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Clinical study of fixation of unstable inter-trochanteric femoral fractures with 95° angle blade plate

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Abstract

Background: Inter-Trochanteric hip fractures account for approximately half of the hip fractures in the elderly. By definition, these are extra-capsular fractures occurring between greater and lesser trochanters of the proximal femur, occasionally extending into sub-trochanteric region. These fractures present in bimodal age distribution. In older females these osteoporotic low energy fractures, while in young patients, usually males are affected with high energy injuries. Intertrochanteric fractures unite with conservative management also, but not without high rate of complications. Therefore, Stable reduction and rigid internal fixation is the treatment of choice for these fractures. In the present study, attempt has been made to evaluate the results of surgical management of unstable inter-trochanteric fractures with a 95 degrees angle blade plate.

Materials and Methods: This study is a hospital based prospective study cantered in Department of Orthopaedics at R.L Jalappa Hospital and Research Centre, Kolar, from October 2012 to October 2014 in which 30 patients with Unstable inter-trochanteric fractures are treated with open reduction and internal fixation with 95 degrees angle blade plate.

Results: Patients were regularly followed-up post-operatively. Thirty cases were available for follow up. Excellent results were seen in 21 patients, good results in 7 patients, fair results in 2 patients and poor results in none.

Conclusion: This study has shown that the 95 degrees angle blade plate fixation is a reliable and effective treatment of trochanteric fractures. This plate can be used for both stable and unstable intertrochanteric fractures. The final result is dependent on various other factors such as the type of fractures, lateral wall comminution and stability of the medial wall post reduction. The operative technique and final implant position also influenced the results. Over-all results also were dependent on co-morbidities of the patients. The ideal position of the implant is to keep the tip of the blade in the lower half of the femoral head and the blade should pass below the superior cortex of the neck. The 95 degrees angle blade plate is found to be a stable and acceptable implant for the fixation of intertrochanteric fractures.

Keywords: Inter-trochanteric fractures, hip fractures, 95 degrees angle blade plate, condylar blade plate

Introduction

Intertrochanteric fractures are seen more commonly in osteoporotic bones in elderly population and most of them result from a simple fall from standing height ^[1, 2]. They are almost 4 more common in women than in men ^[3]. Though the energy is low, comminution of the fracture is usually seen due to osteoporosis ^[4]. Intertrochanteric fractures also occur in the young, most commonly in men after high energy injuries ^[5]. A cadaver study has shown that the energy required for this fracture is very high in young adults ^[2].

Osteoporotic hip fractures have been increasing in Asia as per the Asian Audit Report, 2009 ^[7]. ^[8]. It is also estimated that the incidence of hip fracture will rise from 1.66 million in 1990 to 6.26 million by 2050. According to this report, more than 50% of all osteoporotic fractures will occur in Asia after 2050. Hip fractures are associated with an in-hospital mortality of 7-14 % due to old age and co-morbidities ^{9, 10}. In the earlier days, intertrochanteric fractures were treated conservatively with traction and bed rest. These fractures unite with conservative management but this method is associated with high mortality and morbidity rates.

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Regarding mortality for these fractures, 30% of elderly patients die within 1 year of fracture. After 1 year, patients resume their age-adjusted mortality rate ^[11].

According to current guidelines all hip fracture surgeries should be done within 72 hours of injury. There are studies to suggest that earlier surgery is associated with better functional outcome and lower rates of non-union, shorter hospital stays and shorter duration of post-operative pain and lower rates of complication and mortality ^[12-14]. Internal fixation of trochanteric fractures is a life saving measure in the elderly ¹⁵. Proper precautions are to be taken during surgery to prevent complications like coxa vara deformity, shortening, limited hip movements and secondary osteoarthritic changes in the hip.

Early post-operative ambulation and physiotherapy is crucial and the best approach for the patient. The overall goal is returning of patient to pre-morbid level of function.

Materials and Methods

The present study includes 30 cases of unstable inter trochanteric fracture of femur in adult patients above 20 years of age irrespective of sex, treated by open reduction and internal fixation with 95 degrees angle blade plate, in the Department of Orthopaedics at R.L Jalappa Hospital and Research Centre, Kolar, from October 2012 to October 2014, selected on the basis of purposive sampling (Judgment sampling) method. This study was conducted with due emphasis on clinical observation and analysis of results after surgical management of unstable intertrochanteric fractures with 95 degrees angle blade plate. Gustilo-Anderson's Type III C open fractures, Pathological fractures, Multiple fractures in the femur, Previous surgeries on ipsilateral hip/femur and medical disorders that definitively influence a patient's rehabilitation were excluded from the study.

Diagnosis was confirmed through antero-posterior and lateral radiographs of pelvis with both hips. Fractures were classified according to Evans's classification. Routine pre-operative work up was done. Pre-operative templating was done and appropriate angled blade plate was chosen. The patients were prepared and procedures were carried out under Spinal Anaesthesia. Fractures were managed by open reduction and internal fixation using 95 degree Angle Blade Plate. Post-operative x-ray was taken once the patient was comfortable (Figure 1).

Quadriceps and hip muscle exercises were initiated on 1st post-operative day. Patients were allowed with partial weight bearing with the help of frame. Suture removal was done between tenth to twelfth post-operative day. The patients were assessed for any shortening or deformities, if any and discharged from the hospital. Patients who had infection were treated accordingly before discharging them from the hospital. Complete weight bearing was allowed after fracture union was seen on X-ray. Patients were followed up at 2 and 6 months post operatively and assessed using Harris Hip Score. All the details were recorded in the follow up chart. The radiograph of the operated hip was taken at each follow up.

Results

In our study, 18 were male patients and 12 were females. 16 patients had fracture on the right side and 14 patients had a fracture on the left side and. Among them the minimum age was 38 years and maximum age noted was 103 years. Fifty percent of the patients were in the age group of 61 - 70 years, with the mean age of 64.8 years for males and 70.1 years for females. The study showed a male preponderance over

females. Nineteen fractures were due to domestic self-fall and 11 were due to high energy road traffic accidents. Co morbidities like hypertension was seen in 3, anaemia in 6 and diabetes in 3 patients. In this series 5 fractures were Evans Type III fractures, followed by 10 cases of type IV, 10 cases of type V and 5 cases of Reverse Oblique Type. The mean duration of hospital stay for the sample was 20.15 ± 8.2 days and the mean duration of post-operative stay for the sample was 10.7 ± 4 days. Twenty seven patients healed normally. Two patients developed superficial infection which healed well with IV antibiotics for 3 weeks and one patient had deep infection for which wound exploration and debridement was done followed by IV antibiotics for 3 weeks. Five patients had occasional pain, 3 patients had mild to moderate pain. Limping was present in 5 cases, coxa vara in 4 cases, shortening in 4 cases and implant failure in 2 patients. Eleven cases showed union by 4 months, 13 cases at 5 months and 4 cases showed union at 6 months duration. 2 cases had implant failure at 1st month and 6th month of follow-up respectively (Figure 2).

Anatomical results were assessed on 30 patients available for follow up by presence or absence of shortening, varus deformities and range of movements in hip and knee joints. 75% of the cases had good results and 25% had fair results (Figure 3). In our study, type II fractures had more of excellent results and good results. The total functional outcome was assessed using Harris Hip Score, which consisted of evaluation of patient on the basis of pain, limp, ambulation with support, distance walked, ability to sit, ability to enter public transport, ability to climb stairs, ability to put on footwear, deformity and range of movements.

In this study, at 2 months follow up, 1 patients scored 'excellent', 19 patients scored 'good' and 8 scored 'fair' results. Poor score was scored by 2 patients. At 6 months follow up, 21 patients scored 'excellent', 7 patients scored 'good' and 2 scored 'fair' results (Figure 4).

Statistical Analysis

The paired difference in Harris Hip Score at 2 and 6 months was not normally distributed and the data had an outlier. Hence, a nonparametric test, Wilcoxon signed rank test was used to compare Harris Hip Score at 2 months and 6 months post operatively. The median difference in Harris Hip Score was computed using Hodges Lehman Estimator along with bootstrapped 95% Confidence Intervals. P value less than 0.05 was considered statistically significant at an alpha of 5% (Table 1).

Discussion

Trochanter fractures are difficult to manage due to possible complications. To avoid these complications they need surgical management with due precautions. Early operative treatment of trochanteric fractures reduces both mortality and morbidity giving best chance of early independency and reducing the risk of prolonged bed rest. Various modalities in terms of implants are available for the management of intertrochanteric fractures. These include both intramedullary and extramedullary implants. Unstable trochanteric fractures are technically much more challenging than stable fractures. These fractures require medial and posterior cortical contact between the major proximal and distal fragments. Hence the surgeon must understand the fracture anatomy and implant options and strive to achieve accurate realignment with proper implant placement.

The present study was done to evaluate the results of surgical treatment of unstable inter-trochanteric fractures with 95° angle blade plate. The study was conducted at R. L Jalappa Hospital and Research Centre, Kolar from October 2012 to October 2014. The patients were operated and all intra-operative details were recorded. The patients were followed up regularly after being discharged from the hospital and their post-operative details were recorded.

The average age incidence in our study was 67 years. The mean age for males was 64.8 years and for females was 70.1 years. Majority of the patients belonged to the age group of 61-70 years. Studies done in Indian population have shown similar mean age of patients; while studies done elsewhere show a higher mean age group. The sex incidence in our study was 60:40 for males: females. In age below 60 years, the incidence was 5:1 for males: females. In age above 60 years, the incidence was 13:11 for males: females. In younger and elderly patients, there is a male preponderance in our study. The most probable reason for this could be because Indian males are more active and more mobile than Indian females. Various other authors have shown to have female preponderance in their studies [16, 17, 19, 21, 22, 23]. In our study, the right hip fractures were found in 53.3% of cases. And the rest 46.7% cases had left hip fractures. Studies conducted by Kesemenli [21] and Arun Kumar Singh [23] show right hip fractures to be more common, whereas a study by Suriyajakyuthana [19] shows left hip fractures to be more common. In our study, most patients (63.3%) sustained intertrochanteric fracture after a trivial fall. Of these, almost all patients were elderly patients. Only 36.7% of our patients had a high energy trauma following a road traffic accident. Among these, the majority were young males. Most other studies such as that of Suriyajakyuthana [19] and Kesemenli [21] have similar outcome regarding the mode of injury. In our study, 2 cases (6.7%) showed breakage in implant. Studies conducted by van Meeteren [18], Suriyajakyuthana *et al.* [19] and Yoo MC *et al.* [20] showed breakage of implants in 5%,

3.5% and 2.5% respectively. We have classified the intertrochanteric fractures in our patients based on the Evans Classification. We found that Type IV and V fractures were the most common (33.3%). Type IV fractures were 33.3%. Type V fractures were 33.3%. Type III fractures constituted 16.7%. Type R fractures were 16.7%. Our results are comparable with the studies of Arun Kumar Singh [23] and studies of Murray and Frew [17].

The average duration of stay for the patients in our study was 20.15 days. In the earlier days, when the patients with intertrochanteric fractures were treated conservatively, the patients were admitted for an average of 6 weeks. This can be seen in the studies of Evans [16] and Murray & Frew [17]. The present day studies of Yong [22] and Kesemenli [21] show that the duration of hospital stay is less than 3 weeks, which is comparable with our study. In our study, 27 patients (90%) healed well without any immediate post-operative complication. 2 patients developed superficial infection, which was treated aggressively with intravenous antibiotics and adequate debridement, after which they healed well and one patient had deep infection for which wound exploration and debridement was done followed by IV antibiotics for 3 weeks. The delayed post-operative complications noted in our study were hip pain, limp, coxa vara and limb shortening.

In our study, at the end of 6 months, 70% (21 patients) scored excellent results, 23.3% (7 patients) had good results, 6.7% (2 patients) had fair results and none had poor results. 2 patients had implant failure of which one needed re-doing. Results showed 75% patients to have good outcome and 25% had fair result. 2 patients had a shortening of almost 1 cm. 4 patients had varus angulation and 7 patients had restriction of hip movements. Knee movement restrictions were noted in 2 patients.

Limitations of study were small sample size short follow up period. A longer follow up period is needed to evaluate the late complications.

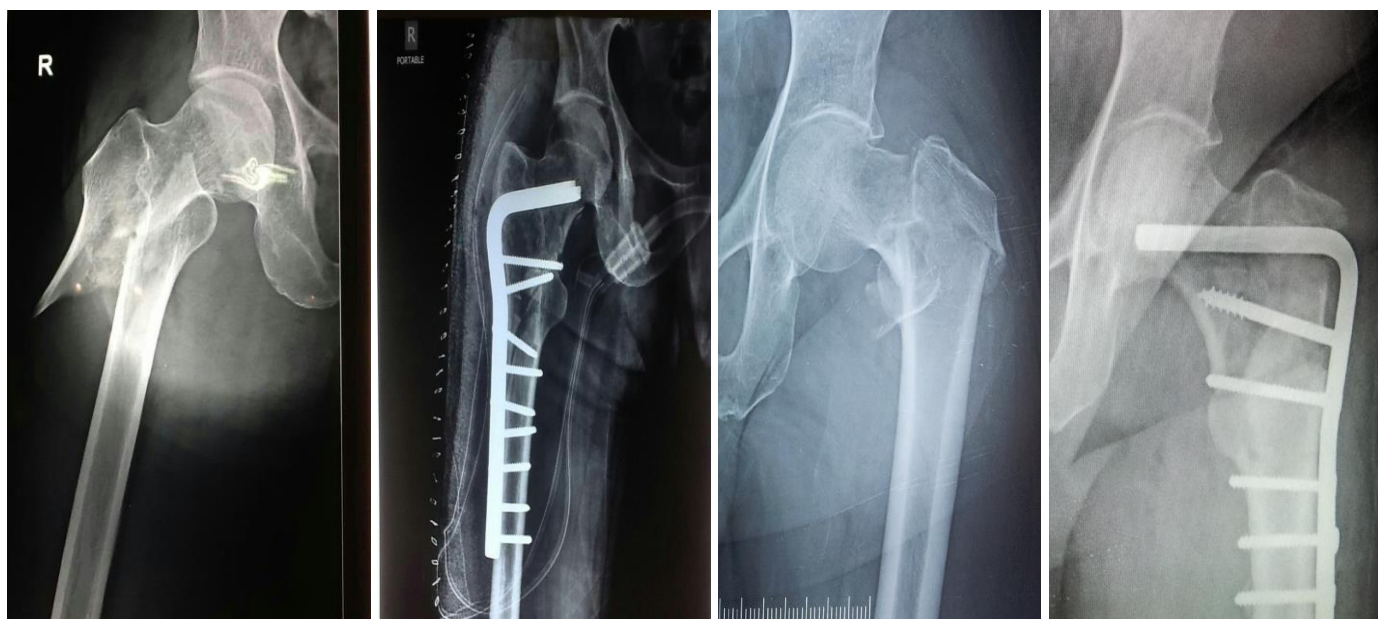


Fig 1: Preoperative x-ray and Post-Operative Radiographs

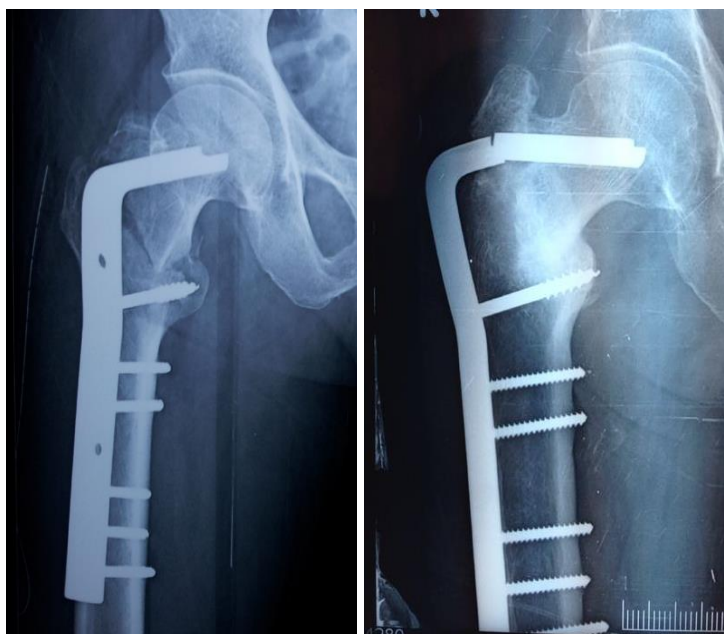
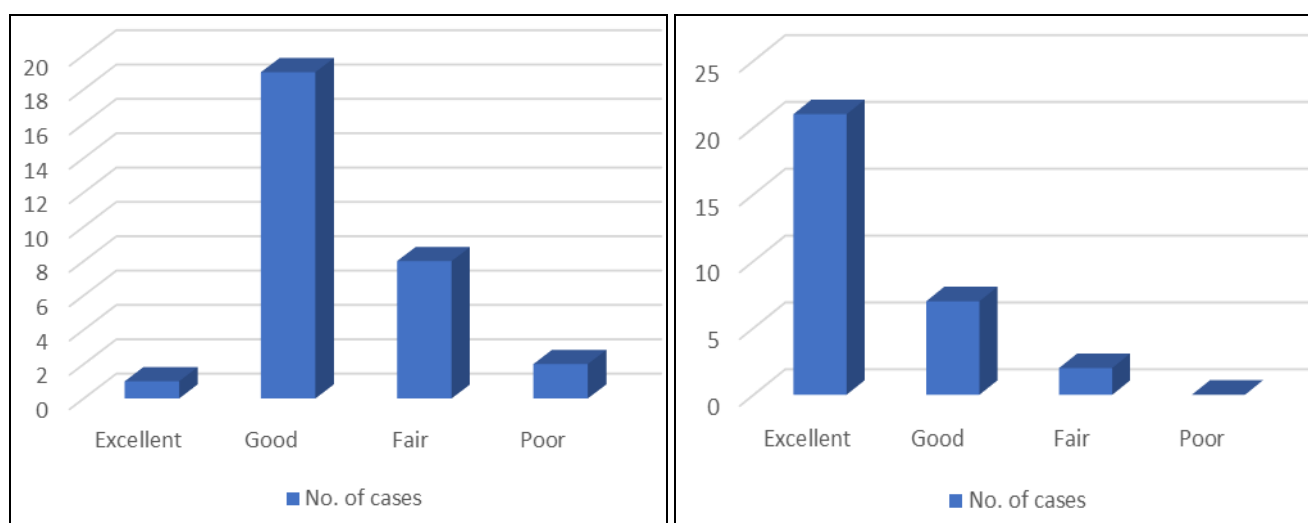
**Fig 2: Implant Failure****Fig 3: Post-Operative Range of Movements****Graph 1: Harris Hip Score at 2 months and 6 months**

Table 1: Comparison of Harris Hip Score at 2 months and 6 months post operatively along with median difference in Harris Hip Score with the 95% CI for the median difference

Harris Hip Score at 2 months	Harris Hip Score at 6 months	Median difference in Harris Hip Score at 2 and 6 months	p value (significant if less than 0.05)	95% Confidence Interval for median difference	
Median (Interquartile Range)				Lower Bound	Upper Bound
83.5 (77.75-86)	91.5 (88.75-95)	10	<0.001	8	11

There was a significant improvement in Harris Hip Score at 6 months compared to Harris Hip Score at 2 months postoperatively

Conclusion

Hip fractures are the leading cause of morbidity and mortality in the elderly. Patients with inter-trochanteric fractures are bed-ridden, if not operated with adequate fixation, leading to severe health problems and reduced quality of life. Overall this increases the burden on the care-givers and society in general. Patients with trochanteric fractures undergoing early surgery have an improved ability to return to independent living and prevention of complications of prolonged immobilisation.

The 95 degrees angle blade plate can be used for unstable intertrochanteric fractures, but the final outcome is dependent on various factors. This study shows that the 95 degrees angle blade plate is a reliable and effective implant for the treatment of inter-trochanteric fractures.

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References

- Cleveland M, Bosworth DM, Thompson FR, Wilson HJ Jr, Ishizuka T. A ten-year analysis of intertrochanteric fractures of the femur. *J Bone Joint Surg Am*. 1959; 41-A:1399-1408.
- Courtney AC, Wachtel EF, Myers ER, Hayes WC. Age-related reduction in the strength of the femur tested in a fall-loading configuration. *J Bone Joint Surg Am*. 1995; 77(3):387-395.
- Laros GS. Intertrochanteric fractures. In: Evarts CM. *Surgery of the musculoskeletal system*. 1st ed., New York: Churchill Livingstone. 1983; 2(5):123-148.
- Hwang LC, Lo WH, Chen WM, Lin CF, Huang CK, Chen CM. Intertrochanteric fractures in adults younger than 40 years of age. *Arch Orthop Trauma Surg*. 2001; 121(3):123-6.
- Robinson CM, Court-Brown CM, McQueen MM, Christie J. Hip fractures in adults younger than 50 years of age. Epidemiology and results. *Clin Orthop Relat Res*. 1995; (312):238-46.
- Boyd HB, Griffin LL. Classification and Treatment of Trochanteric Fractures. *Arch Surg*. 1949; 31B:190-203.
- Mithal A, Dhingra V, Lau E. The Asian Audit: Epidemiology, costs and burden of osteoporosis in Asia. Beijing, China: An International Osteoporosis Foundation (IOF) publication, 2009.
- Dhanwal DK, Dennison EM, Harvey NC, Cooper C. Epidemiology of hip fracture: Worldwide geographic variation. *Indian J Orthop*. 2011; 45(1):15-22.
- Bottle A, Aylin P. Mortality associated with delay in operation after hip fracture: observational study. *Br Med J*. 2006; 332:947-51.
- Weller I, Wai EK, Jaglal S, Kreder HJ. The effect of hospital type and surgical delay on mortality after surgery for hip fracture. *J Bone Joint Surg Br*. 2005; 87:361-6.
- Canale ST, Beaty JH. editors. *Campbell's Operative Orthopaedics*, 11th ed. Elsevier, 2007.
- Orosz GM, Magaziner J, Hannan EL, Morrison RS, Koval K, Gilbert M *et al*. Association of timing of surgery for hip fracture and patient outcomes. *JAMA* 2004; 291(14):1738-43.
- Lyons AR. Clinical outcomes and treatment of hip fractures. *Am J Med* 1997; 103:51-63.
- Simunovic N, Devereaux PJ, Bhandari M. Surgery for hip fractures: Does surgical delay affect outcomes?. *Indian J Orthop* 2011; 45:27-32.
- Ganz R, Thomas RJ, Hammerle CP. Trochanteric fracture of the femur. Treatment and results. *Clin Orthop Relat Res*. 1979; 138:30-40.
- Evans EM. The Treatment of Trochanteric Fractures of the Femur. *J Bone Joint Surg Am*, 1949; 31B:190-203.
- Murray RC, Frew JFM. Trochanteric Fractures of the Femur. *J Bone Joint Surg Am*, 1949; 31B:204-219.
- Van Meeteren MC, van Rief YE, Roukema JA, van der Werken C. Condylar plate fixation of subtrochanteric femoral fractures. *Injury*. 1996; 27(10):715-7.
- Suriyajakyuthana W. Intertrochanteric fractures of the femur: results of treatment with 95 degrees Condylar Blade Plate. *J Med Assoc Thai*. 2004; 87(12):1431-8.
- Yoo MC, Cho YJ, Kim KI, Khairuddin M, Chun YS. Treatment of unstable peritrochanteric femoral fractures using a 95 degrees angled blade plate. *J Orthop Trauma*. 2005; 19(10):687-92.
- Kesemenli CC, Memişoğlu K, Necmioğlu S, Kayıkçı C. Treatment of intertrochanteric femur fractures with 95° fixed-angle blade plate in elderly patients. *European Journal of Orthopaedic Surgery & Traumatology*. 2010; 20(8):629-634.
- Yong CK, Tan CN, Penafort R, Singh DA, Varaprasad MV. Dynamic Hip Screw Compared to Condylar Blade Plate in the Treatment of Unstable Fragility Intertrochanteric Fractures. *Malaysian Orthopaedic Journal*. 2009; 3(1):13-18
- Singh AK. Management of Trochanteric Fractures. *Indian J Orthop*. 2006; 40:100-102.