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Article

A study of functional outcome of dynamic hip screw versus proximal femur locking compression plate in unstable intertrochanteric fracture of femur

Dr. Vinay Kumar C[1,*], Dr. Santhosh Babu[1], Dr. Lawrence Mathias[2] and Dr. Vikram Shetty[2]

[1] Assistant Professor, Department of Orthopaedics, Nitte University K S Hegde Medical Academy, Mangalore Karnataka, India.
[2] Professor, Department of Orthopaedics, Nitte University K S Hegde Medical Academy, Mangalore Karnataka, India.
* Correspondence: vinayck8@gmail.com

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Abstract: Introduction: Fractures of the proximal femur are a big challenge in traumatology. Trochanteric fractures of the femur are rising in incidence. By definition pertrochanteric fractures are those occurring in the region extending from the extracapsular basilar neck to the region along the lesser trocchanter before the development of the medullary canal. Intertrochanteric and peritrochanteric are generic terms for pertrochanteric fractures.
Material and Methods: This is a Randomized and prospective study. All the patients with unstable intertrochanteric fracture femur, presenting to the Orthopedic Department of K.S.Hegde Charitable hospital from October 2011 to October 2013 are included in the study after explaining the procedure and getting the consent. 30 patients meeting the criteria are included for the present study and are randomized equally into two groups: 15 DHS cases and 15 PF- LCP. The study follow up requires evaluation at discharge, 6 weeks 3 months and 6 months. Patient information, including age and sex, nature of violence, type of fracture, associated injuries, operative treatment including and length of hospital stay will be recorded for each patient.
Results: In our series of 30 patients 4 patients expired due to associated medical problems. Functional outcome was assessed by taking the remaining 26 patients into consideration of which 14 patients were from DHS group and 12 patients from PF-LCP group. Among the 15 patients operated by PF-LCP, 8(53.3%) patients were found to have intertrochanteric fractures on the left side while 7(46.7%) patients were found to have fracture on the right side. Among the 15 patients operated by DHS, 3(20%) patients were found to have intertrochanteric fractures on the left side while 12(80%) patients were found to have fracture on the right side. In our present study we consider unstable intertrochanteric fractures Type2, Type 3 and Type 4 as classified by Boyd and Griffin We had 19(63.3%) patients of Type 2, 9(30%) patients of Type 3 and 2(6.67%) patients of Type 4 intertrochanteric fracture.
Conclusion: We conclude that DHS is a better alternative in unstable intertrochanteric fractures when compared to PF-LCP as the functional outcome was better and the complications were fewer in the DHS group when compared to PF-LCP group. The advantages of DHS being the ease and expertise with the procedure, the mechanism of sliding of the plate allowing the fracture to collapse into a stable configuration. PF- LCP being a complex system needs further understanding of the plate biomechanics.

Keywords: Functional Outcome of Dynamic Hip Screw; Proximal Femur Locking Compression Plate; Intertrochanteric Fracture of Femur.

1. Introduction

Fractures of the proximal femur are a big challenge in traumatology. Trochanteric fractures of the femur are rising in incidence. By definition pertrochanteric fractures are those occurring in the region extending from the extracapsular basilar neck to the region along the lesser trocchanter before the development of the medullary canal. Intertrochanteric and peritrochanteric are generic terms for pertrochanteric fractures [1].

Peritrochanteric fractures account for nearly 50% of fractures around hip. They continue to be a major cause of disability leading to reduced quality of life and also death [2]. More than 280,000 hip fractures occur in the United States every year, and this incidence is expected to double by 2050. These fractures are associated with substantial morbidity and mortality; 30% of elderly patients die within 1 year of fracture. After 1 year, patients seem to resume their age-adjusted mortality rate [3].

Low energy falls from a standing height account for approximately 90% of community hip fractures in patients more than 50 years of age, with a higher proportion of women. Higher energy hip fractures are relatively rare; they are more common in men less than 40 years of age [4].

Cummings et al noted that neither age related osteoporosis nor the increasing incidence of falls with age sufficiently explains the exponential increase in incidence of hip fracture with aging. Their hypothesis was 4 conditions correlated for a fall to cause a hip fracture [5].

In low energy falls resulting in hip fractures associated injuries are most commonly distal radius and proximal humerus fractures and minor head injuries that occur during the fall. High energy hip fractures are more commonly associated with ipsilateral extremity trauma, head injury and pelvic fractures [6].

Intertrochanteric fractures can be managed by conservative or operative methods. Conservative methods were the treatment of choice until 1960. In the 1960s HOROWITZ reported mortality rate of 34.6% for intertrochanteric fractures treated by traction and 17.5% for fractures treated by internal fixation. As conservative methods resulted in higher mortality rates and complications like decubitus ulcer, urinary tract infections, pneumonia, thromboembolic complications these methods have been abandoned [7].

Non operative management is considered in non ambulatory, chronic dementia patients with pain that is controllable with analgesics and rest, terminal disease with less than 6 weeks of life expected, unresolvable medical co-morbidities that preclude surgical treatment and active infectious diseases that preclude insertion of a surgical implant [8].

Operative procedure- PF-LCP

Figure 1. Patient positioning

Figure 2. Painting

Figure 3. Draping

Figure 4. Incision split

Figure 5. Tensor fascia lata

Figure 6. Insertion of plate(a)

Figure 7. Insertion of plate(b)

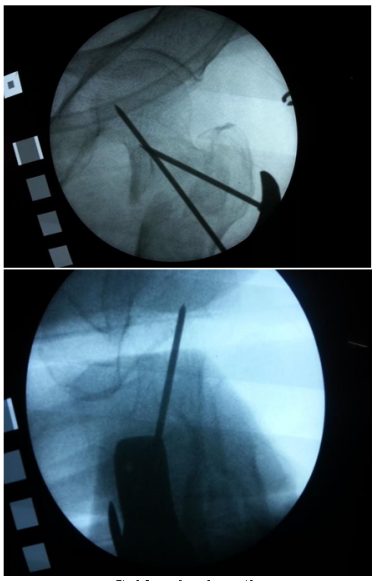


Figure 8. Guide wire insertion

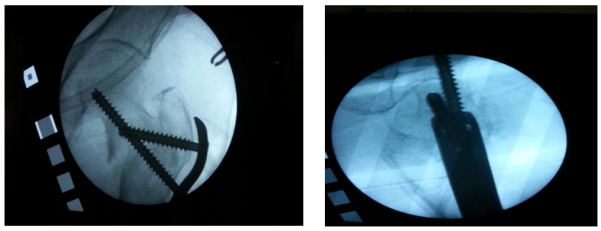


Figure 9. Cannulated cancellous screw insertion

Operative procedure-DHS

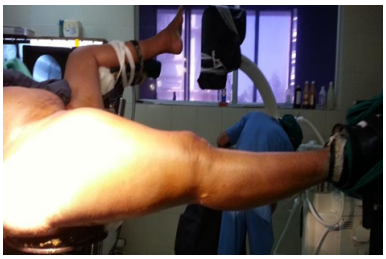


Figure 10. Patient positioning

Figure 11. Painting

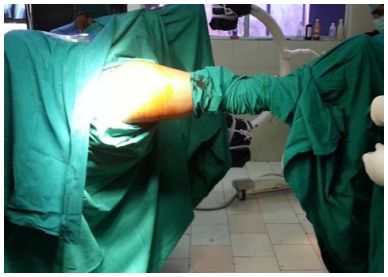


Figure 12. Draping

Figure 13. Incision

Figure 14. Insertion of guide wire

Figure 15. Triple reaming

Figure 16. Insertion of Sliding hip screw(a)

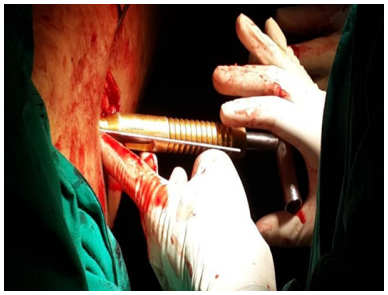


Figure 17. Insertion of Sliding hip screw(b)

Figure 18. Insertion of plate

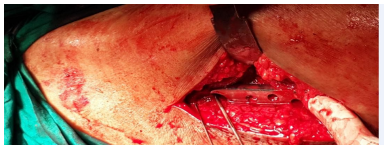


Figure 19. Fixation of plate(a)

Figure 20. Fixation of plate(b)

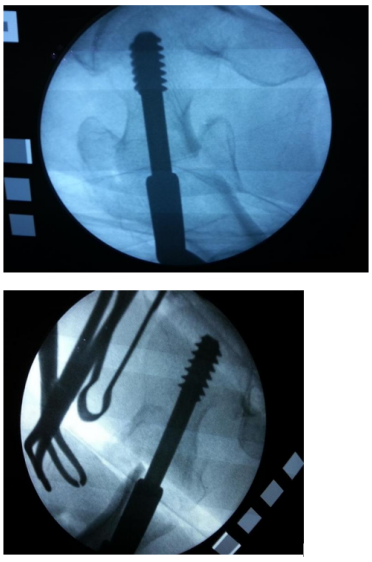


Figure 21

2. Material and methods

This is a Randomized and prospective study. All the patients with unstable intertrochanteric fracture femur, presenting to the Orthopedic Department of K.S.Hegde Charitable hospital from October 2011 to October 2013 are included in the study after explaining the procedure and getting the consent.

2.1. Inclusion criteria

All skeletally mature patients presenting with unstable intertrochanteric fracture of femur (type2, 3 and 4 BOYD and GRIFFIN).

2.2. Exclusion criteria

If you need to add numbers, use following

- Pathological fractures,
- Open fractures,
- Multiple fractures,
- History of previous injury or surgery of the affected hip.

2.3. Sample size

30 patients meeting the criteria are included for the present study and are randomized equally into two groups: 15 DHS cases and 15 PF- LCP
The study follow up requires evaluation at discharge, 6 weeks 3 months and 6 months. Patient information, including age and sex, nature of violence, type of fracture, associated injuries, operative treatment including and length of hospital stay will be recorded for each patient. Radiographs are taken postoperatively, at 3 months and 6 months. Functional outcomes for pain, walking, motion and muscle power, and function are assessed using the Salvati and Wilson scoring system.

2.4. Statistical method used

Percentages, the arithmetic mean, Chi-square test were employed using SPSS for Windows software (version 16.0). P-value <0.05 was considered statistically significant.

3. Results

The following observations were made from the data collected during this comparative study of functional outcome of unstable intertrochanteric fractures in 30 patients treated with DHS and PF-LCP in Department of Orthopaedics , K S HEGDE Charitable Hospital from October 2011 to October 2013.

Table 1. Age wise disribution

Age	No of cases in DHS	No of cases in PF-LCP
20-40	1(6.7%)	1(6.7%)
41-50	2(13.3%)	2(13.3%)
51-60	3(20%)	2(13.3%)
61-70	3(20%)	7(46.7%)
71-80	4(26.7%)	1(6.7%)
81-90	1(6.7%)	2(13.3%)
>91	1(6.7%)	0
Total	15	15

Table 2. Sex wise distribution

Sex	No of patients in DHS	No of patients in PF-LCP
Male	6(40%)	9(60%)
Female	9(60%)	6(40%)
Total	15	15

Table 3. Mode of trauma

Mode of trauma	No of cases
Fall from height	4(13.3%)
Domestic fall(slip and fall)	24(80%)
RTA	2(6.67%)

Table 4. Side of injury

Side	**DHS**	**PF-LCP**
Left	3(20%)	8(53.3%)
Right	12(80%)	7(46.7%)
Total	15	15

Table 5. According to type of fracture

Type of fracture	**No of cases**
Type 2 Boyd and Griffin	19(63.3%)
Type 3 Boyd and Griffin	9(30%)
Type 4 Boyd and Griffin	2(6.67%)
Total	30

Table 6. Comparison of complications between DHS and PF-LCP

Complications	**No of cases in DHS**	**No of cases in PF-LCP**
Infection	1	0
Hip and knee stiffness	1	2
Varus malunion and Shortening >1cm	1	2
Screw loosening, cutout	0	4
Non union	0	2
Implant breakage	0	0

Functional outcome

In our series of 30 patients 4 patients expired due to associated medical problems. Functional outcome was assessed by taking the remaining 26 patients into consideration of which 14 patients were from DHS group and 12 patients from PF-LCP group.

Table 7. Comparison of functional outcome in DHS & PF-LCP

Functional outcome	**DHS**	**PF-LCP**
Excellent	0	0
Good	5(35.7%)	3(25%)
Fair	8(57.1%)	7(58.3%)
Poor	1(7.1%)	2(16.6%)

4. Discussion

In our study most of the patients were between 40-70 years. Mean age group of patients treated with DHS was 65.67 and PF- LCP was 63.53. Maximum age was 94 years and minimum age was 26 years.

Mean age in years both groups combined was 64.6. This signifies the fact that patients from these age groups are involved in low energy trauma like domestic fall (fall at home) 9. Average age reported by other studies is as follows;

In the present study male: female ratio was 50:50. This is in contrast to female preponderance as observed by various other authors.

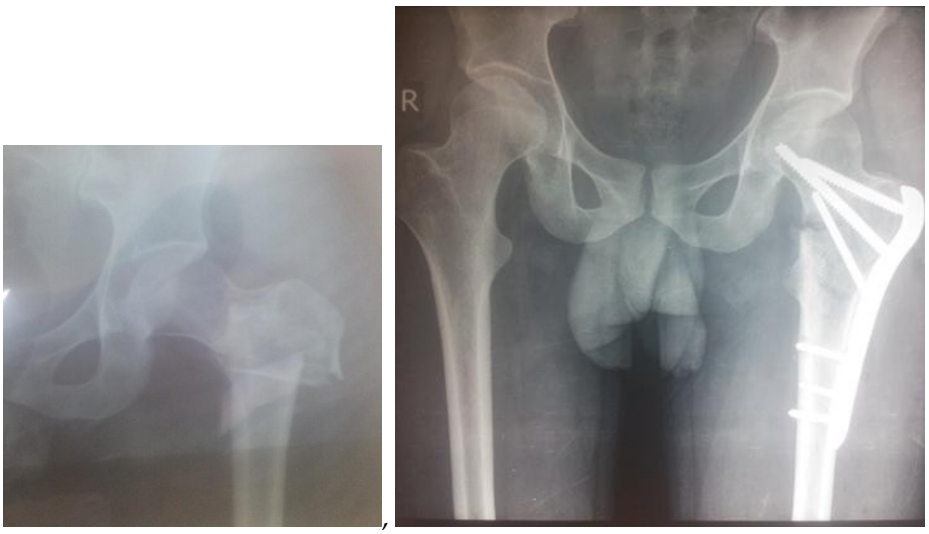
Among the 15 patients operated by PF-LCP, 8(53.3%) patients were found to have intertrochanteric fractures on the left side while 7(46.7%) patients were found to have fracture on the right side. Among the 15 patients operated by DHS, 3(20%) patients were found to have intertrochanteric fractures on the left side while 12(80%) patients were found to have fracture on the right side. In studies conducted by Wade P A and R C Gupta right sided fractures were more common, whereas in studies made by Kenzor et al. and Cleveland et al. left side fracture were common [10,11,13].

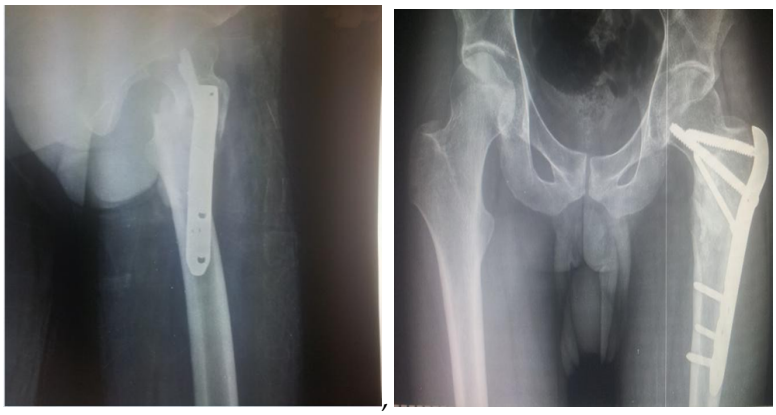
In our present study we consider unstable intertrochanteric fractures Type2, Type 3 and Type 4 as classified by Boyd and Griffin We had 19(63.3%) patients of Type 2, 9(30%) patients of Type 3 and 2(6.67%) patients of Type 4 intertrochanteric fracture. These results are comparable with Arun Kumar Singh et al. in which Type II were common followed by Type III & Type IV [14,15].

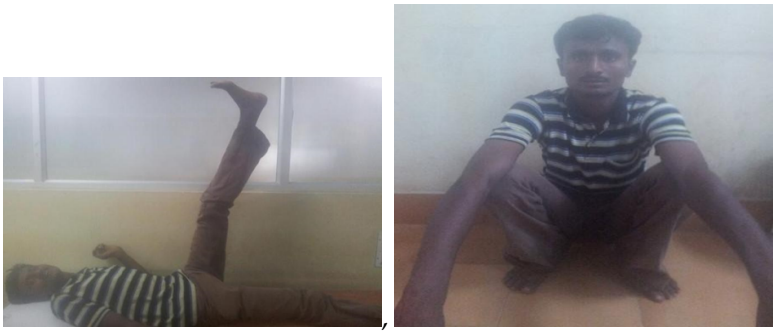
According to Mervin Evans the Intertrochanteric fractures are considered as stable or unstable depending upon integrity of posteromedial cortex. Fractures with intact posteromedial cortex are considered as stable fractures while fractures with loss of posteromedial cortex are considered as unstable fractures. Posteromedial cortex constitutes mainly the lesser trochanter. This also correlated with the finding of Jacobs and coworkers (1980) that incidence of comminuted unstable intertrochanteric fractures is increasing [16].

In our study 3 patients among 14 patients had complications in DHS group. 1(6.67%) patient had infection, 1(6.67%) patient developed stiffness of hip and knee and 1(6.67%) patient had varus malunion with shortening of the limb. In this study, 3 patients among the 12 patients had complications in PF-LCP group. 4 patients had screw loosening among which. In 1 patient the third proximal screw backed out which was removed percutaneously at 6 weeks. This patient developed varus malunion with shortening of the lower limb. 1 patient had backing out of the second proximal screw which further resulted in varus malunion and shortening of the lower limb. 1 patient had loosening and backing out of all 3 proximal screws which further resulted in non union. He was treated with implant removal and hemiarthroplasty. 1 patient had backing out of 2 proximal screws which resulted in proximal migration of the plate and non union. Considering her age and medical condition she was managed conservatively.

Functional outcome was assessed among 26 patients of which 14 were from DHS group and 12 from PF-LCP group. It was assessed using Salvati and Wilson scoring system.16 Among the DHS group 0 patients had excellent results, 5(35.7%) patients had good results, 8(57.1%) patients had Fair results and 1 (7.1%) patient had poor results. Among the PF-LCP group 0 patients had excellent results, 3(25%) patients had good results, 7(58.3%) patients had Fair results and 2 (16.6%) patient had poor results.






5. Conclusion

We conclude that DHS is a better alternative in unstable intertrochanteric fractures when compared to PF-LCP as the functional outcome was better and the complications were fewer in the DHS group when compared to PF-LCP group. The advantages of DHS being the ease and expertise with the procedure, the mechanism of sliding of the plate allowing the fracture to collapse into a stable configuration. PF- LCP being a complex system needs further understanding of the plate biomechanics. Its locking capability along with its possible minimally invasive insertion technique makes it an attractive alternative. However in our experience we had 4 complications among the 12 patients treated with PF-LCP. This may be the result of patient factors like poor bone quality, as well as technical factors like improper plate placement, screw length, possibly lack of adequate compression across the fracture site. However there appears to be high rate of complications when compared to DHS even when the device is inserted by an experienced trauma surgeon.

This procedure can be adopted in patients where use of conventional implants is not desirable, when the fracture is highly comminuted and in patients with osteoporosis. This implant is not advocated to be used in a patient where initial fracture reduction could not be obtained. This procedure was technically more difficult when compared to conventional Dynamic hip screw. Though complications were more in our series with PF-LCP a larger series will be needed to know the true value of PF-LCP in the treatment of unstable intertrochanteric fractures.

Author Contributions: All authors contributed equally to the writing of this paper. All authors read and approved the final manuscript.

Conflicts of Interest: The authors declare that they do not have any conflict of interests.

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