ORIGINAL ARTICLE

Management of Diaphyseal Fracture of Femur with Antegrade and Retrograde Nailing: A Comparative Trial

LAL MOHAMMAD KAKAR[1], MOHAMMAD ISHAQ[2], RAJA SHOAIB ANJUM[3]

ABSTRACT

Background: Diaphyseal fracture or mid shaft fractures of femur are common presentation in an orthopedic setting. Retrograde and ante-grade nailing are the two methods for management of diaphyseal fracture.
Aim: To compare the outcome of diaphyseal fracture of femur with ante-grade and retrograde nailing.
Methods: This randomized controlled trial study was carried out at Department of Orthopaedic, Bolan Medical Complex Hospital, Quetta1st June to 31st December 2017. One hundred consecutive patients presented with diaphyseal fracture of femur were includedand randomly divided in two groups. Patient's demographics were recorded. Surgeries were performed by researcher and nailing was done and outcome was recorded.
Results: The mean ages were 45.10±15.84 years in retrograde group and 45.98±16.75 years in ante-grade group. There were 44(88%) males and 6(12%) females in retrograde group and there were 47 (94%) males and 3 (6%) females in ante-grade group. The mean operative time was 166.40±9.04min in retrograde group while 174.02±8.92min in ante-grade group. The mean blood loss was 192.58±62.23 ml in retrograde group while 286.68±81.95ml in ante-grade group. Complete healing was observed in 48(96%) cases with retrograde nailing while in 42 (84%) cases with ante-grade nailing. Complete union was observed in 48 (96%) cases with retrograde nailing while in 40 (80%) cases with ante-grade nailing.
Conclusion: The outcome was significantly better with retrograde nailing as compared to ante-grade nailing for management of diaphyseal fracture of femur.
Keywords: Diaphyseal fracture of femur, retrograde nailing, ante-grade nailing, operative time, blood loss

INTRODUCTION

Over the 20-year period from 1965 to 1984, 370 residents of Rochester, Minnesota experienced 402 femoral fractures exclusive of the hip, giving an overall incidence rate of 37.1 per 100,000 person-years. Of these, 210(52.2%) were diaphyseal[1]. Concerning aetiology, fall from a high place and road traffic accidents, are the two most common causes of fracture. In infants, usually at age of crawling, 80% injuries occur due to mismanagement, reduced up to 30%, when they start walking. About 90% fracture in young adults occurred due to road traffic accidents usually use of motor vehicles. A rise in number of fractures has been observed due to inter-personal violence, particularly in youngsters, many cases also present due to firearms injury which is increasing in numbers in an emergency setting[2].

Intra-medullary nailing is the standard method to manage diaphyseal fractures of femur. Now-a-days, ante-grade reamed inter-locked intra-medullary nailing is considered to be the best method for management of diaphyseal fractures of femur. Ante-grade nailing is the bestmanagement method to stabilize the fracture[3,4].Retro-grade intra-medullary nailing has recently been recognised as a replacement of ante-grade nailing.Almostcomparable results are found when both these methods were compared. But, prolonged follow-up studies are not available which can evidentante-grade nailing asstandard method[5].

[1]Associate Professor of Orthopaedic Surgery, Bolan Medical College Quetta,
[2]Associate Professor of Orthopaedics, Nowshera Medical College & Teaching Hospital (QHAMC) Nowshera KPK,
[3]Assistant Professor of Orthopaedic Surgery, Mohi-ud-Din Islamic Medical College, Mirpur AJK
Correspondence to Dr. Lal Mohammad Kakar Email: drlalkakar@gmail.com

So we conducted this study to find the difference between both methods to rule out the more effective and successful method with least complications. So that in future, we can implement that method for management of diaphyseal fracture of femur.

MATERIALS AND METHODS

This randomized controlled trial was done at Department of Orthopaedic Surgery, Bolan Medical Complex Hospital, Quettafrom 1st June to 31stDecember 2017. One hundred patients of diaphyseal fracture of femur were included Patients of age 16-70years, of either gender were included. Patients with diabetes mellitus, gun-shot injuries, osteoarthritis, osteoporosis, osteomalacia, patients presented after 15days of fracture, with fracture debridement or infection at fracture site were not included in the study. Written informed consent was taken from each case. Demographic details, like name, age, sex, anatomical side were obtained. Then patients were randomly divided in two groups by using lottery method.In group A, retrograde nailing was done. In group B, ante-grade nailing was done. Then surgeries were done by researcher under spinal anaesthesia. During surgery, operative time and total blood loss was recorded.After surgery, Ceftriaxone 1gm twice daily for 5 days was given. Patients were advised to present after 7 days and wound will be evaluated for infection. Then patients were advised to present after 1, 3, and 6 months of surgery along with x-ray to assess union of bone.Union or non-union and complete healing of fracture will be noted. All the collected data was then analyzed through SPSS version 21.Mean±SD were computed for quantitative variables like age, operative time and blood loss. Qualitative variables like gender, site of

fracture, healing, union and infection were presented as frequency and percentage.

RESULTS

The mean age of patients was 45.10±15.84years in retrograde group while 45.98±16.75years in ante-grade group. There were 44(88%) males and 6 (12%) females in retrograde group and there were 47 (94%) males and 3(6%) females in ante-grade group. In retrograde groups, left side of fracture was involved in 27(54%) cases and right side was involved in 23(46%) cases. In ante-grade groups, left side of fracture was involved in 25(50%) cases and right side was involved in 25(50%) cases (Table 1).

Outcome was compared in both groups. The mean operative time was 166.40±9.04min in retrograde group while 174.02±8.92min in ante-grade group (p<0.0001). The mean blood loss was 192.58±62.23ml in retrograde group while 286.68±81.95ml in ante-grade group (p<0.0001). Complete healing was observed in 48 (96%) cases with retrograde nailing while in 42 (84%) cases with ante-grade nailing (p=0.046). Complete union was observed in 48 (96%) cases with retrograde nailing while in 40 (80%)cases with ante-grade nailing (p=0.014). Infection was observed in 2 (4%)cases with retrograde nailing while in 8 (16%)cases with ante-grade nailing (p=0.046) [Table 2].

Table 1: Characteristics of patients (n=100)

Variable	Retrograde nailing	Ante-grade nailing
Age (years)	45.10±15.84	45.98±16.75
Gender		
Male	44 (88%)	47 (94%)
Female	6 (12%)	3 (6%)
Site of Fracture		
Left	27 (54%)	25 (50%)
Right	23 (46%)	25 (50%)

Table 2: Comparison of outcome in both groups

Variable	Retrograde nailing	Ante-grade nailing	P value
Operative time (min)	166.40±9.04	174.02±8.92	0.001
Blood loss (ml)	192.58±62.23	286.68±81.95	0.001
Healing	48 (96%)	42 (84%)	0.046
Union	48 (96%)	40 (80%)	0.014
Infection	2 (4%)	8 (16%)	0.046

DISCUSSION

Retro-grade and ante-grade nailing methodshave shown similar results regarding union and mal-union after surgery. But in knee surgeries, retro-grade nailing had more complications while in hip surgeries, ante-grade nailing showed more complications.[6]Both ante-grade and retro-grade nailing achieved high occurrence of union after surgery. Both methods have their own benefits and drawbacks. Both procedures are equal in achieving success in cases of femoral shaft fractures[7].

In our study, we compared the outcome in both groups. The mean operative time was 166.40±9.04minutes in retrograde group while 174.02±8.92minutes in ante-grade group (p<0.0001). Dougherty et al., found that operative time was 164 (95–260) minutesand 167 (73–405) minutes, respectively, for bothmethods (p-value=0.96)[8]. This is in disagreement with results of our study and showed insignificant comparison between retrograde and ante-grade nailing.

In our study, the mean blood loss was 192.58±62.23ml in retrograde group while 286.68±81.95ml in ante-grade group (p<0.0001). Dougherty et al[8]found that mean blood loss was 364 (75–1500) mLwith ante-grade nailing and 223(50–900) mLwith retro-grade nailing (p-value=0.06). This does not agree with results of our study and showed insignificant comparison between retrograde and ante-grade nailing.

In our study, complete healing was observed in 48(96%) cases with retrograde nailing while in 42 (84%) cases with ante-grade nailing (p=0.046). Dougherty et al[8] found that fracture were healing in 88% cases with ante-grade nailing while 93% cases with retro-grade nailing. This is also in contrast to results of our study.

In our study, complete union was observed in 48(96%) cases with retrograde nailing while in 40(80%) cases with ante-grade nailing (p=0.014) and infection was observed in 2(4%) cases with retrograde nailing while in 8(16%) cases with ante-grade nailing (p=0.046). Dougherty et al., showed that delayed or non-unionarosein 3(12%) cases with ante-grade nailing and 3(7%) cases with retro-grade nailing (p-value=0.26). In 3 cases of failed management with ante-grade nailing, 2 had successfully managed by nail dynamization and 1 had infection[8].

Poyanli et al[9] done a systemic review of fifteen cases of supra-condylar gun-shot injury who were managed with retrograde nails. Among them 8 had military rifle wounds and 7 were shot with handguns. The researchers found that all the fractures were completely healed, without any development of osteomyelitis or sepsis of knee.On the basis of previous evidence, immediate retro-grade nailingshowed equal efficacy and safety as shown by ante-grade nailing for management offractures of femur[8].

Another study found through results that in obese patients,retro-grade nailing method required significantly less operative time and radiation exposure for the treatment of femoral shaft fractures as compared to non-obese cases. Furthermore, ante-grade nailingrequired more operative time and radiation exposure time significantly in obese patientsas compared to non-obese patients[10].

In a retrospective study conducted by Cannadaet al[11]on 73 patients who had gunshot fractures of femur, were managed by reamed retro-grade nailing. Among them 35 (48%) patients were followed-up for 7months postoperatively, without any complication (i.e. knee sepsis). While 3 patients had shortening of leg (>10mm), 1 had mal-union (>10° angulation) and 1 had non-union which was managed dynamization of nail.

Another study conducted by Bible et al[12] compared 34 fracture managed by retro-grade nailing to 24 fracture managed by ante-gradenailing in patients who hadipsilateral traumatic kneearthrotomies, which required irrigation &debridement. Knee sepsis was absent in all cases with retro-grade nailing while in 1 case with ante-grade nailing. It was concluded that retro-grade nailing method is comparatively safe method, even in cases with traumatic knee arthrotomy[12]

CONCLUSION

The outcome was better with retrograde nailing as compared to ante-grade nailing for management of diaphyseal fracture of femur. So in future, we can recommend the application of retrograde nailing for management of diaphyseal fracture of femur to improve the outcome and reduce the number of complications. Thus make it more acceptable and satisfactory.

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