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Locking Intramedullary Nailing For Distal Femoral Fractures

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ABSTRACT

The study is aimed at studying the fracture patterns, mechanism of injury, union rates and functional results of supracondylar fractures of femur treated with retrograde intramedullary G.S.H.(GREEN SELIGSON AND HENRY) interlocking nail. In present study, 31 patients of supracondylar fractures of femur surgically managed by with retrograde intramedullary G.S.H. interlocking nail, between August 2012 to September 2014 in government general hospital Kurnool were included. The average age of the patient is 39.7 years, road traffic accidents being the most common mode of accident with 90.3%.Closed fractures were commonest with 90.3%,comminuted fractures were seen in 74.1%,AO type A were commonest with 70.96%. The outcome assessment showed that in 77.4% patients union was achieved in 22-24, knee stiffness was seen in 70.9%, delayed union in 9.7%, non union in 6.4% and infection in 19.3%. By analyzing the present study data, we feel that retrograde intramedullary G.S.H. interlocking nail appears to be the implant of choice in the management of supracondylar fractures of femur.

Keywords: *femur, supracondylar fracture, G.S.H. interlocking nail*[1].

INTRODUCTION

Fractures of supracondylar region of femur are the most common fractures resulting from high velocity trauma accounted in orthopaedic practice since femur is the largest bone of the body and one of the principle load bearing bone in the lower extremity. The incidence of distal femoral fractures is approximately 37/1,00,000 person-years[2].Supracondylar and intercondylar femoral fractures are serious injuries and difficult to treat and have potential to produce significant long term disability with poor results[4].The complexity of these fractures may result in prolonged morbidity and extensive disability unless treatment is appropriate.

In early 1960s, studies of non-operative skeletal traction[5] of distal femoral fractures along with principle of Watson Jones[6] resulted in increased

incidence of many complications, like angular deformity, delayed patient mobilization, joint integrity, knee stiffness and post-traumatic osteoarthritis[7,8]. The use of plates & screws in the fixation of these fractures has the inherent drawback of producing a load shielding device. The resultant osteopenia creates a substantial risk of refracture proximal to the plate[9,10].

Choice of treatment remains controversial and method of treatment rests in part on surgeon's experience and available resources. Comminution, bone loss, soft tissue injury, infection, multiple injuries and patient's personality all have been important prognostic factors in fracture healing and final functional recovery. Most surgeons agree that distal femoral fractures need to be treated operatively to achieve optimal outcomes[3].

Retrograde interlocking G.S.H. nail provides both rotational and axial stability, maintains length, produces least tissue trauma and better wound and fracture healing. It permits immediate immobilization, early weight bearing which may help in quick union.

This study is intended to evaluate the results of internal fixation of supracondylar fractures of femur using retrograde interlocking G.S.H. nail.

MATERIALS AND METHODS

This is a study was conducted in the Department of Orthopedics at Government General Hospital, Kurnool over two years from August 2012 to September 2014.The total number of cases studied were 31. The average age of patient was 39.7 years with the oldest patient 70 years and youngest 24 years.

The goal of supracondylar fractures of femur management is achievement of union with an acceptable femoral alignment and, restoration of the patient's prior level of functioning.

Most of the patients 24 out of 31 (77.4%) were brought to the casualty. Remaining 7 cases were admitted in Outpatient Department at Government General Hospital attached to Kurnool Medical College, Kurnool.

Inclusion criteria were age more than 18 years, closed supracondylar fractures, severe comminuted fractures with intra articular extension that required opening of the knee joint to stabilize the femoral condyles, distal fractures in osteoporotic bone. Nonunion, delayed union, narrow medullary canal, previous infections, foreign body sensitivity, active infection, entry point skin lesions and children with epiphyseal injuries were excluded.

A careful history was taken from the patients and attendants to know the mechanism of injury and the severity of trauma. The patients were then clinically assessed to evaluate their general condition and local injury. The vital signs were recorded along with associated injuries. Any associated neurovascular deficit was noted. Radiographs of the affected limb including pelvis with both hips, thigh with knee and leg with ankle were taken in AP and Lateral views. The limb was immobilized in an above knee slab or with bucks traction and analgesics were given. The operative procedure, its advantages and likely complications were explained to the patient and informed consent was obtained. All the necessary serological investigations (complete blood count, blood urea, serum creatinine, blood sugar, HIV,

HBSAg, HCV) were done. The ECG and chest X-ray were taken. All the cases were planned for internal fixation with retrograde interlocking G.S.H. nail.

After thorough preparation under strict aseptic precautions, the limb is prepared and draped, under tourniquet control. The fracture is reduced under C arm control. Lateral approach was used in 12 patients where the guide wire could not be negotiated through the fracture site or in cases which necessitated inter condylar fracture fixation. Patellar tendon is split in the midline or retracted, entry hole is made in the distal femur, guide wire is passed under c-arm control through the fracture into the proximal fragment, reamed and appropriate size GSH nail is inserted, locked proximally and distally. Cannulated cancellous screws were used cases with comminuted inter condylar fractures for additional stabilization. Post operatively the limb is immobilized in above knee plaster, and mobilization started after 1 week on CPM machine. Toe touch weight bearing is allowed after 2 weeks and gradually increased depending on the fracture union.

RESULTS

In the present study, 31 patients with supracondylar fractures of femur, surgically managed by retrograde interlocking G.S.H. nail, between August 2012 to September 2014 in government general hospital attached to kurnool medical college were included.

Table 1 shows the age distribution

Age	Number Total n=31	Percentage
21-30	2	6.45
31-40	16	51.61
41-50	10	32.25
51-60	2	6.45
61-70	1	3.22

The age of the patients in the study ranged from 24 to 70 years, average being 39.7 years.

In the study, 22 were male patients& 9 were female patients. 28 patients sustained the fracture following road traffic accidents(90.32%), 3 following fall. 20 patients (64.51%)had the injury on the right side, 11 patients (35.48%) had the injury on the left side. In the study, 23 were comminuted, 8 were simple.22 were of AO type A and 9 were of AO type C. Twenty four patients had isolated fracture of the femur, two had head injury. Five had ipsilateral limb fractures.

77.4% of the patients showed fracture union by 22-24 weeks. In 22.5% cases united by 28-32 weeks & in two patients there was non-union.

The complications observed in the present study are:

Table 2: post operative complications

Complication	Number n=31	Percentage
Knee stiffness		
ROM > 120 degree	6	19.3
ROM 90-120 degrees	11	35.48
ROM < 90 degrees	14	45.16
Superficial infection	6	19.3
Deep infection	0	
Delayed union	3	9.7
Non union	0	
Deformity (Varus)	4	12.9
Shortening < 2cm	11	35.49

In the study, three patients (9.7%) had delayed union and it went on to union by 28 weeks.

Functional assessment was done with DAWSON AND CARROR criteria (1991) which evaluates range of motion, shortening, infection, deformity and pain. Scored 16-20=excellent, 11-15=good, 6-10=fair, 1-5=poor.

In the study of 31 patients, 90.32% of patients (n=28) had excellent/good results, 9.7% (n=3)had poor results.

DISCUSSION

In the present study of 31 patients 22 (70.96%) were males and 9 (29.04%) were females. In study by William G. Delong Jr & Frederick S. Bennett et al[11] male patients were in majority. This difference is because males are highly exposed to high demanding physical work and road traffic accidents.

Mean age of patients was 39.7 years (range: 24-70 years). Mean age was comparable with William G. Delong Jr & Frederick S. Bennett[11] series explaining high incidence in young, active individuals in productive age group who are involved in demanding physical work and exposed to road traffic accidents.

Road traffic accident was the commonest mode of injury in most of the studies. In the present study most common mode of injury was road traffic accidents in 28 patients (90.3%), fall from height in 3 patients (9.7%),In study by William G. Delong Jr & Frederick S. Bennet et al, road traffic accident was the commonest mode of injury.

In our study of 31 cases, twenty two (70.96%) were AO type A, nine (29.04%) were AO type C. In study by William G. Delong Jr & Frederick S. Bennett et al[11] AO type C were in majority. Comminuted fractures in 23 patients (74.1%), simple fractures in 8 patients (25.9%),Closed fracture in 28 patients (90.3%) and compound in 3 cases (9.7%). In our series right side was affected in 20 patients (64.51%) and left side was affected in 11 patients (35.49%). In study by William G. Delong Jr & Frederick S. Bennett et al[11] right was

the most common side involved. In the present study, we approached fracture site using standard lateral approach of thigh for open reduction and internal fixation. For nail insertion midline incision, medial parapatellar incision were used. We used medial parapatellar incision in most of the cases in order to ovoid damage to patellar tendon. By 28 weeks, 4 patients(12.9%) of the patients had full range of movements of knee 2 patients(6.4%) had terminal restriction 11 patients(35.4%) had 90^0-120^0 13 patients (41.93%) had $<90^0$ knee flexion.

In the present study, solid union is seen in 24(77.4%) cases in less than 24 weeks, with 2 (6.4%) cases going for nonunion due to deep infection in one and in other case it may be due to immediate weight bearing activity done by the patient. There were three (9.7%) case of delayed union, which united after additional two months. The delayed unions were managed with dynamization in one case and weight bearing in remaining two cases with a cast brace which lead to union by end of 28 weeks. One non union case was treated with bone grafting and weight bearing and union seen by 32 weeks.

William G. Delong Jr & Frederick S. Bennett et al[11] reported 75.4% union of supracondylar fractures of femur treated with retrograde interlocking G.S.H. nail. In the present study, majority had a total duration of hospital stay of two weeks with a mean duration of hospital stay of 1.7 weeks. Rest of the patients required longer duration of stay because of associated injuries. DAWSON AND CARROR criteria (1991) score in the present study was 90.32% excellent to good which was comparable to DAWSON AND CARROR criteria (1991) score in the study by William G. Delong Jr & Frederick S. Bennet et al.

In the present study, average time taken for union was 22-24weeks. In William G. Delong Jr & Frederick S. Bennett et al[11], average time taken for union was 18-20 weeks.

Because of the good vascular supply and large soft tissue surrounding the femur, infection is relatively infrequent .In our series we had six patients (19.3%) with secondary infection. Pus culture sensitivity was sent and infection was managed with appropriate I.V. antibiotics for 2-3 weeks. William G. Delong Jr & Frederick S. Bennett et al[11] reported 7.89% infection rate after retrograde interlocking G.S.H. nail. Postoperative early mobilization of the knee and ankle was very critical in attaining full range of movements. It was observed that the movements and the functional ability of the knee depended upon the patient's adherence to rehabilitation programme and early intensive physical therapy hastened the recovery of knee function. Four (12.9%) patients recovered full range of mobility of knee and ankle joint. Two (6.4%) patients had terminal restriction of knee movements. Eleven (35.4%) patients had moderate range of mobility (90^0-120^0) and 13 cases(41.93%) patient had gross ($<90^0$)restriction. William G. Delong Jr & Frederick S. Bennett et al[11] reported knee stiffness in 87.80% patients. In present study, incidence of non union was in two cases (6.4%). In the study by William G. Delong Jr & Frederick S. Bennett[11] et al, incidence of non union was 10.52%. Probable cause of non union in two cases (6.4%) in the present study was improper positioning of nail in medullary canal and locking the nail without attaining reduction.

Open reduction with retrograde interlocking G.S.H. nail fixation usually ensures a high likelihood of anatomic reduction and ideal in patients with comminuted supracondylar fractures. Disadvantages of retrograde interlocking G.S.H. nail fixation are risk of infection, potential injury to the cruciate ligaments, poor fixation in osteoporotic bone, knee joint arthrosis and the possible need for nail removal at a later date. In the present study, 90.32% of patients had excellent/good results, 9.7% had fair results and none had poor results. In the study by William G. Delong Jr & Frederick S. Bennett et al[11] 14.15% had delayed union compared to 9.7% in this present study. The fair functional outcomes in the present study are due to knee stiffness seen in 22 cases(70.9%),infection in 6 cases(19.3%),mild pain and mild deformity each in 9 cases(29.1%)and 1-2 cm shortening in 11 cases(35.49%).

CONCLUSION

31 patients of supracondylar fractures of femur, surgically managed by retrograde interlocking G.S.H. nail fixation, between August 2012 to September 2014 in government general hospital, Kurnool were included. The age of the patients in the study ranged from 24 to 70 years, average being 39.7 years. In the study, 22 were male patients & 9 were female patients. 28 patients sustained supracondylar fractures of femur following road traffic accident, 3 following fall from height. 20 patients had the injury on the right side, 11 patients had the injury on the left side. In the study, twenty three were comminuted, eight were simple, 28 were closed and 3 were compound. 22 cases were of AO type A and 9 were of AO type C. Twenty four patients had isolated fracture of the femur, two patients had head injury, five patients had ipsilateral limb fractures. Most (77.4%) of the patients showed fracture union by 22-24 weeks. In seven patients fracture united by 28-32 weeks & in two patients there was non-union. By six to seven months, seventeen patients(58.1%) of the patients had full or almost full range of movements & thirteen patients(41.93%) had $<90^0$ knee movement. In the study there were two non-unions for which bone grafting was done and later the fracture united. In the study of thirty one patients, 90.32% of patients had excellent/good results, 9.7% had fair results.

By the analysis of the data collected in the present study, retrograde intra medullary interlocking G.S.H. nail for supracondylar fractures of femur we concluded that it offers stable fixation through static locking by controlling rotation, angulation and length disturbances. Causes minimal soft tissue scarring, allows early mobility and prevents stiffness, cost effective, low incidence of infection, reduced hospital stay. Hence retrograde intra medullary G.S.H. nail remains an implant of choice for supracondylar femur fractures.

REFERENCES

1. O.Henry,S.L.Target,S.Green,S.Seligson.Management of supracondylar fractures of the femur with the GSH intramedullary nail:Preliminary report.Contemp.Orthop.22:631-640.1991.
2. Arneson TJ, Melton LJ, Lewallen DG, et al. Epidemiology of diaphyseal and distal femoral fractures in Rochester, Minnesota,

1965-1984. Clin Orthop Relat Res 1988;234:188-194.

3. Giles JB, Delee JC, Heckman JD, et al. Supracondylar-intercondylar fractures of the femur treated with a supracondylar plate and lag screw. J Bone Joint Surg Am 1982;64:864-870.
4. Weil Kuenher, Henry. Quoted by Stewart MJ, Sisk TD, Wallace SL. Fractures of distal third of femur-A compression method of treatment. JBJS, 48-A, pg. 784-807, June 1966.
5. Modlin. Quoted by Stewart MJ, Sisk TD, Wallace SL. Fractures of distal third of femur – a compression method of treatment. JBJS, 48-A, pg. 784- 807, June 1966.
6. Watson and Jones: fractures and joint injuries, 6th edition 1982, pg. 1003-1070.
7. Charnley John: closed treatment of common fractures 3rd edition 1961: pg 197-204.
8. Enneking W.F, Marshall Horowitz: The intraarticular effects of immobilization on the human knee JBJS: Vol, 54-A, No. 5, July 1972, pg. 973-975.
9. Bostman OM. Refracture after removal of a condylar plate from the distal third of the femur. J Bone Joint Surg Am 1990;72:1013-1018.
10. Davidson BL. Refracture following plate removal in supracondylar-intracondylar femur fractures. Orthopedics 2003;26(2):157-159.
11. Iannacone WM, Bennett FS, Delong WG Jr, et al. Initial experience with the treatment of supracondylar femoral fractures using the supracondylar intramedullary nail: a preliminary report. J Orthop Trauma 1994;8:322-327.