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Antegrade or retrograde nailing? Difference in the reduction and union with functional range of motion in operated patients for distal femoral fractures - a clinical study

[1]Dr. Deepak K Aher, [2]Dr. Rajesh K Mishra, [3]Dr. Tapan Jain, [4]Dr. Vipin Singh, [5]Dr.Lakshya Bhardwaj, [6]Dr. Rajesh Jamoria, [7]Dr. Harendra Singh, [8]Dr. Ajay Dandotiya

[1]Assistant Consultant, Upasani Super Speciality Hospital, Mumbai (Maharashtra), India
[2]Senior Resident, Dept. Of Orthopaedics & Traumatology, GMC, Bhopal (MP), India
[3]Junior Resident, Dept. Of Orthopaedics & Traumatology, GMC, Bhopal (MP), India
[4]Junior Resident, Dept. Of Orthopaedics & Traumatology, GMC, Bhopal (MP), India
[5]Junior Resident, Dept. Of Orthopaedics & Traumatology, GMC, Bhopal (MP), India
[6]Junior Resident, Dept. Of Orthopaedics & Traumatology, GMC, Bhopal (MP), India
[7]Junior Resident, Dept. Of Orthopaedics & Traumatology, GMC, Bhopal (MP), India
[8]Junior Resident, Dept. Of Orthopaedics & Traumatology, GMC, Bhopal (MP), India

Corresponding Author: Dr. Rajesh K Mishra, Senior Resident, Dept. Of Orthopaedics & Traumatology, GMC, Bhopal (MP), India

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Abstract

Aim: Assessment of the outcomes of antegrade nailing and retrograde nailing for distal femur fractures.

Materials and methods: 20 men and 10 women aged 20 to 70 [mean, 48] years half of which underwent antegrade and half retrograde interlocking nailing between sept 2014 and sept 2017 for distal femoral fractures were reviewed. Patients were assessed using the modified knee-rating scale of the Hospital for Special Surgery.

Results: The mean range of knee flexion was 105^0 [range 90-115] in retrograde nailing (figure 1,2) and 106^o [range, 90^o–120^o]for antegrade nailing. The final functional outcome was almost similar in both the methods with a slightly better outcome in retrograde nailing.

Conclusion: Antegrade interlocking nailing achieved good-to-excellent outcomes for distal femoral fractures in similar way as retrograde nailing did.

Keywords: Antegrade nailing, Distal Femoral fractures, Retrograde Nailing

Introduction

Supracondylar femoral fractures occur in the distal 9 cm of the femur between the diaphyseal metaphyseal junction and the femoral condyles[1]. The treatment goals are correction of axial alignment, leg length, and rotation, restoration of range of motion, early bone union, and return to normal function[2]. While in the treatment of femoral shaft fractures intra-medullary nailing early became the gold standard, operative strategies in distal femoral fractures refrained to classic plate osteosynthesis [ORIF procedures] for a long period, though it was

associated with high complication rates[3]. Fixation with a lateral condylar blade plate, dynamic condylar screws, or locking compression plates for intra-articular fractures enables early mobilisation of the knee joint [4-6]. However, all these techniques involve opening the fracture site and draining of the haematoma. This results in excessive soft tissue disruption, blood loss, and operating time, and may also require periosteal stripping. Delayed union/ non-union, bone grafting, and infection may ensue [4-9]. Closed intra-medullary nailing minimises the extent of soft-tissue dissection and devitalisation, and the fracture haematoma is not disturbed. Early fracture healing is predictable because of abundant callus formation, and complications are few. Retrograde nailing for distal femoral fractures is associated with stiffness and infection of the knee. Antegrade interlocking nailing avoids these complications. We therefore assessed the outcomes of antegrade nailing and retrograde nailing , comparing both for distal femur fractures in our study.

Materials and methods

This prospective clinical study was conducted in our medical college and hospital. Records of 20 men and 10 women aged 20 to 70 [mean, 48] years, half of which underwent antegrade and half retrograde interlocking nailing, between sept 2014 and sept 2017 for distal femoral fractures reviewed. The causes of injury included motor vehicle accidents [n=27] and falls [n=3]. All the patients had closed fractures. X-rays were done, Prophylactic antibiotics were given half an hour prior to surgery, tourniquet was used.

Inclusion criteria

1. Age 20-70years
2. Closed fractures

Exclusion criteria

1. Pathological fractures
2. Concomitant fractures in the same limb.

Technique of Antegrade nailing: For antegrade nailing, under general or spinal anaesthesia, patients were placed in a supine position on a fracture table; the unaffected leg was flexed 90º at the hip and placed abducted in a leg holder. The affected leg was put in an extension shoe for traction. The skin 70 mm proximal to the tip of the greater trochanter was incised. A guide pin was inserted and confirmed under a C-arm after palpating the tip of the greater trochanter . The medullary canal was prepared, and the reamer guide and nail guide were passed across the fracture site and centred in both anteroposterior and lateral planes. The canal was over-reamed 0.5 to 1 mm more than the diameter of the selected nail.

Technique of Retrograde nailing : patients were positioned supine on an operation table with the leg

Flexed at 40^0-60^0 and distal femur was supported by a pillow to facilitate reduction. For nail insertion a medial paraligamenteous or transligamenteous incision was used. The distal fragment was opened under direct vision and fluoroscopic control at the entry point by the use of an guide wire and a cannulated reamer.

Patients were assessed using the modified knee-rating scale of the Hospital for Special Surgery [Table 1] which places more emphasis on motor strength than ligamentous instability, because instability of the knee is not common after distal femoral fracture [10]

Table I. The modified knee-rating scale* of the Hospital for Special Surgery [10]

* Scores	≥85	excellent
	70-84	good
	60-69	fair
	≤60	Poor

Item	Scores
Pain [30 points]	
During walking	
None	15
Mild	10
Moderate	5
Severe	0
At rest	
None	15
Mild	10
Moderate	5
Severe	0
Function [22 points]	
Walking and standing	
Unlimited	12
5–10 blocks, standing >30 mins	10
1–5 blocks, standing 15–30 mins	8
<1 block	4
Cannot walk	0
Stairs	
Normal	5
With support	2
Transfer	
Normal	5
With support	2
Range of motion [15 points]	
80º	10
90º	11
100º	12
110º	14
120º	15
Muscle strength [15 points]	
Grade 5	15
Grade 4	12
Grade 3	9
Grade 2	6
Grade 1	3
Grade 0	0
Flexion deformity [10 points]	
None	10
0º–10º	8
10º–20º	5
>20º	0
Instability [5 points]	
None	5
0º–5º	4
6º–15º	2
>15º	0
Total [97 points] -	
Subtractions	
Walking aid	
One cane	1
One crutch	2
Two crutches	3
Extension lag	
5º	2
10º	3
15º	5
Deformity [5º=1 point]	
Varus -	
Valgus -	

Results

The mean operating time was 3 hrs[range 2–4]. All fractures were reduced by the closed techniques and no bone grafting was required. The mean non–weight-bearing period was 7 [range 4–10] weeks. The mean time to bone union [formation of circumferential bridging callus across the fracture] was 14 [range 10–18] weeks in antegrade and 16 [range 10-20] weeks in retrograde nailing . The mean follow-up period was 18 [range 11-30] months. Functional outcome given in table-

Table II. Functional Outcome

Outcome	Total patients	Antegrade nailing	Retrograde nailing
Excellent	18	9	9
Good	12	5	7
Fair	0	0	0
Poor	0	0	0

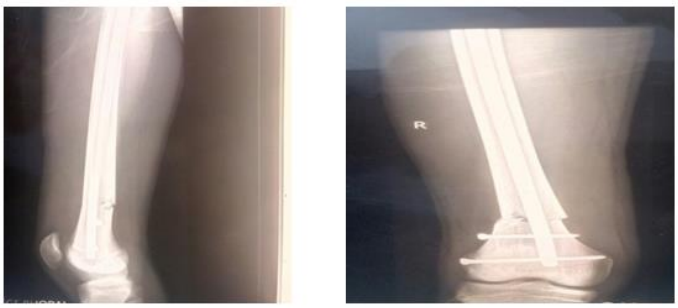
The mean range of knee flexion was 105^0 [range 90-115] in retrograde nailing (figure 1,2) and 106º [range, 90º–120º]for antegrade(figure 3,4) ; 5 patients had 90º, 10 had 100º, 5 had 110º, and 10 had ≥120º of knee flexion.

A: LATERAL VIEW B: AP VIEW

Figure 1: Supracondylar Femur Fracture treated with Retrograde Nailing

A: FLEXION(SIDE VIEW)B: FLEXION(FRONT VIEW) C: EXTENSION

Figure 2: Range of Motion (ROM) after Retrograde Nailing.



A: LATERAL VIEW B: AP VIEW

Figure 3: Supracondylar Femur Fracture treated with Antegrade Nailing

A: EXTENSION B: FLEXION

Figure 4: Range of Motion(ROM) after Antegrade Nailing

All achieved full extension. All patients attained full quadriceps strength. No patient had ligamentous instability, nerve injuries, superficial or deep infections or implant failure. Only one patient had the implant removed in retrograde nailing. 4 patients had malunion, 2 in antegrade and 2 in retrograde nailing. Those 2 antegrade nailing showed acceptable malunion and 2 retrograde nailing also showed acceptable malunion. In retrograde nailing, most of the knees were reported to be absolutely stable and upon clinical examination, no evidence of PCL compromise could be found. there was no functional problem or shortening. The mechanical axis was not deviated. All fractures healed with minimum deformity and no patient had incongruity of the weight-bearing articular surface. The knee Range of motion and functional outcome of all patients is depicted in table III.

Table III: Knee ROM and Functiona outcomes of the patients

Patient outcome	Knee ROM	Functional
1	120^0	excellent
2	140^0	excellent
3	120^0	good
4	130^0	excellent
5	110^0	good
6	100^0	excellent
7	90^0	good

8	100^0	excellent
9	90^0	good
10	100^0	excellent
11	100^0	good
12	110^0	excellent
13	90^0	good
14	100^0	excellent
15	100^0	good
16	110^0	excellent
17	100^0	excellent
18	140^0	excellent
19	110^0	excellent
20	90^0	good
21	100^0	excellent
22	90^0	good
23	100^0	excellent
24	100^0	excellent
25	120^0	excellent
26	130^0	excellent
27	100^0	excellent
28	120^0	good
29	120^0	good
30	120^0	good

Discussion

Distal femoral fractures are generally high velocity trauma, also more comminution seen , poor bone stock in elderly with implants due to precious surgeries , all these factors may lead to difficulty in operative management of distal femoral fractures. Plate osteosynthesis by conventional techniques [ORIF] leads to surgical trauma and impairment of the local vascularity, which causes high rates of septic complications and primary non-unions [3]. Special implants according to the anatomy of the distal femur and minimal invasive techniques are distal femur LCP and retrograde femoral nails ,but plates and screws may produce a load shielding effects[11, 12] . Antegrade interlocking nails can also be used for distal femoral fractures with some changes in the nail distally. Patients with severe osteoporosis or pathologic fracture would have from minimal blood loss and early weight bearing if we use retrograde nailing [13]. Obstruction of the femoral canal due to implants or prostheses inside the medullary cavity is reported up to 50 % [14, 15]. Furthermore, high rates of ipsilateral femoral pathologies are seen in patients over 55 years [16]. Also, some deformities of the proximal femur like severe hip dysplasia, Girdlestone hip etc. represent an ideal indication for retrograde nailing, which sometimes may be the only treatment option. Comparing the results of antegrade and retrograde femoral IMN reveals no significant differences in respect to operation time, radiation exposure, technical complications and bone union rates [17-19]. Our study too had similar results in terms of operation time and bony union in both techniques. Thigh pains are dominant in antegrade nailing while minor knee pains seem to be slightly dominant and quite common in retrograde nailing with rates between 13 % and 60 % [17-23]. In our study too, thigh pain was seen more in antegrade nailing and knee pains in retrograde nailing. Literature says there may be possible intra-articular lesions due to insertion of the nail into the femoral groove, namely the posterior cruciate ligament.

Carmack et al. found that, an optimal entry point in line with the long femoral axis A.P. and lateral by fluoroscopy guide alone resulted in 100% of the portals located within a safe area in relation to the patello-femoral joint and no damage to the PCL [24]. But in our study no such element of damage was seen.

Retrograde IMN provides reliable fracture healing[11, 25] and good functional results, even in the elderly age group [26,16,21,14, 27]. Good results are also seen in extreme osteoporosis[28].In our study, radiological union was about same in both the techniques. *El Kawy et al.* emphasized the benefit of early mobilization provided by IMN ,

though he observed a high rate [35%] of postoperative mal-alignment[21]. A survey of the literature found an average mobility of the knee joints operated with retrograde IMN for distal femoral fractures of 104^0 most functional deficits in retrograde nailing were due to decreased functional knee motion. Our study had similar results with range of motion about same for both the techniques, antegrade being 106^0 and retrograde being 105^0.

Conclusion

Antegrade interlocking nailing achieved good-to-excellent outcomes for distal femoral fractures in similar way as retrograde nailing did. It also minimises the complications of retrograde nailing like knee pain and stiffness, but stability of fracture is more in retrograde nailing. We can conclude from this study that both techniques of nailing doesn't differ much if used by experienced surgeons, with acceptable and similar results in both.

References

1. Albert MJ. Supracondylar fractures of the femur. J Am Acad Orthop Surg 1997;5:163–71.

2. Muller ME, Allgower M, Schneider R, editors. Manual of internal fixation: techniques recommended by the AOASIF group. 3rd ed. New York: Springer-Verlag: 1991.

3. WAGNER, R., WECKBACH, A.: Complications of internal plate fixation in femoral shaft fractures. Analysis of 199 fractures. Unfallchirurg, 97: 139–143, 1994.

4. Chiron HS, Tremoulet J, Casey P, Muller M. Fractures of the distal third of the femur treated by internal fixation. Clin Orthop Relat Res 1974;100:160–70.

5. Schatzker J, Lambert DC. Supracondylar fractures of the femur. Clin Orthop Relat Res 1979;138:77–83.

6. Shewring DJ, Meggitt BF. Fractures of the distal femur treated with the AO dynamic condylar screw. J Bone Joint Surg Br 1992;74:122–5.

7. Giles JB, DeLee JC, Heckman JD, Keever JE. Supracondylar-intercondylar fractures of the femur treated with a supracondylar plate and lag screw. J Bone Joint Surg Am 1982;64:864–70.

8. Siliski JM, Mahring M, Hofer HP. Supracondylar-intercondylar fractures of the femur. Treatment by internal fixation. J Bone Joint Surg Am 1989;71:95–104.

9. Yang RS, Liu HC, Liu TK. Supracondylar fractures of the femur. J Trauma 1990;30:315–9.

10. Insall JN. Surgery of the knee. New York: Churchill Livingstone; 1984.

11. GRASS, R., BIEWENER, A., ENDRES, T., RAMMELT, S., BARTHEL, ZWIPP, H.: Clinical results after DFN- osteosynthesis. Unfallchirurg, 105: 587–594, 2002.

12. HOHAUS, TH., BULA, PH., BONNAIRE, F.: Intramedullary osteosynthesis in the Treatment of Lower Extremity Fractures. Acta Chir. orthop. Traum. čech.,

13. SCHOLL, B. M., JAFFE, K. A.: Oncologic uses of the retrograde femoral nail. Clin. orthop., 394: 219–226, 2002. 75: 52–60, 2008

14. GYNNING, J. B., HANSEN, D.: Treatment of distal femoral fractures with intramedullary supracondylar nails in elderly patients. Injury, 30: 43–46, 1999.

15. KUMAR, A., JASANI, V., BUTT, M. S.: Management of distal femoral fractures in elderly patients using retrograde titanium supracondylar nails. Injury, 31:169–173, 2000.

16. DUNLOP, D. G., BRENKEL, I. J.: The supracondylar intramedullary nail in elderly patients with distal femoral fractures. Injury, 30: 475–484, 1999.

17. OSTRUM, R. F., AGARWAL, A., LAKATOS, R., POKA, A.: Prospective comparison of retrograde and antegrade femoral intramedullary nailing. J. orthop. Trauma, 14: 496–501, 2000.

18. RICCI, W. M., BELLABARBA, C., EVANOFF, B., HERSCOVICI, D., DI PASQUALE, T., SANDERS, R.:

Retrograde versus antegrade nailing of femoral shaft fractures. J. orthop. Trauma, 15, 161–169, 2001.

19. TORNETTA, P. III., TIBURZI, D.: Antegrade or retrograde reamed femoral nailing. A prospective, randomised trial. J. Bone Jointt Surg., 82-B: 652–654, 2000.

20. SALEM, K. H., MAIER, D., KEPPLER, P., KINZL, L., GEBHARD, F.: Limb malalignment and functional outcome after antegrade versus retrograde intramedullary nailing in distal femoral fractures. J. Trauma, 61: 375–381, 2006.

21. EL-KAWY, S., ANSARA, S., MOFTAH, A., SHALABY, H., VARUGHESE, V.: Retrograde femoral nailing in elderly patients with ;supracondylar fracture femur is it the answer for a clinical problem? Int. Orthop. 31: 83–86, 2007.

22. HENDOLIN, L., PAJARINEN, J., LINDAHL, J., HIRVENSALO, E.: Retrograde intramedullary nailing in distal femoral fractures – results in a series of 46 consecutive operations. Injury, 35: 517–522, 2004.

23. LEGGON, R. E., FELDMANN, D. D.: Retrograde femoral nailing: a focus on the knee. Amer. J. Knee Surg., 14: 109–118, 2001.

24. CARMACK, D. B., MOED, B. R., KINGSTON, C., ZMURKO, M., WATSON, J. T., RICHARDSON, M.: Identification of the optimal intercondylar starting point for retrograde nailing: an anatomic study. J. Trauma, 55: 692–695, 2003.

25. PAPADOKOSTAKIS, G., PAPAKOSTIDIS, C., DIMITRIOU, R., GIANNOUDIS, P. V.: The role and efficacy of retrograde nailing for the treatment of diaphyseal and distal femoral fractures: a systemic review of the literature. Injury, 36: 813–822, 2005.

26. ARMSTRONG, R., MILLIREN, A., SCHRANTZ, W., ZELIGER, K.: Retrograde interlocked intramedullary nailing of supracondylar distal femur fractures in an average 76-year-old patient population. Orthopedics, 26: 627–629, 2003.

27. JANZIG, M. J., VAES, F., VANDAMME, G., STOCKMAN, B., BROOS, O.: Treatment of distal femoral fractures in the elderly. Unfallchirurgie, 24: 55–59, 1998.

28. SCHMEISER, G., VASTMANS, J., POTULSKI, M., HOFMANN, G. O., BÜHREN, V.: Treatment of paraplegics with fractures in the area of the knee using a retrograde intramedullary GSH nail. Unfallchirurg, 105: 612–618, 2002.