

Management of Intertrochanteric Fractures of Femur by Minimally Invasive Dynamic Hip Screw

Dayanand M, Deepak S, Manoj Kumar, Vijay Kumar, Mithun S Patil ,
Bangalore Medical College and Research Institute, India

Abstract: Introduction: Intertrochanteric fractures comprise approximately 50% of all hip fractures. In view of associated comorbid conditions in elderly patients the aim of treatment is to prevent malunion and early mobilization, which is provided by Dynamic Hip Screw and Sliding Plate. A large exposure is necessary for implantation of the traditional 4 holed plate which leads to more blood loss and increased operating time adding to increased morbidity and mortality. The two holed side plate affords the surgeon the opportunity to implement a minimally invasive approach in certain intertrochanteric fractures like Boyd and Griffin type I and II fractures. This can potentially reduce operative time, blood loss and possibly improve patient outcome.

Materials and Method: A prospective study was done in 50 patients with Intertrochanteric fractures who were managed with dynamic hip screw and side plate using minimally invasive technique from November 2006 to December 2012 in our institute. Patients with type I and II Boyd and Griffin intertrochanteric fractures were included. Duration of surgery and Intraoperative blood loss was measured. All the patients were examined clinically and radiographically every 6 weeks and any complications were recorded. Sanders 60 point traumatic hip rating score was used to evaluate the functional results.

Results: The average follow up duration was 7 months ranging 3 to 18 months. One death occurred and one was lost to follow up. The average age of the patient was 60 years with a range of 21 to 80 years. There were 15 type I fractures and 35 type II fractures, The average surgical time was 45 minutes ranging from 30 to 80 min and average blood loss was 90 cc, The average time to union was 9 weeks ranging from 6 to 12 weeks. There were no nonunion. There was knee pain in 4 patients, shortening of less than or equal to 2 cm in 4 patients and one patient with superficial infection which responded to appropriate antibiotics. Two malunion with varus angulation of less than 10 degrees was seen. According to Sanders traumatic hip scoring there were 31 % excellent results, 58% good results and 11% poor results. One death occurred due to comorbid conditions.

Conclusion: Minimally Invasive technique for the management of intertrochanteric fractures (types I and II Boyd and Griffin) with DHS and two holed side plate makes "biological osteosynthesis" possible with less operative time, minimal soft tissue stripping, minimal blood loss and adequate biomechanical stability. We conclude that minimally invasive DHS with 2 holed side plate is a reliable and reproducible technique, which requires initial learning curve.

Keywords: Dynamic Hip Screw, Minimally invasive surgery.

I. Introduction

Intertrochanteric fractures comprise approximately 50% of all hip fractures. The incidence is more in female population compared to males due to osteoporosis. In spite of advances in anaesthesia, nursing care and surgical techniques, hip fractures remain a significant cause of morbidity and mortality in the elderly population (2). In view of associated comorbid conditions in elderly patients the aim of treatment is to prevent malunion and early mobilization, which is provided by Dynamic Hip Screw and Sliding Plate. To date it has been used in a primarily open fashion with a relatively large exposure. A large exposure is necessary for implantation of the traditional 4 holed plate which leads to more blood loss and increased operating time adding to increased morbidity and mortality. However recent biomechanical data demonstrates equivalent peak load to failure results when comparing the two and four holed plate (3),(4). The two holed side plate affords the surgeon the opportunity to implement a minimally invasive approach in certain intertrochanteric fractures like Boyd and Griffin type I and II fractures. Insertion of short side plate reduces the size of necessary incision and degree of soft tissue disruption. This can potentially reduce operative time, blood loss and possibly improve patient outcome. Clinical and biomechanical data indicates that a two holed side plate could be sufficient for the treatment of stable intertrochanteric fractures that lack subtrochanteric extension.

In view of these considerations, this study was done to analyze the surgical management of intertrochanteric fractures using dynamic hip screw with two holed side plate using a minimally invasive technique and its outcome regarding pain relief, early mobilization and fracture union(1),(5),(6).

II. Materials and Method

A prospective study was done in 50 patients with Intertrochanteric fractures who were managed with dynamic hip screw and side plate using minimally invasive technique from November 2006 to December 2012 in our institute. Patients with type I and II Boyd and Griffin intertrochanteric fractures were included. Subtrochanteric fractures, Pathological fractures, late presentations, Fractures with reverse obliquity, Poly trauma patients and Compound fractures were excluded. The patient was then taken up for surgery after investigations and as soon as the patient was medically fit for surgery for patients with medical co-morbidities. 2 holed DHS was implanted using an incision of 5-6cms under image intensifier after reduction in all the cases. Duration of surgery and Intraoperative blood loss was measured by weighing the mops and suction drain collection were recorded.

All the patients were examined clinically and radiographically every 6 weeks.

Radiographically evaluated for union, any varus or valgus angulation, collapse and any implant related complications. Sanders (32) traumatic hip rating score was used to evaluate the functional results. It emphasizes on pain, walking capacity, functional restriction, muscle and motion power, performance of daily activities and radiographic evaluation

III. Results

The average follow up duration was 7 months ranging 3 to 18 months. One death occurred and one was lost to follow up. The average age of the patient was 60 years with a range of 21 to 80 years. There were 64% males and 36% female patients. Majority of the fractures occurred due to road traffic accidents accounting for 75%. were 15 type I fractures and 35 type II fractures, The average surgical time was 45 minutes ranging from 30 to 80 min and average blood loss was 90 cc, The average time to union was 9 weeks ranging from 6 to 12 weeks. There were no nonunion. We had our share of complications which included knee pain in 4 patients, shortening of less than or equal to 2 cm in 4 patients and one patient with superficial infection which responded to appropriate antibiotics. Two malunion with varus angulation of less than 10 degrees was seen. According to Sanders traumatic hip scoring there were 31 % excellent results, 58% good results and 11% poor results. One death occurred due to comorbid conditions.

IV. Discussion

The dynamic hip screw with a side plate remains the most common method of treating the intertrochanteric hip fractures .Conventional surgical technique with appropriate dissection for hemostasis and fixation has stood the test of time for radiographic reduction and bone healing .Recently, the goals of treating these fractures have been to decrease the transfusion requirements ,analgesic costs and operating room time in an attempt to mobilize the patient, reduce the convalescence period and hospital costs.(5) However, the use of custom or new implants, which are often more costly and require an increased hospital inventory of the devices, may be counter intuitive to this process(1),(3),(4).

Cephalomedullary nails have been designed to achieve these goals, however a meta-analysis of all the published trials shows that some of these devices had a significantly increased risk of fracture of the femoral shaft and an increased re-operative rate (5),(29). Reported blood loss and operative time varied in comparison to the standard DHS fixation ,but most randomized studies have reported little if no difference (In a study that prospectively examined 100 hip fractures repair ,equally treated by a conventional dynamic hip screw and an intramedullary nail concluded with the following results : Intra-operative blood loss was 198cc and 144cc respectively and average operative time was 57mins and 78mins respectively (29).

A percutaneously placed dynamic hip screw with side plate technique which has been evolved recently in view of achieving the above mentioned goals seems to have allowed reduced complications ,event free fracture healing and improved rehabilitation .In our study we used a 2 holed side plate and dynamic hip screw ,there is another device developed by Gotfried et al which can also be placed percutaneously ,but the disadvantage of this newer device is increased hospital inventory and re-introduction of the learning process for the surgeon which may off set the advantages of this system.³¹ Whereas the conventional DHS with an abbreviated side plate (2 holed) does not have those problems and at the same time fulfills the requirement of a percutaneously placed device which is clinically and biomechanically stable (3),(4).

McLoughlin et al studied the biomechanical strength and stiffness of a DHS with 2 holed side plate and a DHS with a 4 holed side plate .The results of their study revealed that the 2 holed side plate is biomechanically as stable as a 4 holed side plate in cyclic and failure loads under the conditions tested .They suggested that these results in concert with the clinical experience could be used to the support of using a 2 holed side plate in stable intertrochanteric fractures (types I and II Boyd and Griffin) without subtrochanteric extension (4).

Mathew DiaPaola,BA et al in their study of minimal incision technique using a 2 holed side plate for fixation of stable intertrochanteric hip fractures reported an average incision size of 4-6cms(avg 5cms),blood loss of

41.9cc(20-50cc) per surgery .Average operative time of 61mins.Average time to union 13 weeks(7-24 weeks).(5)

In our series of 50 patients with intertrochanteric fractures, the average blood loss was 91cc (70-200cc), average duration of surgery was 45mins (30-80mins) and time to union was 9 weeks (6-12weeks). The functional outcome assessment using the Sanders traumatic hip scoring system(31) revealed that overall, there were 31% excellent, 58% good and 11% poor results. There were no implant failures or nonunion. None of the patients were bone grafted. As per the age of the patient, in those less than 50 years, there were 91% excellent to good results and the same was 87% in those more than 50 years. Our assessment depending on the type of fracture revealed that all the type I had good to excellent results and type II fractures had 83% excellent to good results. We had 4 patients with knee joint pain treated successfully with physiotherapy and analgesics ,4 patients with shortening of 2/<2 cms treated with shoe raise and 1 patient with superficial infection treated with adequate antibiotics and dressing. Our results were comparable with those of the others and also, this indicates that such a technique of using an abbreviated side plate which gives same biomechanical stability as a conventional one ,can be used in future for the treatment of stable (without subtrochanteric extension)intertrochanteric fractures. Advantages being that of reduced blood loss ,union rates ,early mobility and reduced use of analgesics .Though the technique is no more time intensive than the traditional approach and also has a learning curve as the surgeon has to adapt himself to closed reduction techniques ,it is certainly beneficial to the patients .Any surgery that requires transfusion, extended convalescence in a patient population similar to the hip fracture population presents a serious hit to the patient. So the minimally invasive technique in the management of these intertrochanteric fractures has its own advantages over the conventional and intramedullary devices.

V. Conclusion

Minimally Invasive technique for the management of intertrochanteric fractures (types I and II Boyd and Griffin) with DHS and two holed side plate makes “biological osteosynthesis” possible with less operative time, minimal soft tissue stripping, minimal blood loss and adequate biomechanical stability .It is a sound technique in treatment of these fractures in the age group it presents, as shown by good functional results and bone healing rates with reduced complications. We conclude that minimally invasive DHS with 2 holed side plate is a reliable and reproducible technique, which requires initial learning curve.

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FIGURES:



fig 1: length of incision



fig 2: guidewire insertion

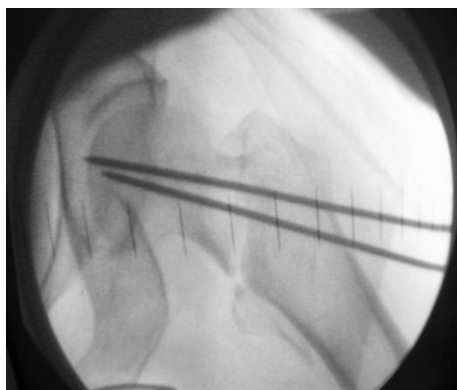


fig 3: C arm view

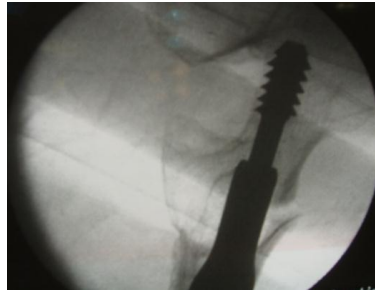


fig 4: DHS in lateral view



Fig 5: final seating of plate



fig 6: pre op xray



fig 7: immediate post op x ray



Fig 8: follow up