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Outcomes of total hip replacement in complicated intertrochanter fractures in elderly

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Abstract

Introduction: Intertrochanteric fracture is one of the most common fractures in elderly and is a major reason for decreased quality of life and increased mortality. Functional outcome following treatment of intertrochanteric fractures with osteosynthesis is not always satisfactory especially in unstable fractures. In our study, we analyze the role and outcome of total hip replacement in complex osteoporotic intertrochanteric femoral fracture.

Materials and Methods: 15 patients with complex and unstable intertrochanteric fracture were studied prospectively. All co-morbidities, metabolic problems, bone quality was assessed preoperatively and excluded. Fractures of AO/OTA type 31-A2.2, A2.3, A3.1, A3.2 & A3.3 and Evans type III or IV were included. THR was done in all cases using standard procedure and postoperatively rehabilitation and gait training was done. Patients were followed up at 6 weeks, 3 months, 6 months up to one year and then annually. The patients were evaluated clinically and radiologically and Harris hip score (HHS) was recorded as a functional outcome.

Results: 15 patients who were able to walk without support before the fracture were included in the study. The average time of surgery was 81 min (range 55–92 min) with an approximate blood loss of 400 ml (range 200–500 ml). The average preoperative Harris Hip Score was 23.66 which improved to 81.73 at 2 year follow up which was a significant improvement (p value =0.0076). At 6 months all patients were ambulatory. 2 patients had pain, and walked with walker while 13 others were painless. 2 patients had shortening of limb of about 1.2 cm average and were managed by a shoe raise. Over all 87% patients had good result with HHS of >80 while 13% cases had poor results.

Conclusion: Unstable intertrochanteric fractures are difficult to treat with osteosynthesis because of unsatisfactory prognosis. Total hip replacement in intertrochanteric fractures is a better option because of early mobilization, better ability to bear weight and good long term prognosis.

Keywords: Intertrochanteric fracture, total hip replacement, unstable, harris hip score

Introduction

Intertrochanteric fractures are one of most common fractures in elderly population worldwide. Every year, an estimated 1.66 million hip fractures are seen worldwide [1] and is rising rapidly [2] with an expected incidence of 6.26 million by 2050 [3]. The incidence in these fractures is rising due to the increased life expectancy and osteoporosis [4]. They are mostly caused by trivial trauma and accounts for 53% of all fractures in persons over 50 years and >80% in those over 75 years.

Stable and undisplaced fractures have been easily treated with osteosynthesis using standard implants like DHS and intramedullary nails or conservative management with appreciable and predictable results. However, the management of unstable intertrochanteric (Evans type III or IV and AO/OTA type 31-A2.2 and 2.3) [5] fractures are a challenge because of difficulty in obtaining anatomical reduction. Internal fixation techniques doesn't always assure early resumption of full weight bearing because of the complications due to comminution, osteoporosis, and instability [6]. Internal fixation is reported to have an overall failure rate of 3–16.5% in intertrochanteric fractures [7]. Moreover, the prolonged recovery time after internal fixation lead to high rate of general complications [8]. Situation is further complicated by cases which are neglected and present late either due to ignorance, poverty or rampant prevalence of traditional treatment by quacks. Such cases usually present with more osteoporosis, muscle wasting, skin problems and other complications like DVT and bedsores along with decreased

will power on part of patient which complicates the surgical planning and post-operative rehabilitation.

Unstable intertrochanteric fractures are conventionally treated by open or closed reduction and internal fixation. Sliding hip screw or Dynamic Hip Screw (DHS) was the predominant method of fixation for these fractures but in osteoporotic patients, excessive sliding (leading to shortening), varus displacement, nail pull-out, and/or screw breakage are the complications commonly seen [9]. Intramedullary interlocking devices like PFN have reduced tendency for failure in osteoporosis [10] and since they are weight sharing devices, show better results in cases of unstable intertrochanteric fractures [11]. However, in unstable osteoporotic and severely comminuted intertrochanteric fractures, the role of the intramedullary nailing devices is still not clearly defined. New generation nail designs with helical blade plates have increased hold in osteoporotic bone but their ability to stabilize an inherently unstable fracture still remains questionable.

Good results in osteoporotic bone and in severely comminuted intertrochanteric fractures are due to advances in internal fixation techniques so as to allow early ambulation [12, 13]. Failure rate in case of internal fixation is 3 to 12%. Failure rate is as high as 56% in certain unstable fracture patterns [14, 15]. Similarly, revision of internal fixation for non-united fractures or neglected fractures continue to have higher rates of complication and morbidity due to higher failure rates. Success is better in younger patients with good quality bone stock [16]. However, hip arthroplasty is advocated in older patients with osteoporosis and degenerative changes in acetabulum [14] because of early rehabilitation and good long term prognosis [17]. Technical difficulties in hip arthroplasty include bone deformity, bone loss, poor bone quality, extraction of implants in case of nonunion later and associated trochanteric nonunion [18]. Hence, an ideal treatment methods remains still rather controversial. In our study, we analyze the role and outcome of total hip replacement in complex osteoporotic intertrochanteric femoral fracture.

Material & Method

15 patients with complex and unstable intertrochanteric fracture who attended Institute of Medical Sciences and SUM Hospital, Bhubaneswar were included in the study of which 10 were male and 5 were female. Patients were in age group of 65-85 years with average of 72.5 years. After classifying according to AO/OTA and Evans classification, fractures of AO/OTA type 31-A2.2, A2.3, A3.1, A3.2 & A3.3 and Evans type III or IV were included. All co-morbidities, metabolic problems, bone quality was assessed preoperatively. Patients with associated fractures of the ipsilateral lower limb, patients who were either bedridden or paralyzed before injury and patients with psychiatric illnesses were excluded. All patients were community ambulatory prior to trauma and previous surgery.

The patients were put in lateral position and operated by posterior approach. The fracture pattern was assessed in primary cases and the femoral head was removed after cutting

the neck at a higher level. In most of the patients, there were three main fragments namely the greater trochanter, the lesser trochanter and the shaft except two patients where lesser trochanter was continuous with the neck. In patients where the lesser trochanter was separate, fragments were reduced with the shaft and greater trochanter and fixed using steel wires before reaming and prosthesis application. In revision cases, implant removal was done in all cases with utmost care. No broken screws or implants were encountered. In 3 cases the GT was found to be fractured during implant removal and was later reconstructed to the shaft using stainless steel wires was done. Tissue biopsy was sent in each case of implant failure for HP study and culture sensitivity test. THR was done in all cases using standard procedure. Intraoperative and postoperative complications were recorded. Postoperatively from second day, all patients underwent physiotherapy protocol including early gait training using walker. The rehabilitation was continued as per patient tolerance. Patients were followed up at 6 weeks, 3 months, 6 months up to one year and then annually. During follow-up visit, patient was evaluated clinically and Harris hip score (HHS) was recorded. Radiological evaluation was done to check loosening of hardware.

Results

The average age of patients was 72.5 years (range 65-85 years). 11 patients had associated comorbidities (hypertension, n=6, diabetes, n=6, CRF n=3, COPD, n= 2) (Table 1).

Table 1: Demographic details and co-morbidities

S. No	Age	Male	Female	Major Comorbidity
1	66	M		DM/HTN
2	70	M		COPD
3	67		F	DM/HTN
4	81	M		CRF/HTN
5	73		F	-
6	70	M		DM
7	65		F	-
8	70	M		DM
9	71	M		COPD
10	73	M		CRF/HTN
11	71		F	-
12	74	M		-
13	84	M		CRF/HTN
14	77	M		DM
15	75		F	DM/HTN

All 15 were able to walk without support before the fracture or previous surgery. There was considerable delay of 10 days (range 6 to 14 days) in surgery either due to the patients presenting late or due to time taken for patients to be fit for anesthesia. The average time of surgery was 81 min (range 55-92 min) with an approximate blood loss of 400 ml (range 200-500 ml). One unit of blood transfusion was needed post operatively for the four neglected cases and three revision case patients. (Table 2).

Table 2: Type of fracture and time

S. No	AO/Ota Type	Type of Surgery		AVG Duration of Surgery (Min)	AVG Duration Of Stay
1	31 A 2.2	Revision	PFN	92	10
2	31 A 2.3	Primary	NEGLECTED	75	11
3	31 A 3.1	Revision	PFN	88	14
4	31 A 2.3	Revision	DHS	75	12
5	31 A 2.2	Revision	PFN	90	12

6	31 A 2.1	Revision	Proximal Femur Plate	96	12
7	31 A 2.3	Primary	Traditional T/T Failure	80	17
8	31 A 2.3	Primary	Neglected	70	20
9	31 A 3.3	Revision	Pfn	90	12
10	31 A 2.3	Revision	Dhs	80	10
11	31 A 2.2	Revision	Proximal Femur Plate	90	14
12	31 A 2.2	Revision	Dhs	78	18
13	31 A 2.3	Primary	Neglected	55	14
14	31 A 2.2	Primary	Traditional T/T Failure	85	11
15	31 A 2.3	Primary	Neglected	68	10
				80.8	13.1

Physiotherapy rehabilitation protocol was started from 5 days after surgery (range, 3–8 days). Two patient did not follow rehabilitation protocol and denied walking and had a poor prognosis. The average hospital stay was 13 days (range 10-20 days). Prolonged hospitalization was needed in one patient for 7 days due to bed sore and in another patient for 18 days due UTI.

The patients were evaluated preoperatively and post operatively using the Harris Hip Scoring (HHS) chart and were followed up for average of 2 years. The average preoperative HHS was 23.66 which improved to 81.73 at 2 year follow up which was a significant improvement (p value =0.0076) (Table 3).

Table 3: Follow up Harris Hip score.

S. No	Harris Hip Score Pre Op	Harris Hip Score Pre Op			P Value	Status of Ambulation At 6 Months
		6 Month	1 Year	2 Year		
1	20	42	68	81		Painless with walker
2	28	44	63	83		Painless crutch
3	18	38	60	77		Painless unaided
4	25	40	70	87		Painless unaided
5	23	45	70	86		Painless crutch
6	20	41	65	81		Painless unaided
7	24	36	44	62		Painful with walker
8	28	49	72	85		Painless unaided
9	30	51	74	88		Painless walker
10	27	46	71	82		Painless crutch
11	22	41	75	86		Painless crutch
12	19	45	69	88		Painless walker
13	26	48	70	84		Painless unaided
14	23	42	71	92		Painless walker
15	16	40	52	64		Painful with frame
	23.66	43.2	66.26	81.73	0.0076	

At 6 months all patients were ambulatory. 2 patients had pain, and walked with walker while 13 others were painless. 5 of these patients walked without any aid while remaining 8 used a crutch or walker. 2 patients had shortening of limb of about 1.2 cm average and were managed by a shoe raise. No cases of lengthening was noted. No cases of periprosthetic fracture, implant loosening, delayed infection or death was seen in these 2 year follow up. Over all 87% patients had good result with HHS of >80 while 13% cases had poor results (Table 4).

Table 4: Functional outcomes

Garde	Pre-op	Post-op
Poor	15 (100%)	2 (13%)
Fair	-	1(7%)
Good	-	11 (73%)
Excellent	-	1(7%)

Discussion

Global increase in elderly population is expected to double over the next 50 years with the present trend of incidence of hip fractures being more than 80 per 100,000 persons [19] of which intertrochanteric fractures make almost 45% of all hip fractures [20]. Majority of them are stable two-part fractures which can be treated satisfactorily with either a short proximal femoral nail (PFN) or a Dynamic hip screw.

Although high rates of morbidity and mortality are also seen in 35–40% which are unstable three and four part fractures [20].

The mortality in intertrochanteric fractures has drastically reduced because of internal fixation [21] but is associated with complications like deep venous thrombosis, pulmonary embolism and pneumonia which are generally related to prolonged bed rest and immobilization. Immediate weight bearing is not tolerated in elderly patients where the fixation is poor due to instability of the fracture and osteoporosis [14]. In-hospital mortality rate is 0.03 to 10.5%, while one year mortality rate is 22% [22]. Fixation in intertrochanteric fractures following internal fixation is 3–16.5% [7].

Hemi arthroplasty and total hip arthroplasty are used as primary treatment of these fractures because of associated complications and high failure rate of internal fixation irrespective of the implant used. A long, straight-stemmed prosthesis was first used by Tronzo *et al.* for the primary treatment of intertrochanteric fractures [17]. Leinbach prosthesis was successfully used with good results by Rosenfeld *et al*, Schwartz *et al*, and Alter *et al.* [33, 23] and multiple studies conducted later have reported similar results. Liang *et al.* [24] in their study on elderly patients with unstable intertrochanteric fractures reported the positive outcome of hemi arthroplasty as an effective treatment modality. Advantages being decreased complications, free from

debilitating pain, reduced the mortality and better quality of life. Bipolar hemiarthroplasty is generally done either due to financial constraints or due to technical factors. However recently, many authors are of the opinion of using hip replacement in treatment of complex comminuted intertrochanteric fractures because of its advantage of allowing rapid weight-bearing from day one following operation and early return to a pre-fracture mobile state [25]. Haentjens *et al.* [14, 26] conducted two studies on arthroplasty in unstable intertrochanteric fractures and concluded that it promoted immediate weight-bearing, rapid recovery with good functional outcome and reduced risk of mechanical failure and fewer complications. In our case only 1 case of bed sore and 1 case of UTI was noted as complication without any wound complications, DVT, pneumonia, or deaths.

Rodop *et al.* [27] in his study based on Harris hip-scoring system over 12 months of bipolar hemi arthroplasty for unstable intertrochanteric fractures in 37 older patients obtained 17 cases with excellent (45%) result and 14 cases with good (37%) results. In our study too, good results were obtained in 73% (11) cases and excellent results in 7% (1). 13% (2) of poor results was due to non compliance to post op advice and rehabilitation protocols. Both of these cases had diabetes and osteoporosis and were non compliant to medical advice. Total hip replacement was done later in both these patients. Bipolar hemiarthroplasty and THR in intertrochanteric fractures are rarely compared and not many studies have compared both these procedures. Many studies exist over neck of femur fractures and suggests that total hip arthroplasty is more superior to hemiarthroplasty [28]. Major risks of hemiarthroplasty include acetabular erosion and protrusion [29] and any associated osteoarthritis with articular cartilage erosion increases the risk. Revision surgery is needed in elderly patients due to lesions of articular cartilage caused by repeated articulations [30]. Total hip arthroplasty has longer durability compared to hemiarthroplasty [31]. Major complication of total hip arthroplasty following intertrochanteric fracture include dislocation [32] with a reported rate of dislocation of 0–44.5% [32]. In our study, abduction brace was used postoperatively for three weeks and rehabilitation protocol was followed under supervision. In the immediate postoperative period, none of the patients suffered dislocation. Instructions were given for daily activities which can result in dislocation and patient compliance was checked at each follow up.

In our study, better functional outcome was seen in total hip arthroplasty than internal fixation. No deaths were seen during the study period. Within one month, patients returned to their normal activities and they there was progressive improvement at three months follow-up. All the patients were ambulatory with or without aid by 6 months. At 2 years follow-up, all patients showed progressively better functional outcome in spite of their advanced age.

Conclusion

Total hip arthroplasty is a reasonably valid treatment option for complex and unstable intertrochanteric fractures who were previously mobile and mentally healthy patients whether primary or revision of internal fixation failures. Total hip arthroplasty offers faster recovery with lower risk of mechanical failure, overcomes the complications of internal fixation and provides better functional ability in the immediate postoperative period. It provides a stable, pain-free, and mobile joint with acceptable complication rate. However since number of cases in our study is limited,

reports may change with higher number of cases. Hence a larger randomized study on unstable osteoporotic fractures with a large number of patients to compare primary fracture fixation with Total hip arthroplasty is needed.

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