Total Hip Arthroplasty in Failed Fixation of Intertrochanteric Fracture - A Salvage Procedure

Aamir Bin Sabir¹, Mohd. Faizan¹, Md. Ishtiaq¹, Latif Z Jilani¹, Sohail Ahmed¹, Ziaul Hoda Shaan¹

Abstract

Background: Internal fixation is the treatment of choice for intertrochanteric fractures. Failed fixation is very cumbersome for the patients due to pain and functional disability. Hip arthroplasty as a salvage procedure in these patients is a technical challenge due to bone loss and poor bone quality. The purpose of this study was to evaluate the outcome of total hip arthroplasty in failed fixation of intertrochanteric fractures.

Materials and methods: In a prospective study, eighteen patients (13 male and 5 females) with a diagnosis of failed fixation of intertrochanteric fracture confirmed either by fracture collapse or established nonunion were included. Mean age of patients was 69 years (range: 53 to 79 years). Total hip arthroplasty was done in all patients. Assessment was done clinically by Harris hip score (HHS) and radiologically by x-rays. Trochanteric nonunion was found in seven patients which was treated either by tension band wire or Ethibond.

Results: All patients had full weight bearing walk. The mean follow up was of three years. The mean duration of surgery was 125 minutes and average blood loss was 600 ml. No patients were lost to followup. There was no dislocation. The mean Harris hip score increased from 35.71 to 88.37 at 1 year.

Conclusion: Hip arthroplasty attenuated pain and improved function in majority of patients. It requires meticulous preoperative planning. Despite technical difficulties it is an effective salvage procedure after failed fixation of intertrochanteric fracture.

Key words: Total Hip Arthroplasty, Failed internal fixation, Intertrochanteric fracture, HHS

Introduction

Most intertrochanteric fractures are successfully treated with closed reduction and internal fixation[1, 2]. Management of these fractures varies from conservative to Osteosynthesis and primary replacement arthroplasty [3]. Although union rate is as high as 100% in these fractures if they are well reduced, stable and treated with ideal implant [4]. Advancement has done in fixation process as in small percentage of patients fracture fails to unite which might be because of fracture comminution, initial fracture pattern, poor implant selection, suboptimal reduction and poor bone quality [5]. Failed treatment leads to functional disability and pain. The two treatment options available for failed intertrochanteric fractures are revised internal fixation or salvage treatment with total hip arthroplasty (THA)[4]. Revision of internal fixation is usually preferred in younger patients having preserved femoral head, healthy acetabular cartilage and favorable fracture pattern [6-9]. As many patients have poor bone quality, damaged head and acetabular cartilage, limb shortening, achieving good clinical results is somewhat challenging, so replacement arthroplasty has been used as a salvage procedure[10,11]. Technical difficulties arises while doing THA in these patients because of previous implant, poor bone quality, distorted bony anatomy, bone loss, trochanteric nonunion, scarred tissues and chances of infection[12]. The purpose of this study is to evaluate the outcome of total hip arthroplasty in failed intertrochanteric fracture as a salvage procedure.

Material and Methods

We conducted a prospective study including Thirteen males and five females with mean age of 69 years (range: 53-76 years) from January 2012 to November 2016. Patients were reviewed for complications leading to requirement of THA, type of component used, leg length discrepancy, technical hurdles, blood loss, postoperative complications and clinical outcome. We included patients with age more than 53 years and previous fixation with dynamic hip screw (DHS). Patients...
with age less than 52 years, previous fixation with cephalomedullary nail, dynamic condylar screw (DCS), PF-LCP, infected failed DHS and previously non ambulatory patients were excluded from the study. All patients had undergone preanaesthetic checkup preoperatively. Preoperative radiograph was obtained in all patients. For occult infection, pus culture was sent in all cases intraoperatively.

Operative procedure
All patients were operated by single orthopaedic surgeon. Posterior approach in lateral decubitus position was used in all patients. This approach makes the procedure easy for the removal of implant and it also allowed safe accessibility to the nonunion of greater trochanter. Surgical difficulties were greater in these patients because of extensive fibrous tissue and malpositioned greater trochanter. It was mobilized, fibrous tissue removed and brought to best possible anatomical position either by tension band wire or Ethibond. Cemented or uncemented THA was done. The decision was made according to the physiological age of patients, level of activity, bone loss, affordability of the patients, condition of bone on preoperative x-ray and also intraoperatively. Stem selection depends upon bone quality, stability of trial on table and the distal most cortical screw hole. Limb length was adjusted by soft tissue tension as local anatomical landmarks were disturbed.

Table 1: showing mode of failure of Internal fixation

| Mode of failed fixation       | Number of patients | Percentage (%) |
|------------------------------|--------------------|----------------|
| Cut out or screw penetration | 11                 | 61.1           |
| Varus collapse               | 4                  | 22.2           |
| Nonunion                     | 2                  | 11.1           |
| Varus collapse + nonunion    | 1                  | 5.5            |

Patients were ambulated on 3rd to 5th postoperative day with the help of walker. Weight bearing and active assisted exercises were allowed according to patient’s tolerance. Dressing was changed on 4th day. Patient was discharged on 6th to 7th postoperative day. Stitches were removed on 14th day after surgery. Patients were then followed up at 6 weeks, 3 month, 6 months, 1 year and yearly thereafter. Clinical (Harris hip score) and radiological results (x-ray) were noted down at each visit. No patients were lost to followup.

Results
We assessed the results on 18 patients (13 male and 5 females) after average followup of three years (range: 8 to 48 months). Left side was more common (61.1%). The average duration between primary fixation and total hip arthroplasty was 14 months (range: 9 months-21 months). The average duration of surgery was 125 minutes (range: 90-170 minutes). Mean blood loss was 600ml (range: 350-800ml). All surgeries were performed in single stage. Pus culture was negative in all patients. Out of 18 patients, screw penetration or cut out was found in eleven patients, varus collapse in four patients, nonunion in two patients, nonunion with cutout in one patient (table 1). Cemented long stem (STRYKER) was used in 14 patients (77.7%). Uncemented cup and cemented stem (hybrid) was used in two patients (11.2%). Cemented cup (STRYKER) and cemented stem (INORE) was used in two patients (11.2%). At 1 year of followup the mean Harris hip score increased from 35.71 (range: 32-45) to 88.37 (range: 83-92) [table 2]. At 1 year, 13 patients were walking full weight

![Figure 1](image1.png)  
**Figure 1:** [A] X-ray Pelvis with both hip AP view- showing Cut out lag screw with broken screws with nonunion intertrochantric fracture.  
[B] Postoperative X-ray Pelvis with both hip AP view – showing total hip replacement with trochanteric repair by Ethibond.

![Figure 2](image2.png)  
**Figure 2:** [A & B] X-ray right hip AP & lateral view showing failed internal fixation of intertrochanteric fracture.  
[C] Postoperative X-ray right hip with femur AP view - showing Cemented total hip replacement with multiple encirclage for extensive trochanteric osteotomy (stem was stucked up midway due to earlier setting of cement)  
[D] X-ray right knee with thigh AP & lateral – showing periprosthetic fracture after fall  
[E] X- ray right knee with thigh AP & lateral – showing union of periprosthetic fracture fixed with distal femoral locked plate
Discussion
Intertrochanteric fractures are treated successfully with internal fixation devices [3]. Internal fixation remains the primary treatment modality of these fractures because of the benefits of the preservation of native hip joint[13,14]. Complications like residual hip pain and functional disability remain in some patients [3]. Various studies reported overall failure rate in the range of 3-12%, with device penetration 2-12%, nonunion 2-5% and malunion causing varus deformity 5-11% [15]. The surgeon should also think of occult infection as the cause of failed fixation [3]. Therefore, we send pus culture in every patient in our study. Fortunately, it was negative in all patients. Total hip arthroplasty is a universally accepted treatment option if internal fixation failed [12]. It markedly alleviates pain and improves functions in many patients [16]. However, when compared with primary total hip arthroplasty, risk of early complications and poorer hip functions are more [17].Tabsh et al [18] compared the results of 53 THA done after failed proximal femur fracture with those of routine THA, an increased prevalence of complications and surgical difficulty were found in patients with failed fixations. Infection rates are high after secondary THA because of additional surgery and increase in the number of implant [19]. In our study superficial infection was found in 16.6% patients. Limb length inequality was present in 22.2% patients which might be due to difficulty in assessing bony landmarks. None of the patient had dislocation postoperatively or in followup due to proper reattachment of trochanter and capsular repair which is necessary for stability of hip and proper functioning of abductor mechanism. Mabry et al [20] showed dislocation in 9% of their patients for secondary total hip arthroplasty. Haidukewych and Berry et al [21] studied the results of 60 patients in whom THA was done for failed intertrochanteric fracture fixation. At a mean followup of 65 months, 89% patients had no or mild pain, 91% were able to walk, 59% were walking with one arm support. Srivastav et al [22] studied THA in 10 patients of failed intertrochanteric fracture with mean followup of 4 years. Harris hip score increased from 32 to 79 postoperatively. Thakur et al [23] studied 12 THA in failed intertrochanteric fracture. The increase in mean Harris hip score was 35.9 to 83.Because of second surgery, anatomical landmarks were not clearly visualized so dissection was done carefully to avoid damaging the nearby neurovascular structures and muscles. Bone quality was found poor due to preexisting osteoporosis and disuse osteopenia. Cemented stem were used only in those patients having good proximal bone and where adequate cementing was possible. Another technical difficulty was containment of cement into the medullary canal when it was pressurized. Lag screw hole was closed by thumb and for screw holes direct finger pressure was applied. In one of our patient, introperatively the cement got set early and stem was stucked up midway while inverting, so we had to do extended trochanteric osteotomy, encirclage was done and union was achieved but at 14 weeks, patient had periprosthetic fracture for which distal femoral lock plate was done. Cortical holes was considered as a stress risers so we used femoral stem with tip extending about 2.3 cm distal to the last screw hole of the removed dynamic hip screw plate. These operative challenges were responsible for the long mean operative time in our study. The strength of our study was the good followup in our patients. We found several limitations in our study. First, the sample size was small. Second, the followup was short. Third, diversity of the implant design and implant fixation methods, this makes the comparison of results difficult. Our study demonstrates that satisfactory results may be achieved in majority of cases with good pain relief and marked functional improvement. Few patients had residual hip pain which might be because of trochanteric nonunion or bursitis.

Conclusion
We reckoned that total hip arthroplasty after failed fixation of intertrochanteric fracture is technically more challenging than primary total hip arthroplasty. It requires diligent preoperative planning and surgical techniques. It provides good option for early ambulation and restoration of normal life. Patients had good pain relief and marked functional improvement which is the hallmark of any salvage procedure. But, despite these technical challenges and complications, total hip arthroplasty
References

1. Kyle RF, Gustilo RB, Premer RF. Analysis of six hundred and twenty-two intertrochanteric hip fractures. J Bone Joint Surg Am. 1979;61:216-21.
2. Kyle RF, Cabanela ME, Russell TA, Swiontkowski MF, Winquist RA, Zuckerman JD, Schmidt AH, Koval KJ. Fractures of the proximal part of the femur. Instr Course Lect. 1995;44:227-53.
3. Srivastav S, Mittal V, Agarwal S. Total hip arthroplasty following failed fixation of proximal fractures. Indian J Orthop. July-September 2008;vol-42/Issue 3.
4. Haidukewych GJ, Berry DJ. Hip arthroplasty for salvage of failed treatment of intertrochanteric hip fractures. J Bone Joint Surg Am. Volume 85-A, Number 5, May 2003.
5. Haidukewych GJ, Israel TA, Berry DJ. Reverse obliquity fractures of the intertrochanteric region of the femur. J Bone Joint Surg Am. 2001;83:643-50.
6. Anglen JO. Intertrochanteric osteotomy for failed internal fixation of femoral neck fracture. Clin Orthop Relat Res 1997;341:175-82.
7. Wu CC, Shih CH, Chen WJ, Tai CL. Treatment of cutout of a lag screw of a dynamic hip screw in an intertrochanteric fracture. Arch Orthop Trauma Surg 1998;117:193-6.
8. Alvarez DB, Aparicio JP, Fernández EL, Múgica IG, Batalla DN, Jiménez JP. Implant breakage, a rare complication with the gamma nail. A review of 843 fractures of the proximal femur treated with a gamma nail. Acta Orthop Belg 2004;70:435-43.
9. Said GZ, Farouk O, El-Sayed A, Said HG. Salvage of failed dynamic hip screw fixation of intertrochanteric fractures. Injury 2006;37:194-202.
10. Haentjens P, Casteleyn PP, Opdecam P. Hip arthroplasty for failed internal fixation of intertrochanteric and subtrochanteric fractures in the elderly patient. Arch Orthop Trauma Surg 1994;113:222-7.
11. Kim Y-H, Oh J-H, Koh Y-G. Salvage of neglected unstable intertrochanteric fracture with cementless porous-coated hemiarthroplasty. Clin Orthop. 1992;277:182-7.
12. Mehlhoff T, Landon GC, Tullos HS. Total hip arthroplasty following failed internal fixation of hip fractures. Clin Orthop. 1991;269:32-7.
13. Pachore JA, Shah VI, Sheth AN, Shah KP, Marothi DP, Puri R. Hip arthroplasty in failed intertrochanteric fractures in elderly. Indian J Orthop. November 2013;vol.47, Issue 6.
14. Marya SKS, Thukral R, Bawari R, Gupta R. Hip arthroplasty following failed dynamic hip screw fixation for per-trochanteric femoral fractures. July 2004, Vol. 38, No. 3.
15. Haentjens P, Casteleyn PP, Opdecam P. Hip arthroplasty for failed internal fixation of intertrochanteric and subtrochanteric fractures in elderly patients. Arch Orthop Trauma Surg 1994;113:222-7.
16. Winemaker M, Gamble P, Petruccelli D, Kaspar S, de Beer J. Short term outcomes of total hip arthroplasty after complications of open reduction internal fixation of hip fracture. J Arthroplasty 2006;21:682-8.
17. McKinley JC, Robinson CM. Treatment of displaced intracapsular hip fractures with total hip arthroplasty: comparison of primary arthroplasty with early salvage arthroplasty after failed internal fixation. J Bone Joint Surg (Am).2002;84:2010-5.
18. Tabsh I, Waddell JP, Morton J. Total hip arthroplasty for complications of proximal femoral fractures. J Orthop Trauma. 1997;11:166-9.
19. Weiss NG, Parviji J, Hanssen AD, Trousdale RT, Lewallen DG. Total knee arthroplasty in post traumatic arthrosis of the knee. J Arthroplasty 2003;18:23-6.
20. Mabry TM, Branko PR, Haidukewych GJ, Harnsen SW, Berry DJ. Long-term results of total hip arthroplasty for femoral neck fracture nonunion. J Bone Joint Surg Am 2004;86:2263-7.
21. Haidukewych GJ, Berry DJ. Hip arthroplasty for salvage of failed treatment of intertrochanteric hip fractures. J Bone Joint Surg Am 2003;85-A:899-904.
22. Srivastav S, Mittal V, Agarwal S. Total hip arthroplasty following failed fixation of proximal hip fractures. Indian J Orthop 2008;42:279-86.
23. Thakur RR, Deshmukh AJ, Goyal A, Ranawat AS, Rasquinha VJ, Rodriguez JA. Management of failed trochanteric fracture fixation with cementless modular hip arthroplasty using a distally fixing stem. J Arthroplasty 2011;26:398-403.

Conflict of Interest: Nil.
Source of Support: None

How to Cite this Article
Sabir A B, Faizan M, Istiak M, Jilani L Z, Ahmed S, Shaan Z H. Total Hip Arthroplasty in Failed Fixation of Intertrochanteric Fracture- A Salvage Procedure. Journal of Bone and Joint Diseases Sep-Dec 2019; 34(3):13-16.