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UNSTABLE OSTEOPOROTIC INTERTROCHANTERIC FRACTURES IN ELDERLY PATIENTS TREATED WITH PRIMARY HEMIARTHROPLASTY

Medical Science

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Background: Unstable osteoporotic intertrochanteric fractures are complex fractures and treatment for this fractures in elderly patients is challenging because of poor bone quality. The present study was undertaken to evaluate the functional outcome of primary hemiarthroplasty in unstable osteoporotic inter-trochanteric fractures in elderly patients.

Method: In 35 patients aged >60 years with diagnosis of unstable osteoporotic intertrochanteric fractures (AO/OTA type 31-A2.2 and 31-A2.3 and Evans type III or IV fractures) primary hemiarthroplasty was done and patients were followed up at 1 month, three month, six month and one year postoperatively.

Results: Among 35 patients, 24 (68.57%) were females and 11 (31.42%) were males with a mean age of 75.21 years. 2 patients died due to unrelated cause (myocardial infarction) within 6 months of surgery and remaining 33 patients were followed up to an average of 11.7 months. The mean surgery time was 73 min with an average intraoperative blood loss of 340 ml. 4 patients needed blood transfusion postoperatively. The patients walked on an average 3.6 days after surgery. One patient had superficial skin infection and one had bed sore. A total of 31 out of 33 patients (93.93%) had excellent to fair functional results and 1 had poor result with respect to the mean Harris hip score of 85.4±7.63, ranged from 56-95. One patient who had neurological comorbidity refused to walk postoperatively and was labeled as failed result.

Conclusion: In the elderly, unstable osteoporotic intertrochanteric fractures could be effectively managed by primary hemiarthroplasty, which provides early mobilization with a stable, pain-free, and mobile joint with acceptable complication rate.

KEYWORDS

Unstable, Intertrochanteric fractures, Osteoporosis, Hemiarthroplasty, Myocardial infarction, Harris hip score, Neurological

INTRODUCTION

Unstable intertrochanteric fractures are those where there is poor contact between fracture fragments, especially medial and posterior cortical displacement, comminution or a fracture pattern such that the weight bearing forces tend to displace the fracture further or a reverse oblique type [1]. Elderly people (>65 years old) are particularly vulnerable to this type of injury because of the higher prevalence of osteoporosis or osteopenia and female to male ratio is 3:1 [2]. With rising life expectancy throughout the globe, the number of elderly individuals is increasing in every geographical region, and it is estimated that the incidence of hip fracture will rise from 1.66 million in 1990 to 6.26 million by 2050 [3, 4]. Around 45% of all hip fractures are intertrochanteric fractures and 35–40% of these fractures are unstable and associated with high rates of morbidity and mortality [5]. Due to difficulty in obtaining anatomical reduction, management of the unstable intertrochanteric fractures in elderly patients is challenging and controversial [6].

These fractures can be treated both conservatively and operatively. Due to higher risk of mortality and morbidity associated with conservative management. There is a need for internal fixation for early mobilization to avoid complications [7]. A successful surgery at the hip joint should provide a painless, stable hip with wide range of movements. But, none of the accepted procedures have been able to achieve the goal fully. The patient needs to go through in many instances, multiple surgical procedures and a prolonged rehabilitation in order to preserve his original joint. Primary hemiarthroplasty offers a durable and versatile solution for unstable intertrochanteric fractures in the elderly [6, 8]. It can be done as a primary procedure or secondary to failure of conservative or internal fixation, offering an advantage of rapid return of function with a pain-free, stable and mobile hip [8]. Hence, the present study was undertaken to analyze the role and evaluate the functional outcome of primary hemiarthroplasty in cases of unstable osteoporotic intertrochanteric femur fractures.

MATERIALS AND METHODS

The present prospective study was conducted in the Department of Orthopaedics, Indira Gandhi Government Medical College and Hospital, Nagpur, Maharashtra, India during a period from 1 October 2018 to 25th January 2020. Total 35 cases of age above 60 years with unstable intertrochantric fractures classified according to AO/OTA type 31-A2.2 and 31-A2.3 and Evans type III or IV fractures were included in the study. All patients had confirmed osteoporosis on the preoperative bone mineral density scan confirming with the WHO criteria [9]. All patients were community ambulators prior to trauma. Patients with associated fractures that might significantly affect the final functional outcome, patients that were non ambulatory before injury and patients with psychiatric disorders were excluded from the study.

All cases were operated by using a standard posterior approach in lateral position. The fracture anatomy was assessed and a cut was taken high up in the neck (almost subcapital level) to facilitate removal of the femoral head. With the removal of head, fracture now had three main fragments namely the greater trochanter, lesser trochanter, and shaft with the retained portion of the neck of femur. In 20 cases, the lesser trochanter was in continuity with the neck of femur and was reconstructed with the shaft and greater trochanter using steel wires. A neck cut was then taken roughly about 1–2 cm above the lesser trochanter depending upon the amount of comminution. At times, both the trochanters were found as a separate fragment (n=10); in these cases the lesser trochanter and greater trochanter were fixed to the shaft using steel wires; however, most of the portion of the neck had to be sacrificed. In 7 cases where the lesser trochanter was comminuted, the trochanter pieces were left attached to the soft tissue and the medial defect was reconstructed using a cement mantle. In 17 cases the greater trochanter was the fracture en masse and was reattached to the main shaft using steel wires. In 8 cases where the greater trochanter was coronally split, a tension band was applied beneath the gluteus medius tendon and a bony tunnel was drilled in the distal greater trochanter. In 6 cases, the greater trochanter was found to be severely comminuted; here ethibond sutures were used to suture together the trochanter pieces and soft tissue to make a stable construct. The gluteus medius, greater trochanter, and the vastus lateralis apparatus were maintained in continuity as a stable lateral sleeve. This was then fixed loosely to the shaft fragment with steel wires or ethibond sutures. In cases where both greater and lesser trochanters were comminuted (n=2), they were both segregated together with the ethibond sutures to form separate masses and were reattached to the shaft after the insertion of a cemented femoral stem. Thus at the end of reconstruction, the greater trochanter, lesser trochanter, and shaft were wired together using steel wires in 31 cases while only ethibond sutures were used in four cases which were severely comminuted. The femoral canal was broached with appropriate anteversion. A fixed bipolar prosthesis was then inserted and trial reduction was done with the leg in longitudinal traction. Manually cement was inserted into the canal and final prosthesis was fixed into the canal. Once the prosthesis was fixed, the fracture fragments were reconstructed and reattached to the shaft. Stability of the prosthesis was checked and all the layers were closed accordingly over a suction drain after achieving hemostasis. Postoperatively, all the patients were followed up at 1 month, three month, six month and one year.

OBSERVATIONS AND RESULTS

Total 35 patients of unstable osteoporotic intertrochanteric fracture were treated with primary hemiarthroplasty during a period from 1 October 2018 to 31st December 2019. Among 35 patients, 24 (68.57%) were females and 11 (31.42%) were males. The maximum numbers of patients were in the age group of 71-80 years (45.71%) with a mean age of 75.21 years. Left side affected in 51.42% of patients. Most of the patients (54.28%) had unstable intertrochanteric fracture of Evans type IV and AO type 31–A2.3 (57.14), (Table 1).

Table 1: Demographic profile of patients, side and classification of fracture

Parameters	No. of patients	Percentage	
Age	61-70	13	37.14
	71-80	16	45.71
	81-90	06	17.14
Sex	Male	11	31.42
	Female	24	68.57
Laterality	Left	18	51.42
	Right	17	48.57
Evans classification	Type III	16	45.71
	Type IV	19	54.28
AO classification	31-A2.2	15	42.85
	31-A2.3	20	57.14

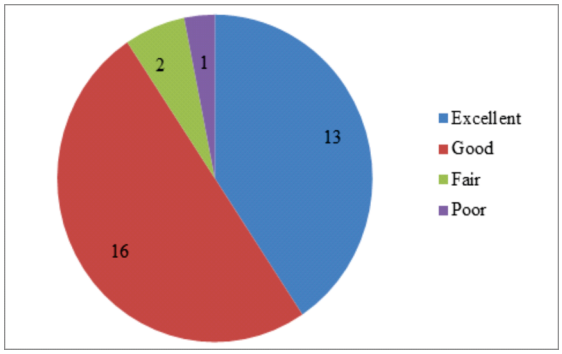
Eleven patients had associated comorbidities, hypertension in 6, diabetes mellitus in 4 and one patient had neurological comorbidity. Twenty two patients were walking independently without support before the fracture while rest of them required an aid like a cane or a walking stick. None of our patients had any significant preexisting hip pathology. All patients were operated within 15 days. All the surgery related parameters are depicted in table 2. The average surgery time was 73 min with an average intraoperative blood loss of 340 ml. 4 patients needed single unit blood transfusion postoperatively. The patients walked on an average 3.6 days after surgery. The mean hospital stay was 10.96 days. Two patients who were diabetic had superficial skin infection in the form of wound dehiscence and one patients developed bed sore postoperatively.

Table 2: Surgery related parameters

Parameters	Mean ± SD	Ranged
Delay in surgery (days)	6.21±2.43	2-14
Duration of surgery (min)	73.2 ± 2.13	55-90
Intraoperative blood loss (ml)	340.0 ± 1.34	180-500
Full weight bearing after surgery (days)	3.6 ± 3.1	3-7
Hospital stay (days)	10.96 ± 2.34	5-21
Follow up(months)	11.7 ± 4.21	1-12

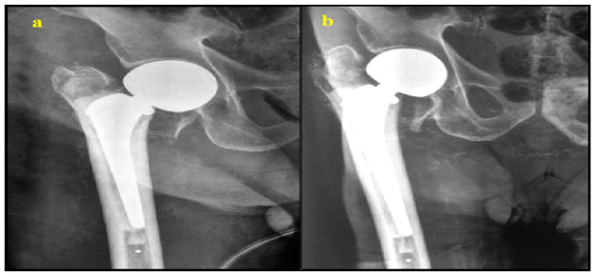
Out of 35 patients, 2 patients died due to unrelated causes (both due to myocardial infarction) within 6 months of surgery. The remaining 33 patients having a minimum one year follow up (average=11.7 months) were evaluated and data was further analyzed for only these patients. There was increase in average Harris hip score at 1 month (64.22), after 6 months (80.12) and after 1 year follow-up (85.17). One patient who had neurological comorbidity refused to walk postoperatively and was labeled as failed result (HHS 58). Among 33 cases, 13 (39.39%) patients got excellent results, 16 (48.48%) got good results, 2 (6.06%) got fair results, and 1 (3.03%) patients got poor results with respect to the Harris hip score (mean 85.4±7.63, ranged 56-95) as shown in figure 1.

Figure 1: Final Harris hip score (after 1 year follow up)



Patient with poor results had a superficial wound infection which settled down with a course of intravenous antibiotics for 2 weeks but this patient continued to have diffuse pain along the incision site and walked with a limp. The patient with the failed result was a case of Alzheimer's disease. This patient did not cooperate with the physiotherapy program and refused to walk postoperatively. Eventually, the patient developed a severe adduction contracture and was wheelchair bound (Figure 4).

Figure 4: X-ray right hip joint anteroposterior view a) unstable intertrochanteric fracture treated with primary hemiarthroplasty, (b) with adduction contrauture



DISCUSSION

Displaced, unstable, severely comminuted intertrochanteric fractures are associated with notable morbidity and mortality in elderly patients. Internal fixation has drastically reduced the mortality associated with intertrochantric fractures [10]. Despite modern methods of osteosynthesis, early mobilization is still avoided in cases with comminution, diminished bone stock, or poor screw fixation. Hence, primary hemiarthroplasty has been used as an alternative for unstable intertrochanteric fractures since 1971, allowing early mobilization in these patients and preventing postoperative complications such as pressure sores, pneumonia, atelectasis, and pseudo arthrosis [11]. Tronzo [12] claimed to be the first to use long, straight-stemmed prosthesis for the primary treatment of intertrochanteric fractures. Rosenfeld et al [13] reported good results with the use of the Leinbach prosthesis. Since then, there were multiple studies showing good results using this technique [14, 15]. The Indian perspective regarding the use of primary arthroplasty as a modality of treatment for comminuted unstable intertrochantric fractures has been shown by few authors [16, 17]. However, in present study, the lateral approach was preferred because of its shorter operative time, less blood loss, and lower incidence of postoperative dislocation. Patients undergoing hemiarthroplasty generally are more elderly and have more medical co-morbidities.

The average age of the study patients was 75.21 years, ranging from 61–90 years. Incidence of unstable osteoporotic intertrochanteric fractures was more in females compared to males due to osteoporosis. All patients were operated within 15 days (mean delay of 6.21±2.43 days, range 2 days to 14 days) with delay due to patients presenting late and time taken for patients to be fit for anaesthesia. Postoperatively the patients were made to bear weight on average 3.6 days after surgery and walking with support allowed from 4, 5 day onwards and one patient who had neurological comorbidity refused to walk postoperatively. Majority of the patients started walking after about 4 weeks, with exception of 5 cases which continued to use support for walking. Due to early mobilization of the patient there were very few complications and hospital stay of the patients also drastically reduced. The average hospital stay was 10.96 days. These findings are correlated well with the previous studies [18, 19].

The average blood loss during hemiarthroplasty was 340 ml with only 4 patients needed single unit blood transfusion each postoperatively, rest of the patients did not require any blood transfusion and there was no incidence of dislocation. The mean Harris Hip Score (HHS) at final follow up was 85.4±7.63, ranged from 56-95 with 13 excellent, 16 good, 2 fairs, 1 poor and 1 failed result. Study done by Sancheti et al [6] had HHS at final follow up 84.8 ± 9.72 (58-97) with 10 excellent, 15 good, 7 fairs. 2 poor and 1 failed result. Goel et al [19] found the final mean HHS was 85.24. Out of total 21 cases, 9 had excellent results, 7 good, 3 fair and 2 poor results, i.e. 76.19% had better than fair results. Choy et al [20] had mean HHS at last follow-up 80.6 ± 9.3, with excellent in 8, good in 19, fair in 9 and poor in 4 out of total 40 cases, i.e. better than fair results in 67.5% cases. Our results are comparable with the above studies [6, 19, 20].

Superficial infection in the form of wound dehiscence was seen in two

patients who were diabetic. They were managed by adequate control of diabetic status and use of appropriate parenteral antibiotics based on culture sensitivity results. One patient had developed bed sore on 13 post-operative days and required a week more of hospital stay, till the healing of the sore, which healed with nursing care and dressing. This patient was operated on 5th day post injury and did not have a pre-operative bed sore. This patient refused to walk and had poor results. There were no cases of dislocation, loosening, or late infections. These findings are in accordance with the study done by Maru et al [10], Goel et al [19] and Puttakemparaju et al [21]. Early postoperative full weight bearing in primary hemiarthroplasty is the main reason for significant reduction in post-operative complications such as pressure sores and pulmonary complications and improving quality of life of patient [22].

Conflicting reports about postoperative mortality in cases with primary hemiarthroplasty are cited in the literature. Kesmezacare et al [23] reported postoperative mortality in 34.2% after a mean of 13 months and in 48.8% after a mean of 6 months in patients treated with internal fixation and endoprosthesis, respectively. In existing study, out of 35 patients, two patients expired due to myocardial infarction. The first among these patients was an 88 year old female with hypertension, diabetes and ischemic heart disease and was operated on 8 day post trauma. She died 4 months after surgery due to myocardial infarction. The second patient was 79 year old male with ischemic heart disease and right nephrectomy and chronic renal failure, was operated on day 4 post injury and died 5 months post-surgery.

The limitations of present study were that the sample size was small and study period was not too long, so long-term complications like hip osteoarthritis, loosening, protrusion, stem failure etc. cannot be assessed.

CONCLUSION

In the elderly, unstable osteoporotic intertrochanteric fractures could be effectively managed by primary hemiarthroplasty, which provides early mobilization with a stable, pain-free, and mobile joint with acceptable complication rate. Thus, primary hemiarthroplasty is a reliable, technically simple and a safe procedure in elderly patients with unstable osteoporotic intertrochanteric fractures. However a larger prospective study using primary hemiarthroplasty for unstable osteoporotic fractures will be needed to support our conclusion.

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