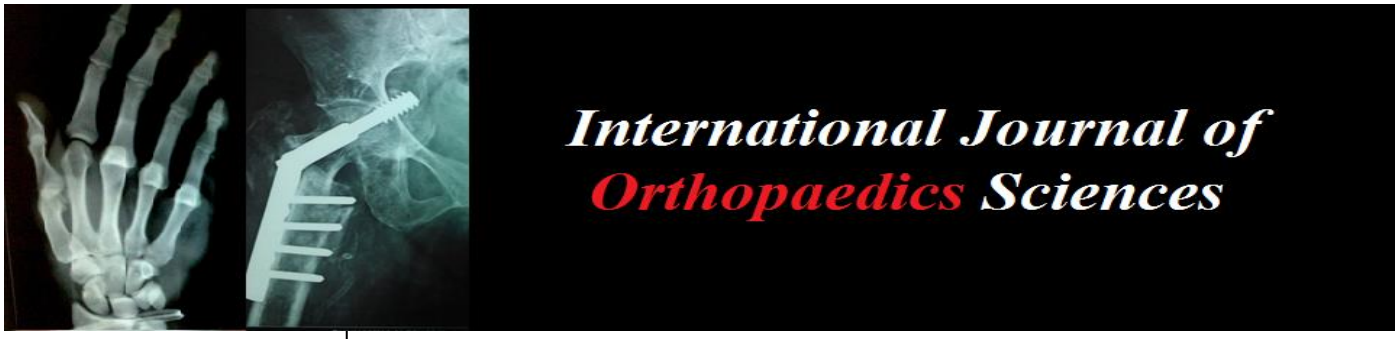

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Primary cementless bipolar long stem hemiarthroplasty for unstable osteoporotic intertrochanteric fracture in the elderly patients

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Abstract
Background: Intertrochanteric fracture (ITF) is a major part of fracture in femur. 95% of ITF are found in elderly patients. Osteosynthese is the preferred method of choice. However, elderly patients had osteoporotic, combined with many of chronic disease conditions that increase the rate of osteosynthese failure. Hemiarthroplasty bipolar long-stem is a surgical method that helps patients relieve pain, facilitate early rehabilitation, limit long-term complications, and improve quality of life for patients.
Aim: The aim of our study is to evaluate the clinical of the result of primary cementless bipolar long stem hemiarthroplasty in treatment for unstable ITF in the elderly patients.
Methods: We retrospectively analyzed 35 cases of primary hemiarthroplasty performed for osteoporotic unstable intertrochanteric fractures (AO/OTA type 31-A2.2 and 31-A2.3 and Evans type III or IV fractures). There were 26 females and 9 males with a mean age of 77.1 years (range, 62-89 years).
Results: Mean age of studied subjects was 84.29 ± 6.17, the lowest was 71, the highest was 96; ratio of male/female was 1:288. Follow-up of 33 patients for at least 6 months showed 88.6% caused by a low-energy injury; Average rehabilitation time was 4.63 ± 1.7 days. The average Harris point at the end was 90.4 ± 4.72.
Conclusion: Primary cementless bipolar long stem hemiarthroplasty is one of good choices in treatment of unstable ITF in elderly patients with severe osteoporosis, helped patients improve the quality of life.

Keywords: Cementless bipolar, osteoporotic, elderly patients

Introduction
In 1990, an estimated 1.66 million hip fractures occurred worldwide. 1. This global annual figure is quickly increasing [2, 3], with an estimated incidence of 6.26 million by 2050 [4]. The increased life expectancy of people, as well as osteoporosis, has resulted in an increase in these fractures [5]. The most common mechanism of injury is minor trauma. Low-energy trauma was shown to be the cause of 53% of all fractures in those 50 and older, according to Bergstrom *et al*. [6]. Low-energy trauma caused >80% of all fractures in persons over 75 years old. The importance of osteoporosis-related fractures is more than previously assumed. Osteosynthesis can be used to treat stable fractures with predictable results. However, owing of the difficulties in attaining anatomical reduction, the therapy of unstable intertrochanteric (Evans type III or IV and AO/OTA type 31-A2.2 and 2.3) [7-8] fractures is difficult. Fixed nail plate devices utilized to treat these fractures in the past have a high rate of cut-out and fracture displacement [9-11]. Following that, a sliding hip screw was widely employed and became the standard method of fixing these fractures [12-15]. Head perforations, excessive sliding resulting to shortening, plate withdrawal and plate breakage remained an issue, particularly with unstable fractures [16-19]. one of the most prominent causes leading to unsatisfactory results is osteoporosis and instability [20-22]. A period of restricted movement is also recommended in these older patients with unstable osteoporotic fractures [23, 24] which may result in comorbidities such as atelectasis, bed sores, pneumonia, and deep vein thrombosis [25]. In cases of intertrochanteric fractures, fracture stability, bone strength, and early rehabilitation determined the final results.
Intramedullary interlocking devices have been found to lower the likelihood of cut-outs in osteoporotic bones [26, 27] and to improve the outcome of unstable intertrochanteric fractures [28-32].

The significance of intramedullary devices in unstable osteoporotic and severely comminuted intertrochanteric fractures, on the other hand, has yet to be determined. Endoprosthetic replacements have also been found to improve patient rehabilitation and long-term outcomes [33-37]. However, due to the low quality of bone mass, concomitant conditions, and difficulty in rehabilitation of these patients, an appropriate therapeutic technique is still debatable [38].

Materials and Methods

Between January 2019 to December 2020, 35 patients with unstable comminuted ITF and osteoporosis were treated by primary cementless bipolar long stem hemiarthroplasty at Swasthiyog Pratishthan Institute, Miraj. The track period was 6 months. The average age was 84.29 years (range 71-96). Cases were included from the AO classification A2.2 in 14 patients and A2.3 in 21 patients. The Singh index was 2 in 27 patients and 3 in 8 patients. Average time from hospitalisation to intervention was 3.4 days. The elderly patients often have many chronic diseases association, including cardiovascular disease, diabetes mellitus, lung disease, and others. Posterior lateral approach was used. Orientation of the prosthesis was made out using the lesser trochanter anatomically and posterior condylar plane. The fracture trochanter was reduced and fixed to the prosthesis with stainless steel wires Pre-operation 12h, we used antibiotic and low-molecular-weight heparin (enoxaparin) for the patients. In post-operative phase, we used antibiotics and enoxaparin for 5 days. Non-weight bearing (WB) exercises were started on the second day after the operation, partial WB exercises were started in 4 post-operation days. Patients were followed in 1 month, 3 months, and 6 months. Follow-up patients were assessed according to the score of HHS. Data in our study were analysed and calculated by the medical statistics software SPSS 21.2.

Results

Operative technique

A posterior lateral approach was used. Orientation of the prosthesis was made out using the lesser trochanter anatomically and posterior condylar plane. The fracture trochanter was reduced and fixed to the prosthesis with stainless steel wires.

Table 1: Shows associated co-morbidities of patients among which maximum of 14 cases (60%) had cardiovascular issues. Other patients had diabetic (8 patient), nephro disease (5), hematological (3) and respiratory disease (2 patients).

Medical disease	No of cases	Percentage (%)
Respiratory disease	2	5.7
Cardiovascular	14	40
Diabete	8	22.9
Urinary disease	5	14.3
Rheumatology disease	3	8.6
Other	9	25.7

Mean operation time was 64 ± 24.9; mean peri-operative blood transfer was 643.7 ml; meantime rehabilitation was 4.63 days; meantime hospital was 14.69 days.

Table 2: Shows Complications post-operative were included in 3 patients accounted 8.6%. One patient was superficial infection and two others were a pulmonary infection. All of them were treated well before being discharged from the hospital.

Complication	No of cases	Percentage (%)
Superficial infection	1	2.9
Dislocation	0	0
Lung infection	2	5.7
Cardiovascular	0	0
Die	0	0
Total	3	8.6

Table 3: shows After 6 months, 22 patients had no pain, 13 had mild pain; 30 patients without aids, 5 patients with crutches; The mean HHS was 90.4 ± 4.72, of which 24 were excellent (68.6%), 10 were very good (28.6%), 1 was good (2.9%) and none show poor results.

Result	Excellent	Very good	Good	Poor	Total
n	24	10	1	0	35
%	68.6	28.6	2.9	0	100
Average			90.4 ± 4.72		

Fig 1: Preoperative X-Ray

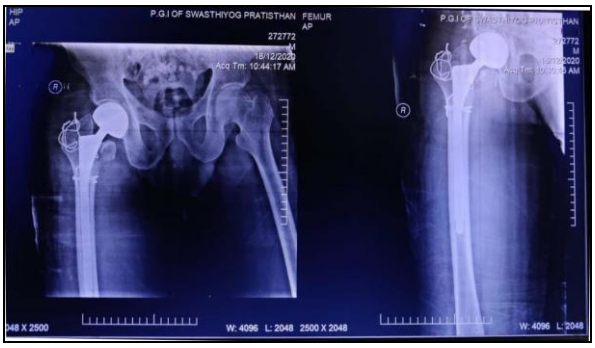

Fig 2: Immediate Post operative xray

Fig 3: Xray on Follow up after one Month

Discussion

According to earlier studies, the osteosynthesis approach is preferred with a variety of materials, including lock plates, DHS plates, PFNA nails, and gamma nails. However, pseudarthrosis, loss of fixation, and cut-out of the lag screw are all concerns linked with osteosynthesis of unstable ITF in senile patients with osteoporotic bone. Some surgeons have proposed prosthetic replacement, particularly with a long stem prosthesis hemiarthroplasty, for the treatment of unstable ITF in order to achieve early WB after surgery and to keep the fracture stable [39-41]. Our findings show that a primary partial replacement with a long stem prosthesis reduces discomfort, allows for early rehabilitation, increases implant stability over time, and reduces complications in patients with an unstable ITF due to severe femur osteoporosis.

In our study, the average recuperation time was 3 days. This is a time of early rehabilitation that allows patients to move around more quickly, making the treatment process easier and reducing the risk of long-term consequences such as pressure sores, pneumonia, and urinary tract inflammation. For patients with fracture intertrochanteric, the average time to partial weight-bearing after hemiarthroplasty surgery is 7 days, according to Su-Hyun Cho (2014). [42] Shin-Yoon Kim (2005) compared two groups of arthroplasty and osteosynthesis with PFNa, finding that the average time of rehabilitative exercise in the arthroplasty group was 7.8 days, whereas the average time of rehabilitating exercise in the osteosynthese group was 8.8 days.43 Parvjeet *et al*., (2009) [44] evaluated two groups of hemiarthroplasty biplar long stem and osteosynthese with DHS plate, finding that the arthroplasty group had a partial stand-up time of 7 days, while the osteosynthese group had a partial stand-up time of 10.1 days. The reason for this is that the bipolar long-stem hemiarthroplasty strengthened the joints and fractures, allowing the patient to begin practicing and weight-bearing sooner.

When compared to earlier osteosynthese findings, hip replacement surgery produced similar or superior results [43, 45-47]. Treatment of osteosynthese for unstable ITF in osteoporotic patients took a long time to WB. And this approach has a number of drawbacks, including loss of fixation, pseudoarthrose, and lag screw cut-out. 48Some writers advocated for primary hemiarthroplasty to avoid the problems of osteosynthesis and to assist the patient in early rehabilitation and return to normal activities prior to fracture. The stable attachment of the stem into the canal of an osteoporotic femur, on the other hand, is quite poor. They also preferred a cemented stem for quick prosthetic stability. 48 However, using cement increases the risk of embolism and can result in secondary cardiac problems, especially in elderly people with several chronic conditions. We can avoid using cement with the cementless long stem while still providing fracture stability. It was a tapered round-rectangular stem that was employed. It fits into the femur's distal diaphysis. The notion of fixation at the distal end of the femur lessens the influence on the level of fracture in this approach. Even in osteoporotic proximal femurs with extensive bone defects, this stem can provide initial stability and long-term biologic fixation [49].

According to Rothman's research, difficulties such as bleeding and operative time are less common in cementless stems than in cemented stems [50].

Deniz *et al*., (2013) examined two hemiarthroplasty groups: cemented and cementless treatment to fracture intertrochanteric, finding that the cemented group had a greater HHS than the cementless group, but the cemented group had a substantially higher rate of complications during and after surgery. With a statistical significance of p 0.05, the ratio of patients who died after surgery throughout their hospital stay was 13 percent compared to 0 percent in the cementless group. As a result, the author continues to advocate for cementless arthroplasty, and uses a lengthy stem to fix at the distal end of the femoral to increase postoperative joint stability [47].

According to Keating (2017), patients with general complications (infection, pneumonia, and deep vein thrombosis) were 22.73 percent in the osteosynthese group and 18.01 percent in the hemiarthroplasty group [51].

Florian Geiger (2007) investigated the postoperative death ratios of patients in the osteosyntheses and arthroplasty groups, finding the following: After one year, mortality in the osteosyntheses group is 39.8%, while it is 33% in the arthroplasty group [48].

In the elderly, Jaswinder examined the HHS of two groups: hemiarthroplasty (group 1) and total arthroplasty (group 2), finding that the HHS of group 2 was higher than that of group 1. However, the rate of articular dislocation in group 2 was higher than in group 1 (8 percent versus 0%), and the time of surgery was longer, resulting in a higher surgical cost. The authors suggest that, while total joint replacement may be more beneficial, hemiarthroplasty should be considered in the treatment of older individuals with unstable ITFs [52].

In 2010, KhadounSinno conducted a study to compare hemiarthroplasty and osteosynthesis. After surgery, the group arthroplasty had a faster full WB time than the group osteosynthesis, and the point Harris was higher [53].

Yeesuk Kim observed 161 elderly patients for an average of 3.8 years following bipolar hemiarthroplasty. The results were positive, with an average HHS of 82 at the end of the study.

Bipolar hemiarthroplasty is also a promising option for senile patients with osteoporotic unstable ITFs, according to the expert [54].

When Kayali *et al*. [55] evaluated two groups in the treatment of unsteady ITF, they found that group 1 had 42 hemiarthroplasties and group 2 had 45 osteosyntheses. They also discovered that group 1's average recuperation time was shorter than group 2. We got great and very good results about 97 percent of the time after surgery, with no dislocation or loosening. The rehabilitation period lasted roughly four days. With the death rate, complication rate, early WB, and early resumption to pre-fracture activities, short-term cementless long stem bipolar appears to be superior to osteosynthesis. Young Kyun Lee reported 87 patients with long stem bipolar for unstable intertrochanteric findings of 14.7 on the Merle d'Aubigne scale in 2011.

[56, 57] The author assumed that, even if the ultimate results

were not perfect, the long-term hemiarthroplasty approach is still a viable option for treating unstable ITF in senile patients [56]. There were certain limitations in our research. For starters, our study had a limited follow-up period. Because a long follow-up research is difficult for us and has only a few clinical implications in senile individuals with a short lifespan and restricted activity. Second, we did not do a comparison between osteosynthesis and arthroplasty in our study. Furthermore, we have not undertaken a cemented process collation. We did so because we were concerned about the potential risks of the cemented treatment. In future work reports, we will go into greater detail on this topic.

Despite these limitations, we have effectively established that primary cementless bipolar long stem hemiarthroplasty is a suitable treatment option for elderly patients with severe femur osteoporosis.

Finally, while we cannot state that this treatment is superior to internal fixation, the results of our study show that cementless bipolar long stem hemiarthroplasty is a good option for correcting unstable ITF in older patients with osteoporosis. Patients have a better prognosis, receive early WB, receive early rehabilitation, have less sequelae, and have a higher quality of life. Research on a greater number of patients is required to properly evaluate the effectiveness of this strategy, and in the long run, with additional evaluation criteria, this helps to open new ideas for our next investigations.

Conclusion

The problem is that we can't tell whether this procedure is superior than internal fixing, but according to our findings, cementless bipolar long stem hemiarthroplasty is also a good option for correcting unstable ITF in older osteoporotic patients. Patients have a better prognosis, receive early WB, receive early rehabilitation, have less sequelae, and have a higher quality of life. Research on a greater number of patients is required to properly evaluate the effectiveness of this strategy, and in the long run, with additional evaluation criteria, this helps to open new ideas for our next investigations.

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