip Score

Figure 3: Functional score grading.

Figure 4: (a and b) Anteroposterior and lateral radiographs showing union of fracture site with cephalomedullary nail inside.

Discussion

The femoral neck fracture is a special fracture for which there are a number of methods of osteosynthesis (Tronzo 1974) [9]. The main reason observed is the high frequency of complications including non-union, and avascular necrosis, which often requires secondary surgical procedures. [10] Controversy always exists regarding prosthetic replacement versus internal fixation. [11] Nicoll in 1963 identified the effectiveness of routine use of prosthesis in fresh fracture neck femur having a higher rate of complications. [12] Boyd and Salvatore (1964) compared the results of femoral neck fractures treated by endoprostheses or internal fixation and described that no prosthesis is better than the patient's own femoral head.[11] so, the routine use of prosthesis replacements in fresh femoral neck fractures is not justifiable except in a small group of older patients with short life span. [10,11,12]

In the study by Chandra Prakash Pal et al [13], a total of 22 patients with fracture neck femur were operated on and fixed with a proximal femoral nail. The age of the patients varied from 20 years to 65 years of which 14 patients were male and 8 were female. Transcervical femoral neck fracture was present in 19 (86.38%) cases while the rest 3 (13.62%) had basal type femoral neck fracture. (54.6%) of the patients were operated on within 2 weeks of the injury. In isolated fracture neck femur, we used short proximal femoral nail (PFN) while we used long PFN in associated ipsilateral trochanteric fracture. The duration of the surgery in 91% of the patients was within 90 minutes. Postoperative knee mobilization exercises were started on the second postoperative day in 91% of the patients while in the rest 9% it was started in one week. In the same study, partial weight-bearing walking with the help of a walker was started in the first week in >80% of the patients after the surgery. Full weight bearing was started within 6 weeks in 81% of cases. In two cases weight bearing was encouraged late due to posterior comminution. Sixty-three percent of cases of our study presented with the nonunion and 37% showed osseous union of which 3 were of a basal type and 5 were of transcervical type. out of the 22 patients assessed in the study according to Harris hip score (HHS); only 27.24% of cases showed good results whereas 63.56% of cases showed poor results. Results based on the anatomical type of the fracture showed the basal type of fractures with good results of the union while 73.68% of the transcervical type of fractures showed poor results. Fair results were seen in 10.25% while only 15.26% of the patients showed good results in a transcervical type of fractures.

In our study when compared to the above study, 30 patients with fracture neck femur were operated on and fixed with the proximal femoral nail. There were 23 (77%) males and 7 (23%) females in the study subjects. This suggests the increased incidence of fracture femur neck in the male gender. 14 (46%) of the subjects were having basic cervical fractures followed by 12 (40%) subjects with a trans-cervical type of fracture neck femur. 1(3%) of subjects were having transcervical neck femur fractures with ipsilateral shaft femur. 3 (10%) subjects were having basicervical neck femur fractures with ipsilateral subtrochanteric femur fractures. The sub-capital type of fracture neck femur was not included in our study. This shows an increase in the incidence of basicervical femur neck fractures. The mean duration of surgery to insert the proximal femur nail was 76.80 minutes with a standard deviation of 8.84 minutes, with a maximum of 93 minutes and a minimum of 54 minutes. The average amount of blood loss in our study is around 77ml. The duration of the procedure is an average of 76.8 minutes compared to the given study with 90 minutes mean. Postoperatively knee mobilization exercises were started immediately on the second postoperative day in 93% of the patients while in the rest 7% it was started on the 5th day. In our study, partial weight-bearing walking with the help of a walker was started in the first week in >87% of the patients after the surgery. This suggests early mobilization of the study population can be successfully encouraged in the first week compared to the previous study. 89% of our study population can do full weight bearing in the second month of our study. In our study population of 30 subjects, 19[63%] subjects had bony union whereas 11 [37%] subjects had poor results of non-union, and among subjects with a union, 13 [68.4%] are of basicervical type of neck femur fractures,5 subjects [26%] are of the transcervical type of femur neck fractures and 1 [5.2%] subject had basicervical with ipsilateral subtrochanteric fracture. High rates of the union are observed in basicervical types of femur neck fractures. Union is 92.8% among basicervical femur neck fractures. 12 (40%) subjects were having fair results following surgery while 10 (34%) with good results. 1(3%) subject had excellent results. 7(23%) subjects had poor results and (3%) one patient had an excellent prognosis as per the system used by Harris hip score

(HHS).

Conclusion

Cephalomedullary femur nailing is highly effective and beneficial in the basal type of fracture and in those types of transcervical fractures which are associated with an ipsilateral subtrochanteric fracture in young population, acute trauma presentation, viable femoral head, and no posterior comminution at the fracture site. The use of cephalomedullary nails for the treatment of intracapsular neck femur fracture yields satisfactory clinical and radiological results and is a safe and effective option.

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Conflict of Interest

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