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Research Paper

Study of Results of Trochantric Femoral Nail (TFN) for the Treatment of Inter Trochanteric Fracture of Femur

Medical Science

KEYWORDS : Fracture; Hip; Intertrochantric; TFN

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ABSTRACT

The Trochantric femoral nail (TFN) is a new device designed for the treatment of the trochantericfemoral fracture. All patients presenting to our department with Inter trochanteric fractures were treated operatively using theTFN.A total of50patients were included in the study and were followed up to fracture union or fixation failure. A case documentation form and follow-up form were used to collect the data which included the Salvati and Wilson assessment of hip function.

All fracturesunited at the time of final follow-up. The femoral neckscrews cut throughin 3 patients two of them requiring removal. Haematoma formation in 1 patient inpatient,Superficial wound infection1 patient andDelayed wound healingin 1 patient

Eighty -eight percent of the patients at the final follow-up scored>20 points (out of 40 points), using the Salvati and Wilson hip function scoring system. According to the patients and/or their careers, outcome was described as good or very good in 94% of the patients and the level of function was similar to pre-injury level in80% of the patients.

We conclude that theTFNis a useful device in the treatment of the Inter trochanteric femoral fracture.It is a relatively easy procedureand a biomechanically stable construct allowing early weight bearing.

1. Introduction

Trochanteric femoral fracture is common in elderly patients. The unstable fracture (fractures 31-A2 and 31-A3, AO/ASIF classification) can be difficult to manage, particularly in non- compliant patients with implant failure and other complications being relatively common. Conservative treatment of such injuries is also not without serious complications. There are a large number of devices for operative treatment. They can be divided into two groups: extra medullary and intra medullary devices.

Biomechanical studies show that screw intramedullary nail devices are more stable under loading[1],with a shorter lever arm, but some earlier hip screw intramedullary nail devices were associated with significant number of femoral shaft fractures below the nail and with technical failure[2,3], for these reasons proximal femoral nailing has never become a popular procedure in the UK and most unstable trochanteric femoral fractures are still treated with along plate sliding hip screw or other extramedullary devices.

Wolfgang et al.reported a 19% mechanical and technical complication rate with unstable trochanteric fracture treated with plate sliding hip screw device[4]. The TFN is designed to overcome the problems encountered with other earlier intra medullary devices.

2. Methods and materials

We conducted a study to asses the role of TFN for the treatment of Inter trochanteric fractures in a Sri Aurbindoo Medical college & P.G.Institute. Between January 2012 and January 2014, all patient presenting with an Inter trochanteric fracture were included (fractures 31-A2 and 31-A3, AO/ASIF classification). The PFN was developed by AO/ASIF. It consists of a 180mm long nail. The distal part of the nail is availablein8, 9, 10, 11 or12 mm diameter and its proximal part is 17mmin diameter. The angle between the two parts measures 6◦and is situated at 11 cm from the top of the nail. Two screws can be inserted through the proximal part, an11mmneckscrew and a 6.5mm anti-rotation screw. Distal locking can be static or dynamic. The tip of the nail is specially shaped to reduce stress concentration.

Fifty patients were included; all were treated operatively using the TFN .Data was collected from history, examination and X-ray films.

Salvati and Wilson hip function scoring system [5]

Pain
0 = Constant and unbearable, frequent strong analgesia
2 = Constant but bearable, occasional strong analgesia
4 = Nil or little at rest, pain with activities
6 = little pain at rest, pain on activity
8 = Occasional slight pain
10 = No pain

Walking
0 = Bedridden
2 = Wheelchair
4 = Walking frame
6 = One stick, limited distances up to 400 yards
8 = One stick, long distances
10 = Unaided and unrestricted

Muscle power and motion
0 = Ankylosing and deformity
2 = Ankylosing with good functional position
4 = Poor muscle power, flexion <60◦, abduction <10◦
6 = Fair muscle power, flexion 60–90◦, abduction 10–20◦
8 = Good muscle power, flexion>90◦, abduction >20◦
10 = Normal muscle power, full range of movement

Function
0 = Bedridden
2 = House-bound
4 = Limited housework
6 = Most housework, can stop freely
8 = Very little restriction
10 = Normal activities

The Salvati and Wilson hip scoring system was used at follow-up assessment[5].The AO/ASIF fracture classification system and the Singh osteoporosis grading system were used[6, 7].A fracture table and image intensifier were used in all cases. All

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patients received three doses of prophylactic intravenous antibiotics. The nail was inserted as standard technique. Patients were mobilized on 3rd day onwards. Partial or full weight bearing was allowed as decided by fracture geometry and quality of fixation. Patients were followed up at 2 week, 1 month and 3 moth and then at 6 month and 1 year. Fracture healing was assessed clinically and radio logically. . Radiographic assessment was performed before and after the operation and at time of follow-up. The average follow-up period was 6 months (range 3–12 months).

3. Results

Fifty patients were followed up for results. There were 32males and 18females; the average age was 70 years (S.D. 10.7 years). Before the injury, 90%of the patients were walking independently. History of fall was the commonest mode of injury. 22 fractures were type 31-A1, 16 fractures were type 31-A2 and11 was type 31-A3.

AO/ASIF	31-A21	31-A22	31-A23	Total
Singh 1				
Singh 2	03			03
Singh 3	06	04	03	13
Singh 4	04	05	02	11
Singh 5	10	06	05	21
Singh 6	02	0		02
Total	25	15	10	50

(Table).

The Patients were operated within first 5 days of Injury. .Only in younger age group patients reaming of the proximal femoral trochanteric area was done. However, distal part of femur was not reamed in any of the patients. Two fractures required open reduction to allow nail insertion. Distal locking was done with jig only. Patients were mobilized on 3rd day onwards. Partial or full weight bearing was allowed as decided by fracture geometry and quality of fixation.

Post-operative X-ray examination showed anatomic reduction in eight patients (16%), almost anatomic in 26 patients (52%) and approximate reduction in 16 patients (32%). No patients had systemic complications and three patients (4%) had local complications; one superficial wound infection, one wound haematoma and one delayed wound healing.

Fifty patients were followed up for results. All fractures had united at the time of final follow-up. The femoral neck screws cut through in 4patients two of them requiring removal. Haematoma formation in 1 patient inpatient, Superficial wound infection 1patient and Delayed wound healing in 1patientAt 3 month 12 patients (24%) were mobilising with walking aids and the rest were mobilising unaided. The Salvati and Wilson score for hip function was>20 points in 88% of the patients (maximum score is40 points). Average score for pain was 8.2 (S.D. 1.97) out of 10. According to the patients and/or their careers, at the final follow-up the level of function was equal to pre-injury level in 80% of the patients. Outcome was rated as good or very good by Majority of patients.

4. Discussion

The best treatment for unstable trochanteric femoral fracture remains controversial. Intramedullary devices have mechanical and biological advantages in such fractures. The TFN is designed to overcome some of the difficulties encountered with earlier designs of intramedullary proximal femoral nails. The main design differences between the TFN And other such devices are the introduction of ananti-rotation6.5mm neck screw; fluting of the nail tip which is said to decrease stress and finally the positioning of the distal locking screws more proximal than in some other devices hence avoiding pain at the Anterior part of thigh.

In this series, we have not seen any incidence of intra operative femoral fractures previously reported with the use of other similar devices. In this study, operative difficulties were encountered in 5.7% of the patients (three distal locking and one nail insertion).the local complication rate was 4% ,the screws cut through in Three patients (6%) and at final follow-up, Salvati and Wilson hip function scoring was>20 in 88% of the patients. According to the patients and/or their careers, outcome was described as good or very good in 94% of the patients and the level of function was similar to pre-injury level in 80% of the patients, at the final follow-up.

Distal locking difficulties can be avoided by tightening the bolt joining the nail and the insertion handle at the time of distal locking. Screw cut through occurred with mal position as in the dynamic hip screw [8, 9] and can be prevented by putting the screws in proper position and maintaining the tip apex distance. The anti-rotation screw should be shorter to prevent the Z effect. Screws cut through in the three cases due to mal positioning of the screws. Out of the three patients in which screw cut through only in 2 cases screws were removed.

An earlier European AO/ASIF PFN handling study [10] showed a lower incidence of screw cut through (0.6%), but nearly similar re-operation rate (7%). There was higher local complication rate (13%) but no femoral fractures at the nail tip or below.

5. Conclusions

The TFN is a good implant in the treatment of Intretrochantric femoral fracture. It creates a biomechanically stable construct allowing early weight bearing. It is a relatively easy procedure. Femoral neck screws positioning is critical. There was a low incidence of wound infection as it is done percutaneously. There was a low incidence of Anterior thigh pain and fracture at the tip of nail that is a crucial difference between this device and other designs of proximal femoral nails. A longer study trial comparing the PFN with other devices is required.

Case 1 pre op

Case 1 post op

Case 1 one year post op

case 2 pre op

case 2 post op

Case 3 pre op

Case 3 post op Ap & lat.

Case 3 post op 6 month

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