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MANAGEMENT OF TROCHANTERIC FRACTURE FEMUR BY DYNAMIC HIP SCREW (DHS) AND CROSS SCREW FIXATION

Orthopaedics

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ABSTRACT

Introduction: With increasing necessity of rapid transport system, incidence of high speed trauma is also on the rise. Increased longitivity now enjoyed by the population by and large has lead to predominance of complications related to geriatric age group, fractures of proximal femur being one of them. Any fracture in the region that lies between the greater trochanter and lesser trochanter should be labeled as trochanteric fracture.

Aim: Management of trochanteric fracture femur by dynamic hip screw (DHS) and cross screw fixation.

Material and methods: The study was conducted on 112 patients which were selected on certain criteria. Of them 73 patients were males and rest 39 were females. All the patients were indoor admitted patients. It was a mixed group of patients with both the rural and urban population forming a part of the study.

Results: The average age in the series was around 65 years. Road traffic accident was a very common mode of injury in the young patients. Majority of the patients (52.68%) reported within one week of injury. 97% of the points had full range of motion after operation at 6 months of follow up. 10 cases (9%) developed infection, 6 cases (5.4%) developed superficial infection and 4 cases (3.6%) developed deep infection. Radiological union was reported in 99 cases (94.29%) in 8 – 12 weeks of time, in 5 cases (4.77%) union was observed at 12-16 weeks.

Conclusion: The construct provides good rotational stability, early weight bearing and union. It is a very good fixation in osteoporotic bones where chances of cut out are always a problem. This procedure is very good in unstable trochanteric fractures which often are a problem to fix using DHS and plate alone..

KEYWORDS

Introduction

With increasing necessity of rapid transport system, incidence of high speed trauma is also on the rise. Increased longitivity now enjoyed by the population by and large has lead to predominance of complications related to geriatric age group, fractures of proximal femur being one of them. Any fracture in the region that lies between the greater trochanter and lesser trochanter should be labeled as trochanteric fracture and it is unnecessary to retain terms like intertrochanteric and pertrochanteric fractures.

Conservative treatment of trochanteric fractures has it attendant problems like prolonged stay in hospital, bed sores, hypostatic pneumonia, deep vein thrombosis, urinary complications, etc. for these reasons treatment of trochanteric fractures by rigid fixation has become a standard procedure. *Operative* treatment of these fractures as early as possible is of vital importance in order to alleviate pain, early ambulation and complications of prolonged recumbency in elderly patients. Various implants are used for fixation of these fractures such as fixed nail plates, sliding nail plates, intramedullary devices and replacement prosthesis.

Of all the methods of internal fixation it is widely accepted that trochanteric fractures are best treated by DHS and side plate because this method provides satisfactory positioning of the fragments and abolishes the hazards of recumbency. This device also permits continuous telescoping of proximal segment into distal segment and promoting healing and early union (Ecker 1975). The compression at fracture site at the time of surgery is maintained later by dynamic compression due to muscle activity.

Fixation of trochanteric fractures by DHS and plate alone gave good results but some complications such as shortening, limp and deformity was evident due to rotation of the proximal fragment over the screw. So as to overcome the rotational instability we used an additional cancellous lag screw which was placed in a cross fashion(X) bisecting the DHS both in antero-posterior and lateral views as seen on radiographs.

Aims and Objectives

i) To evaluate the role of anti-rotation screw in the fixation of trochanteric fractures along with DHS and plate that we usually use.
(ii) To check the stability and rigidity of the construct.
(iii) To study the behavior of the construct on weight bearing.
(iv) To see the stability in osteoporotic bones**.**

Review of Literature

Though the fracture of hip region were known to HIPPOCRATES(350 BC), it was AMBROSE PARE(1510-1590) who first emphasized the difference between fracture of the hip and dislocation of hip. In 1924 RUSSEL described balanced Russel traction using Buck's extension and a system of pulleys so placed as to obtain a slight amount of flexion at knee and yet an effective traction. Silver et al 1940 modified the classical Russel traction by using steinmen pin instead of Buck's extension.

Smith Peterson 1931 revolutionized the surgical treatment of trochanteric fractures by introducing Smith Peterson triflanged nail along with a long plate under direct vision. **Boyd and Anderson 1961** recognized the complication of protrusion of proximal end of nail into hip joint after medial migration of femoral shaft in unstable trochanteric fractures. **Jacobs et al 1976** used the Jewett nail and compression screw in 62 cases of stable and unstable trochanteric fractures. They concluded that compression screw was better than Jewett nail and had lesser complications. **Kaufer et al 1980** observed that the strength of the fracture implant assembly was determined by five variables (i) fragment geometry (ii)reduction (iii) implant (iv) implant position (v) bone quality.

Rao et al 1990 compared the results of compression hip screw fixation and enders nail in the treatment of intertrochanteric fractures of hip. They preferred compression screw as the treatment of choice in both stable and unstable intertrochanteric fractures of femur. **Ali M 1995** reported that severely comminuted intertrochanteric and subtrochanteric fractures treated with dynamic hip screw fixation provides stable osteosynthesis and helped to achieve bony union within 18 weeks in 19 of 21 patients followed up. **Harrington P et al 2002** compared a sliding hip screw and intramedullary hip screw for the treatment of intertrochanteric fractures in the elderly. **Arshad Bhatt et al 2004** said that positioning of DHS in the femoral head is not a significant factor in determining failure by cut out. The association between non-anatomical reduction and failure was however highly statistically significant.

Material and Methods

The present study was conducted on patients with trochanteric fractures of femur admitted in Bhattacharyya Orthopaedic and Related Research Centre, Kolkata from June 2002 to June 2006. All the

selected patients were treated operatively during the selected period.

Operative treatment was carried out using a Richards compression hip screw assembly along with an additional cancellous lag screw with washer. The patients were selected on the basis of following criteria :-

1. Patients belonging to both sexes and of all age groups.
2. Only closed fractures were taken up.
3. Only pure trochanteric fractures were taken up sub trochanteric fractures were excluded from the study.
4. Pathological fractures and fractures resulting from any bony pathology were excluded.

The data for the study was collected on the basis of two performa A and B which was made at the hospital for the convenience. It had all the components like interview, radiological examination, physical examination and others. In addition to the above the help of a mathematician was taken to prove the role of additional cross screw as an anti-rotation screw and also to prove the stability of the construct. Also the help of a professor of Kanpur IIT who is in the department of Materials and Metallurgy was taken to prove the stability of the construct under load as compared to using a DHS alone and also using a DHS along with a parallel screw in combination.

RESULTS

Observations were made in following tabulated form:

Age (years)	No. of Patients	Percentage
< 40	6	5.36%
41 - 50	13	11.61%
51 - 60	22	19.65%
61 - 70	53	47.32%
71 - 80	11	9.82%
> 80	7	6.25%
Total	112	100%
Sex	**No. of patients**	**Percentage**
Male	73	65.12%
Female	39	34.83%
Total	112	100%
Associated fractures	**No. of cases**	**Percentage**
Colles fracture	6	5.36%
Intercondylar humeral fractures	2	1.79%
Proximal humeral fractures	3	2.68%
Spinal fractures	2	1.79%
Total	13	11.61%
Complications	**No. of cases**	**Percentage**
Superficial wound infection	6	5.36%
Deep wound infection	4	3.57%
Over penetration of lag screw	1	0.89%
Urinary tract infection	2	1.79%
Chest infection	0	0%
Deep vein thrombosis	2	1.79%
Bed sores	3	2.68%
Total	18	16.07%
Range of movement after 6 months	**No. of cases**	**Percentage**
Full range	97	92.38%
Flexion 80-110 degrees	6	5.72%
Flexion < 80 degrees	2	1.91%
Total	105	100%
Time taken for radiological union	**No. of cases**	**Percentage**
8-12 weeks	99	94.29%
12-16 weeks	5	4.77%
16-20 weeks	1	0.96%
Total	105	100%

DISCUSSION

The present study was conducted on 112 cases of which only 105 could be followed up for more than 6 months. 4 cases expired during the study as they were old and one had severe medical problems which complicated over time. Of the 3 cases lost to follow up 2 migrated out and one in which the implants were removed due to infection.

In the present study trochanteric fractures were common in the 6th and 7th decade of life. The average age in the series was around 65 years. Fractures were common in the males in younger age group probably because of more involvement in outdoor activity. In older age group females had a more preponderance for fractures due to post menopausal and senile osteoporosis. **Heyse Moore GH et al 1983** reported that trochanteric fractures were more common in women in older age group and explained it to metabolic bone changes.

In our study it was found that road traffic accident was a very common node of injury in the young patients. However most of our cases had a trochanteric fracture as a result of severe fall on the ground (34.82%). In the present study a majority of the patients (52.68%) reported within one week of injury while about 1/4th (24.11%) reported within 2 – 3 weeks of injury. The reason for their late presentation was either that they were living in rural areas or were receiving conservative treatment elsewhere.

In the present study about 97% of the points had full range of motion after operation at 6 months of follow up. In 2% cases the range of motion was between 90 – 110° which was attributed to late presentation at the hospital. 1% had less than 90% of flexion which was due to prolonged immobilization as a result of infection.

In our study 10 cases (9%) developed infection, 6 cases (5.4%) developed superficial infection and 4 cases (3.6%) developed deep infection. All superficial infection and 2 deep infections were controlled by appropriate antibiotic cover, of the remaining 2 cases of deep infection, in one case the implants had to be removed before union while in the other implants were removed at union. The infection rate reported by other workers are **Schumpelick et al 1955** as 15%, **Jensen et al 1980** as 2%, **Sernbo et al 1988** as 2.5%, **T.S. Sethi et al 1993** reported 8%, **Barr 1974** said that after DHS infection varies from 1.7% - 16.9%.

In our series 5 cases (4.77%) developed external rotation deformity, 3 cases (2.85%) developed adduction deformity and 2 cases (1.91%) developed a combination of adduction and external rotation deformity. Adduction deformity as reported by other workers is **Boyd & Griffin 1949** as (31.4%) in conservative cases, 40% by **Clawson 1957** in operative cases and 21% by **Evans 1951**.

In the present series radiological union was reported in 99 cases (94.29%) in 8 – 12 weeks of time, in 5 cases (4.77%) union was observed at 12-16 weeks and in 1 case (.96%) the union time was 16-20 weeks as the case developed infection and the complaints were removed only after bony union and consolidation was achieved.

Further to prove the stability, bending and rotational stability of our construct we tested the construct at IIT Kanpur in the Department of Materials And Metallurgical Engineering. For the comparison purpose we tested three constructs under loading conditions and came to the conclusion that using a dynamic hip screw and an additional cross screw provided a more stable construct rotationally as well as to bending stress than the other three constructs. **Lustenberger A et al 1995** have concluded that rotational instability of a gliding implant system is a very severe complication in the treatment of trochanteric fractures. **Edward T et al 2003** concluded that attachment of an additional lateral support plate to a sliding hip screw significantly decreases displacement of the femoral head after cyclical loading.

CONCLUSION

From the study it can be concluded that using the DHS with an additional cross screw provides good rotational and mechanical stability and at the same time initiates early weight bearing as chances of cut through are reduced. As most of these fractures occur in the elderly so early ambulation is must as complications of delayed recumbency are dreadful and difficult to manage, also the bones are osteoporotic which also pose a problem so fixation with the above construct can reduce them. The stability of the construct was proved in the study, mathematical evidence and the mechanical study at Kanpur IIT also proved the same.

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