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Original Research Article

A Prospective Analysis of Retrograde Supracondylar Nailing in the Management of Supracondylar and Distal Femoral Fractures at SKMCH, Muzaffarpur, Bihar

Vikash Kumar[1], Niraj Kumar[2], Rakesh Kumar[3]

[1,2]Senior Resident, Department of Orthopaedics, Sri Krishna Medical College & Hospital, Muzaffarpur, Bihar

[3]Associate Professor, Department of Orthopaedics, Sri Krishna Medical College & Hospital, Muzaffarpur, Bihar

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Corresponding Author: Dr. Niraj Kumar

Conflict of interest: Nil

Abstract:

Background: Fractures of the distal femur are complex injuries that pose a challenge to the orthopaedic surgeon. It constitutes about 6% of all femoral fractures. It usually occurs during high energy trauma in younger patients and frequently is associated with concomitant injuries. In contrast, elderly patients with severe osteopenia might sustain solitary distal femoral fractures from minor trauma such as a simple fall.

Aim: The aim of the study is to analyse prospectively the results of Retrograde Supracondylar Intramedullary Nail in the management of Distal femoral & Supracondylar Fractures.

Materials and Methods: This is a prospective study of 20 patients with supracondylar and distal femoral fractures treated with Retrograde Supracondylar nail at Sri Krishna Medical College and Hospital, Muzaffarpur, Bihar from July 2020 to December 2021. Of the 20 patients, 11 cases were supracondylar fractures and 9 cases were distal femoral fractures.

Results: In our study, 20 cases were treated by retrograde intramedullary supracondylar nail. Patients were followed up every 3 weeks till thereafter at 3 months, 5 months and 1 year. The functional outcomes were analyzed using Knee Rating System by the Hospital for Special Surgery. Of the forty cases, thirty eight were available for follow up. The functional outcome was good to excellent in 12 patients (63%), fair in 4 (21.0%) and poor in 3 patients (17.6%).

Conclusion: Based on our study, we conclude that early surgical intervention and mobilization of patients will give better results. The retrograde intramedullary locked nail offers practical advantages of simple and efficient technique for patients with polytrauma, floating knee injuries and in elderly.

Keywords: Supracondylar Nailing, intramedullary locked nail, polytrauma, floating knee injuries.

Introduction

Fractures of the Distal femur are complex injuries that pose a challenge to the orthopaedic surgeon. It constitutes about 6 % of all femoral fractures. It usually occurs during high energy trauma in younger patients and frequently is associated with concomitant injuries. In contrast, elderly patients with severe osteopenia might sustain solitary distal femoral fractures from minor trauma such as a simple fall. Significant advances have been made in treatment of these fractures in the past three decades. Neer in 1967 concluded that these fractures were not suitable for internal fixation and treated with traction & cast bracing. It is recognized that operative fixation with the ability to maintain anatomical reduction of the joint surface, restoring axial alignment and early range of motion presents clear advantages over closed means of treatment. Numerous devices have been proposed for the treatment of these fractures. The principles of internal fixation must be met regardless of the choice of fixation. These include anatomical reduction of the distal femoral articular surface, stable internal fixation, minimal soft tissue stripping and early active mobilization. However, plate devices needed an extensive surgical exposure and a potential risk of infection. Fixation with a lateral blade plate or its modifications became popular because it allowed fixation of intraarticular fractures and early mobilization. Their use requires significant soft tissue stripping, which can affect osseous healing and a potential risk of infection. Intramedullary implants offer potential biomechanical advantages over plate and screws because their intramedullary location results in less

stress on the implant, they have potential for load sharing and they can be inserted with minimal soft tissue stripping. However the use of antegrade intramedullary nail in the treatment of supracondylar femoral fractures has been associated with angular deformities because of the inability of distal interlock of antegrade nail to achieve control of the small distal fracture fragment. To extend the practical and theoretical advantages of intramedullary nailing in distal femoral fractures, the supracondylar Nail was designed by Green, Seligson and Henry in 1988. Several studies have been done to evaluate the role and efficacy of supracondylar nailing in the recent times showing variable results. This study was conducted to analyse the outcome of the Retrograde Supracondylar Nail in fractures of distal femur and supra condylar area.

Aim of the Study

The aim of the study is to analyse prospectively the results of Retrograde Supracondylar Intramedullary Nail in the management of Distal femoral & Supracondylar Fractures.

Materials and Methods

This is a prospective study of 20 patients with supracondylar and distal femoral fractures treated with Retrograde Supracondylar nail at Department of Orthopaedics, Sri Krishna Medical College and Hospital, Muzaffarpur, Bihar July 2020 to December 2021. All patients above 18 years with closed & grade I & II open fractures of supracondylar & distal femur fractures extending up to 15 cm from distal articular surface, Closed distal femoral fractures & nonunion, AO type A1 A2 & A3 fractures, AO type C1 C2 fractures were included. AO type B1 B2 & B3 fractures, AO type C3 fractures, Grade III open fractures were excluded. The age of the patients ranged from 19 - 65 years with a mean age of 37.5 years. The male female ratio was 5.4:1. The mode of injury was RTA in 15 patients (75 %), one patient (5%) was injured due to wall collapse and in another 4 patients (20%) the history was fall from height. Of the 20 patients, 11 cases were supracondylar fractures and 9 cases were distal femoral fractures. Of the 18, two patients with distal femur fracture treated with plate osteosynthesis developed nonunion. They subsequently underwent plate removal and supracondylar nailing. All the patients were preoperatively managed with pin traction until they were taken up for surgery. Standard anteroposterior and lateral radiographs of lower femur and knee were taken for preoperative analysis. CT scan of the distal femur was done wherever necessary, to know about the extent of intararticular communition of these fractures.

Results

In our study, 20 cases were treated by retrograde intramedullary supracondylar nail. Patients were followed up every 3 weeks till fracture united and thereafter at 3 months, 5 months and 1 year. The minimum follow up period in our study was 4 months and maximum follow up period was 14 months. Two of them had expired one month following surgery due to septicaemia secondary to pressure sores and not directly attributable to the operative procedure.

Clinically, tenderness at fracture site, knee pain, limb length discrepancy, range of movements, any varus or valgus deformity were assessed at each follow up. The results were analyzed with standard anteroposterior and lateral radiographs. Clinical and radiological signs of union were analysed at each follow up. The fracture was said to be radiologically united if callus was seen in at least 3 cortices in anteroposterior and lateral views. The functional outcomes were analysed using Knee Rating System by the Hospital for Special Surgery.

Of the 20 cases, 19 cases were available for follow up. The functional outcome was good to excellent in 12 patients (63%), fair in 4 (21.0%) and poor in 3 patients (17.6%).

Table 1:

Results	No. of patients	Percentage
Excellent	7	36.8%
Good	5	26.3%
Fair	4	21.0%
Poor	3	15.7%

Complications: The following complications were encountered:

Table 2: Complications

Complication		No. of patients
1.	Delayed union	6
2.	Knee Joint Stiffness < 90	16
3.	Knee Pain	8
4.	Infection	2
5.	Nail Impingement	2
6.	Leg length discrepancy	2

Discussion

Fractures of distal femur are complex injuries that can be difficult to manage and have the potential to produce significant long term morbidity. Operative treatment is the treatment of choice in these injuries nowadays, resulting in anatomic reduction and early mobilization combined with early weight bearing. Previously stabilization was usually achieved with a condylar screw and plate.

Retrograde intramedullary nailing has been developed in order to address some of the previous problems associated with distal femur fractures. Biomechanical properties of retrograde supracondylar nailing have been studied by many authors. [1,2,3,4,5] Henry et al [6] in 1991 reported that by nature of the intramedullary position, GSH nail has a bio mechanical advantage over laterally placed conventional devices.

The intramedullary position decreases the lever arm, reducing varus or valgus angulations. IN 1995 Firoobakhsh et al [5] mechanically tested the retrograde intramedullary nail & 95 screw & side plate. He found plate & screws were found stiffer in lateral bending and in tension than a supracondylar nail. He had concluded supracondylar nail had comparable biomechanical rigidity to condylar screw & plate with varus loading. Benefits of supracondylar nailing include less extensive exposure, no periosteal stripping, reduced blood loss, decreased operating time and hospital stay [1,2,3,4].

In our study 40 patients with supracondylar & distal femoral fractures underwent retrograde supracondylar nail. The mean age of occurrence of fracture in our study was 37.5 years (19-65 years) as compared to 29.4 years reported by Ostrum et al [7], 50 years reported in a study done by Gellman et al [8] and 32.4 years in a study done by Herscovici and Whiteman [9]. According to our study, the incidence of fracture was high in the age group between 21- 35 years. The most common mode of injury was road traf□c accidents in our study similar to other studies [10,11,8].

There was a de□nite male preponderance (85%) in our study. 0strum 12 reported 75% in his study and 60% was reported by Seifert et al [10]. The mean age in males were found to be 39 as against 45 years in females in our study.

The average time interval between injury and surgery was higher in our study (4 weeks) which is attributed to time taken for the wound to heal in compound injuries, delay in the patient reporting time to the hospital after taking native treatment, non-availability of theatre time and management of associated injuries. This delay resulted in difficult reduction of fracture by closed methods during surgery. Consequently in 90% of our cases fracture site was opened and reduction achieved by open method. Primary bone grafting was done in fractures with gross communition and fractures with gross osteoporosis.

Callus formation was prompt in 26 of the 34 patients seen at 6 – 8 weeks with radiological & clinical evidence of union by 12 – 14 week similar to other studies [8,12,11].

In our study, 6 cases (15.1%) had delayed union and 2 cases developed infected non-union (5.2%).Of the 6 cases of delayed union, 4 underwent bone grafting and 2 patients were advised full weight bearing with a tube cast. The fracture had not yet united completely at the completion of the study. The patient with non-union underwent implant removal and Ilizarov fixation was done. Our results were comparable to studies by Iannacone et al [13] in 1994. He had reported 41 complex distal femoral fractures treated with GSH nail resulting in four nonunion, and five delayed unions. This he attributed to the use of open technique in his study. In a review of one hundred twenty five supracondylar fractures by Henry et.al6 in 2000, percutaneous technique of supracondylar nail was compared with open reduction & fixation using a GSH supra condylar Nail. Twenty nine patients out of eighty patients treated with open arthrotomy and open reduction of the fracture, needed bone grafting as an additional procedure. The incidence of nonunion & delayed union was also higher in the group.

He had concluded that treatment of supracondylar fractures should be placed percutaneous with distinct advantages of decreased operating time, decreased blood loss and avoidance of extensive surgical dissection. In the study of comparison between antegrade and retrograde nail insertion by Ostrum et.al [7], had concluded that time to union was slightly longer in the retrograde group & more secondary procedures were needed to obtain union .We attribute our rates of delayed union to open method of reduction (in 90%of our cases), delay in □xation and overall stability of □xation.

In our study series of 40 patients, 63% had good to excellent results and 15.1% had poor results as against the study by Gellman et al [1] which showed higher percentage (80%) of good results. In our study, excellent results were obtained in patients operated early and in those with closed non-articular type of fracture. We attribute our poor outcome to the development of nonunion and delayed union in some patients, and presence of associated injuries which may decrease the functional outcome of the patients. In our study, the use of open technique for supracondylar nailing has been associated with poor functional outcome.Our study showed knee range of motion averaged 70 degrees. Studies by Papadokostasis et.al [14] in

2004 showed that mean range of motion was 104 ±17.2 and 93 degrees by Henry et al [6]. There has been a concern expressed regarding the use of intraarticular entry and development of arthrofibrosis and stiffness of the knee. In our study, younger patients regained higher range of motion than the elderly similar to other studies [10,15]. The cause of knee stiffness could be due to prolonged immobilization after surgery with a knee brace done based on fracture patterns stability, delay in taking up patients for surgery, lack of patient compliance regarding knee mobilization & presence of associated injuries.

In our study, patients with stable fixation were mobilized in the first or second postoperative day. Static quadriceps exercises and knee mobilisation exercises were taught. In some patients with less stable fixation, knee was immobilised in a knee brace for 3 weeks. No continuous passive motion was tried in our patients. The main problem encountered was non-compliance of patients regarding physiotherapy exercises at home possibly due to lack of awareness regarding its importance or may be due to fear.

Knee pain has been encountered as a major problem in 30% of our patients. In the series by Lauri. Handolin et.al [11] in 2004 anterior knee pain seen in patients about 20 - 30%. The knee pain possibly could be due to distal screw prominence, impingement of iliobitibial band, due to secondary nail protrusion or previous osteoarthritis. In summary, retrograde supracondylar nailing is an excellent technique with good union rates in the management of supracondylar fractures. However in view of some of the complications associated with it, less invasive stabilization system and locking plates has been gaining popularity nowadays. Long term comparative study regarding the use of different methods of fixation should be undertaken in the future.

Conclusion

Distal femoral fracture poses a challenging problem to the orthopedics surgeon as it occurs in young with high velocity and elderly with low velocity trauma. Retrograde supracondylar nail has evolved to address some of the problem in fixation of these fractures. It has benefits of less periosteal stripping, reduced blood loss, decreased hospital stay and operating time. Based on our study, we conclude that early surgical intervention and mobilization of patients will give better results.

Moreover, closed method of reduction should be done wherever possible and percutaneous nailing should be advocated to yield better results. The retrograde intramedullary locked nail provides the surgeon with a different option in treatment of specific supracondylar fracture patterns. It offers practical advantages of simple and efficient technique for patients with polytrauma, floating knee injuries and in elderly. However proper selection of patients and fracture patterns should be done in other cases and cautious use of retrograde supracondylar nailing in diaphyseal fractures should be exercised.

Further studies comparing with other alternative methods of fixation are required to validate the outcome. We conclude that this technique is easy and adds to armamentarium of every orthopedic surgeon.

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