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Research Article

INVESTIGATION THE OUTCOMES OF CEMENTED BIPOLAR HEMIARTHROPLASTY IN ELDERLY PATIENTS WITH UNASTABLE INTERTROCHANTERIC FRACTURE REFERRED TO AHVAZ IMAM KHOMEINI AND RAZI HOSPITALS IN AHVAZ DURING 2011 TO 2015

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Abstract:

Background and Objective: Hip fractures among elderly are associated with a high mortality rate imposing considerable burdens to healthcare systems. Given the age, underlying diseases and poor bone quality of these patients, hemiarthroplasty can be used with bipolar prosthesis. This study aimed to evaluate the outcomes of bipolar hemiarthroplasty (BA) elderly patients with intertrochanteric fractures.

Materials and Methods: This study was conducted on 35 patients with unstable intertrochanteric fracture after surgery using cemented bipolar hemiarthroplasty method. Three patients had incomplete follow-ups and five patients were deceased. In total, 27 patients (12 males and 15 females) were followed up for a mean duration of 38.85 months (12-70 months). Clinical and radiographic evaluations were performed. Subjects were assessed in terms of weight bearing, the ability to walk with or without assistance, evaluation of the amount of limb length discrepancy, evaluation of deep infection, dislocation of the implant, claudication, pain during walking, presence of loosening or subsidence prosthesis, acetabular erosion and nonunion of the greater trochanter. Harris Hip Score (HHS) questionnaire was filled for all the patients. In addition, lack of the ability to walk and non-ambulatory or prosthesis subsidence were defined as failure of the surgery.

Results: At the end of the follow-up, the HHS score was excellent for five patients, whereas it was good, fair, and poor for 12, 6, and 4 patients, respectively. In addition, mean HHS was 81.22 (good). During the follow-up, 14 patients were able to walk without assistance and pain, and 11 patients walked with assisting tools. There were no deep infection cases. In total, two cases of prosthesis dislocation, three cases of loosening around stem, three patients with nonunion of the greater trochanter and three patients with limb length discrepancy (LLD) less than 2cm were identified.

Conclusion: Performing surgery with cemented bipolar hemiarthroplasty method to treat patients with unstable intertrochanteric fracture and osteoporotic led to acceptable clinical and functional results. Therefore, it is recommended that bipolar hemiarthroplasty method can be used to help patients for accelerate to start walking, so that unwanted complications, such as non-ambulatory, are prevented.

Keywords: intertrochanteric fracture, bipolar hemiarthroplasty, Harris Hip Score

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INTRODUCTION:

Intertrochanteric fractures are the most common type of hip fractures in the elderly. In order to increase life expectancy and promote healthcare treatments in societies, it is predicted that the incidence of these fractures will increase from 2.6 million fractures in 1990 to about 6.4 million by 2050 (1-4). Intertrochanteric fractures, which occur in the elderly due to osteoporosis, are mostly in a comminuted and unstable form. Therefore, these fractures cannot be treated with internal fixation with a DHS selected device. It is mostly recommended that intramedullary devices be used for these patients. However, literature review has revealed that low bone quality in such patients will increase the risk of cut out, collapse, limb length discrepancy, failure and need for revision (5-8).

On the other hand, these patients have underlying diseases due to their age, which increases the risk of repeated surgery. These patients require surgery methods that leads to the ambulate after the surgery and do a complete weight bearing since partial weight bearing in these patients is not practically possible. Lack of weight bearing and early ambulation of patients after the surgery will be associated with complications, such as atelectasis, pneumonia, bedsores, UTI, DVT, morbidity and mortality (7-9).

Considering the aforementioned reasons as well as the better outcomes of previous experiences with cemented and cementless bipolar hemiarthroplasty surgeries with calcar replacement on such patients, there has been an increasing trend towards using these surgeries for treatment of unstable fractures in the elderly is moving toward this technique (10-13).

Clinical and functional findings and radiographic evaluations after the surgery were different in these patients; however, the majority of studies indicated acceptable clinical and functional results using cemented bipolar method.

However, there is limited number of studies about long-term follow-ups of these patients. There, we aimed to conduct a research with long-term results and follow-ups of patients with intertrochanteric fracture, treated with cement bipolar method.

MATERIALS AND METHODS:

This descriptive and retrospective study was conducted on 35 patients with unstable intertrochanteric fractures defined based on AO/OTA. Subjects were aged 60 years old and had osteoporosis based on Singh's index. The research was carried out during 2011-2015 at two orthopedic centers.

The surgery was performed by two orthopedists and all of the patients received cemented bipolar prosthesis (Omnifit® straker/NJ/USA) with the technique of TBW of greater and lesser trochanter and calcar replacement with cement.

Inclusion criteria were age >60 years, unstable intertrochanteric fracture (according to OA/OTA type A2 and A3) and severe osteoporosis (based on Singh's index grade 1, 2, 3, 4). On the other hand, exclusion criteria were stable fracture, history of hip fracture in the front, pathologic fractures and patients who were not followed up. All of the experimental procedures of this study were approved by the guidelines set by the ethics committee of Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran (No.: IR.AJUMS.REC.1396.21) and were in complete accordance with the Helsinki declarations of ethical principles for medical research involving human subjects.

In total, three patients had incomplete follow-ups and five patients were deceased, who were eliminated from the research. Therefore, 27 patients entered the study. Patients were followed up for a specific duration (12-70 months) and were then evaluated using radiographic images.

During the examination, patients were assessed in terms of weight bearing and ability to walk with or without assistance, evaluation of LLD amount, evaluation of deep infection, dislocation of the implant, pain during walking, loosening and subsidence of prosthesis, acetabular erosion, and nonunion of greater trochanter. The HHS questionnaire was filled for all the patients. Lack of walking and ambulate or subsidence of prosthesis of patients were indicative of failure of the surgery.

Surgical procedure

All of the patients underwent the surgery in a lateral position under spinal anesthesia using the modified lateral Hardinge approach. In addition, anterior capsulotomy was carried out.

The anatomy of fracture was assessed regarding the number of fragments. Eventually, it was attempted to attach all of the fragments of greater trochanter together, so that they are stuck to the abductors. The posteromedial part remained attached to the femoral shaft and was separated from the head and neck of femur using osteotomy.

After removing the head and neck, proximal femur was exposed. Broaching was performed inside the canal. After ensuring of attachment of greater trochanter fragments, cement was injected, which was followed up by insertion of the prosthesis (Omnifit® straker/NJ/USA).

Size and position of prosthesis and offset of femoral neck were estimated using templating before surgery. In addition, the calcar region was renovated with cement mantle.

After trial reduction, suitable head and neck for the restoration of length of organs and sufficient soft tissue tension were selected. At the end, greater trochanter fragments along with the attached abductors and also posteromedial parts were

attached to the proximal femoral shaft and special holes on prosthesis using wiring.

Any cement between the fractured fragments was carefully extracted. Eventually, the wound was sutured at separated layers. Prophylaxis for DVT by Enoxaparin were prescribed for two weeks.

Antibiotics were taken for 24 hours after the surgery. Patients were asked to walk in the ward one day or 48 hours after the surgery, if they were able to tolerate the pain. Patients were recommended to do complete weight bearing and walk with walkers. After that, they were discharged and sent to the clinic for follow-up.

RESULTS:

In this descriptive and retrospective study, 35 patients aged >60 years with unstable intertrochanteric fracture, who were treated with cemented bipolar hemiarthroplasty, were followed up. In total, three patients did not refer to the clinic

for follow-up and five patients, including two in the first six months after the surgery and three in the first year after the surgery, were deceased due to cardiovascular problems.

Eventually, 27 patients (male=12, female=15) with mean age of 79.7 years old (range: 63-93 years) were assessed for a mean duration of 38.85 months (range:12-70 months).

Patients without ambulate or with painful loosening and prosthesis subsidence of more than five mm were considered as failure of the surgery. In this study, one patient due to dialysis and another one patient due to uncontrolled diabetes and had painful loosening and prosthesis subsidence were not ambulated at all.

Patients underwent the surgery on mean 5.2 day of hospitalization (3-15 days). After the surgery, 15 patients on the second day, six patients on the first week, and four patients during the first three weeks were ambulated and were able to bear weight.

Table 1: Time of weight bearing in patients

After surgery	Patients (n)
2 Days	15
1 week	6
3 weeks	4
Non- ambulatory	2

Mean hospitalization period was 14.4 days (5-37 days). At the end of the follow-up, 14 patients were able to walk without assistance and pain, and 11 patients used assisting tools, such as cane.

Table 2: Functional outcome during the follow-up

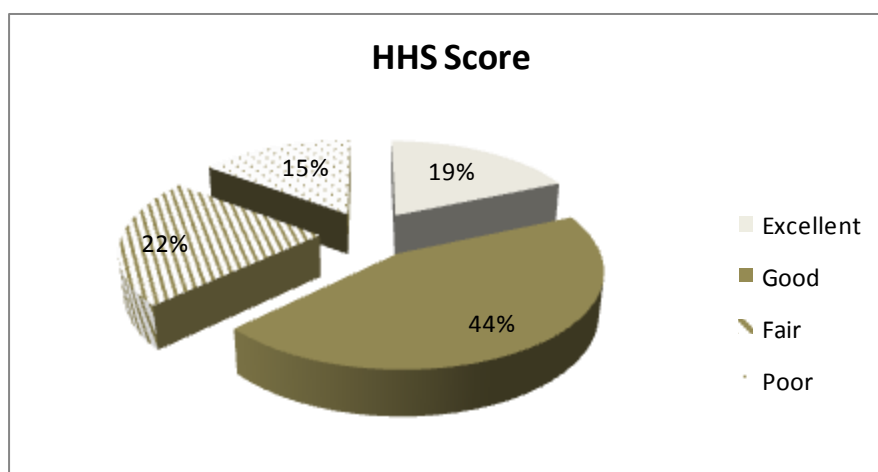
Walking	Patients (n)
Walking without support	14
Walking with support	11

In addition, 16 patients got back to their routine and normal activities before the fracture occurred and nine patients had inferior function and mobility, compared to their situation before the fracture.

The HHS score was excellent for five patients, whereas it was good, fair and poor for 12, 6 and 4 patients, respectively. Mean HHS was 81.22 (good).

Table 3: Results at last follow up according to Harris Hip Score

Harris Hip Score	Patients (n)
Excellent	5 (19%)
Good	12 (44%)
Fair	6 (22%)
Poor	4 (15%)
Mean of HHS Score: 81.22 (Good)	



No deep infection was observed, and there were two cases of prosthesis dislocation, one reduced with close reduction (C.R) and the other with open reduction (O.R).

The O.R case was one of the failure cases, who underwent revision surgery. At the end of the follow-up, three patients had limb length discrepancy (LLD) less than 2 cm, which were asymptomatic and could be treated with heel lift. Moreover, there were three cases of loosening around the stem, one of whom had no pain but the other two had painful loosening and were regarded as treatment failure, undergoing revision surgery to be treated.

Three patients had nonunion of greater trochanter, one of whom had no symptom and was treated with nonoperation. On the other hand, one of the other two cases underwent ORIF again with TBW and the other case was regarded as treatment failure and was cured with stem revision.

DISCUSSION:

This descriptive and retrospective study was conducted on 27 patients, who were treated with cemented bipolar hemiarthroplasty and were followed up. Mean age of the participants was 79.7 years (63-93) and mean duration of patient follow-up was 38.85 months (12-70 months).

In the past few years, osteosynthesis and internal fixation (DHS, PFN, Gama Nail) were proper treatments for stable intertrochanteric fracture. However, the results of the present study indicated that this method could be associated with adverse outcomes in patients with high mortality risk, such as collapse, short limbs and lag screw cut out and etc. (7, 11, 14, 15).

Therefore, arthroplasty was used to treat unstable fractures in the elderly due to osteoporosis and low bone quality for internal fixation (14-16).

Emami et al. (2013) and Hasankhani et al. (2014) both conducted clinical trials to compare the two methods of bipolar and DHS.

According to the results of the aforementioned studies, the risk of early complications after the

surgery and complications caused by lack of ambulation, as well as complications caused by device were significantly more observed in the DHS group, compared to the bipolar group. Therefore, the method of bipolar was introduced as the more suitable alternative for treating unstable fracture in the elderly (14, 15).

Shetty et al. (2017) compared the two methods of bipolar and PFN in a clinical trial. This study was conducted on two groups of 25 cases, the results of which indicated that HHS and early weight bearing in patients treated with bipolar method were significantly higher, compared to the PFN group. In the PFN group, early and late complications due to lack of ambulate and amount of device failure were more observed, compared to the other study group (17).

Moreover, Rodop et al. (2000) followed up 54 patients for 22 months. According to their results, the score of HHS was reported to be excellent for 14 cases, whereas it was good, fair and poor for 11, 3 and 3 patients, respectively. In this research, no dislocation or loosening was reported. One case had acetabular erosion, four patients had nonunion of greater trochanter and five individuals reported LLD. Moreover, seven patients were diseased four months after the surgery. One case with deep infection died after one year. On the other hand, 33 patients were able to perform weight bearing on the first week after the surgery. In the present study, the HHS score was reported to be excellent for five patients, whereas it was good, fair and poor for 12, 6 and 4 patients, respectively. There was no case of deep infection. In addition, we had three LLD cases, three nonunion cases, as well as two dislocation and three loosening cases.

However, five patients were deceased one year after the surgery. Our findings are in line with the results obtained by Rodop, and inconsistency in the results of some studies might be due to differences in the number of cases and mean duration of longer follow-up in the present study (9).

In a retrospective study by Ayman et al. (2012), 24 patients with unstable intertrochanteric fracture

were followed up for a mean duration of 22 months (18-36). Mean HHS in the present study was 85 after one year. All of the patients were able to perform weight bearing during the first two days after the surgery. There was no case of dislocation, loosening, deep infection, revision or Failure. Moreover, early complications of the surgery were minimized. However, three patients died during the follow-up period. Cement bipolar prosthesis with calcar replacement were used for the mentioned patients. The HHS score of the present research is similar to this study. The difference between the two studies was the fact that there was no calcar replacement in the current research (18).

In a retrospective research, Elmorsy et al. (2012) followed up 41 patients for a mean duration of 13 months. Five patients were deceased after one year. Mean HHS score of the study was 78. In addition, 27 patients ambulated and were able to walk without assistance and 13 patients could walk with walkers.

There was one case of dislocation, one deep infection, one acetabular erosion and three individuals with early complications after the surgery. Four patients underwent revision procedure. In the current research, 14 and 11 patients were able to walk without assistance and with walkers at the end of the follow-ups, respectively. There were two cases with revision. We obtained better results, compared to the mentioned research, in terms of complications after the surgery (16).

In another clinical trial by Cankaya (2013), 86 patients with unstable intertrochanteric fractures were followed-up for 38 months. Patients were randomly divided into two groups of cemented and cementless. According to their results, patients treated with cemented bipolar were able to walk sooner, compared to the other participants.

On the other hand, early complications were less observed in the cementless group. While there was a significantly higher rate of mortality due to cement in short term, no significant difference was observed in the two groups in terms of mortality in long term. In general, the study groups were clinically and functionally similar.

They decided that cementless prosthesis led to higher risk of early mortality and complications after a surgery, compared to cement treatment.

In the present study, cemented prosthesis was used due to the osteoporotic nature of patients and lack of calcar prosthesis replacement. According to the results, no early mortality was observed, and there were few cases with early complications. After comparing our findings with the previous studies, it was concluded that using cemented prosthesis without calcar replacement was also associated with relatively good clinical and functional results (19).

In this regard, Singh et al. (2014) conducted a retrospective study on 25 patients treated with cemented bipolar prosthesis and followed up these individuals for a mean duration of 12 months. In the mentioned research, Mean HHS was 78.86, and all of the patients were able to perform weight bearing one week after the surgery.

There was no case of dislocation, loosening, nonunion, deep infection and revision. A few cases of bedsore were reported, which were treated with care. They also used two questionnaires of VAS and Lower Extremity Functional Scale (LEFS), the results of which were indicative of similar results for patients in terms of mobility. The difference between our findings and the results of the aforementioned research might be due to the short duration of follow-up in this study and its retrospective nature. However, according to HHS range, we obtained better results, compared to the previously mentioned research (20).

In another retrospective study by Thakkar et al. (2015), 48 patients with unstable intertrochanteric fracture were followed up for a mean duration of 54 months (12-84 months). These patients were treated with cemented bipolar, along with Strut graft cortical from the femoral head and neck of the patient while maintaining calcar.

In this research, 11 patients were deceased and three cases were not followed up. Mean HHS score of 6 months was 84.96 (13 excellent, 13 good, 7 fair and 2 poor). All of the patients were able to walk three days after the surgery and there was no case of loosening and deep infection.

However, there was one case of bedsore, one nonunion greater trochanter and one LLD less than one cm. Two cases had revision, one of whom was total hip after 48 months. Graft was absorbed in just two of the cases and stem displacement or subsidence was observed. Graft was completely healed in 32 patients.

At the end of the follow-up, 26 and 6 patients were able to walk independently and with cane, respectively. Our findings are incongruence with the results of the mentioned study. The only difference was in the duration of follow-up. In a study by Thakkar, a new technique for using Strut graft from cortical femoral neck while maintaining calcar in patients was applied. In our research, calcar of patients was maintained, but no Strut graft was applied (21).

CONCLUSION:

Treatment of unstable intertrochanteric fractures in the elderly is still a topic of debates. Using early arthroplasty with cemented bipolar prosthesis has been recently introduced as an alternative treatment for these patients. The present study indicated that cemented bipolar led to good results in treating patients with unstable intertrochanteric fracture and osteoporosis.

By applying this method, patients can walk very soon, which prevents unwanted complications caused by lack of ambulate. In addition, early mortality of these patients, who have underlying diseases as well, could be prevented by having the risk of cemented bipolar prosthesis.

One of the major drawbacks of this study was its retrospective nature, small sample size and lack of randomized evaluation of patients. On the other hand, one of the strengths of this research was the long-term follow-up of patients. It is recommended that a cohort retrospective study with greater sample size and longer duration of follow-up be performed to confirm the treatment of old patients with unstable intertrochanteric fracture.

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