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EVALUATION OF THE FUNCTIONAL OUTCOMES OF MODULAR BIPOLAR FEMORAL PROSTHESIS IN THE TREATMENT OF NEGLECTED FEMORAL NECK FRACTURES

Orthopaedics

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ABSTRACT

Introduction: Neck of femur fractures are common injuries in the trauma center. In developing countries, there is high incidence maltreated femoral neck fractures due to lack of treatment facility. Non-union and AVN of fracture in the neck of femur increases day by day. In case of more than 6 months old fractures regardless of age or stage, prosthetic replacement (hemi or total) is the treatment of choice.
Method: It was a descriptive observational type of study carried out in National Institute of Traumatology and Orthopaedic Rehabilitation (NITOR) and private hospitals of Dhaka from August 2015 to June 2017. Total 18 samples were included in this study to evaluate the functional outcomes of modular bipolar femoral prosthesis in the treatment of neglected femoral neck fractures
Results: The pain status of patients decrease significantly following operation. In almost all cases pain was decreased significantly (P value <0.05). According to Harris hip score results were 44.44% excellent, 33.33% good, 16.67% fair and 5.56% poor.
Conclusion: Satisfactory functional results, minimal incidence of major radiological complications and the biomechanical advantage make modular bipolar prosthesis a dependable endoprosthesis in neglected fracture neck of femur.

KEYWORDS

Non-union, Avascular necrosis, Neglected femoral neck fracture, Hemiarthroplasty, Modular prosthesis

INTRODUCTION

Fracture in the neck of femur are very common type of injury in the department of trauma. The incidence of femoral neck fractures will continue to rise in the future (Chevalley et al., 2007; Karantana et al., 2011). The neck of femur fractures have been regarded as difficult fractures to treat as because of high rate of non-union and avascular necrosis of the femoral head (Naidoo, 2008; Parker, 2010). In developing countries, there is high incidence maltreated femoral neck fractures due to lack of treatment facility (Jain et al., 2015) or treated by traditional bone setters or operated with low-grade implants and below standard theater condition.

If there has been a delay of more than 30 days to seek physician from the time of femoral neck fracture, the fractureis called neglected femoral neck fracture(Roshan, 2008). The incidence of non-union and AVN increases further in neglected femoral neck fractures (Elzohairy, 2017). There are various options for the treatment of neglected femoral neck fracture. But, in case of more than 6 months old fractures regardless of age or stage, prosthetic replacement (hemi or total) is the treatment of choice. Hip arthroplasty is indicated in less than 55 years old patients and in severe stage (Stage III) of neglected femoral neck fractures (Jain et al., 2015).

Hemiarthroplastycan be done with a modular bipolar prosthesis, so that it can be easily converted to total hip arthroplasty (Balan et al., 2016). There are many benefits of using modular bipolar prosthesis in neglected femoral neck fractures in patient between 20 to 60 years' old (Chandran et al., 2006).

- The fully modular prosthesis allows to select the best implants according to patient's need during operation
- Versatility of prosthesis allows for easy conversion to a total hip prosthesis in future by changing the acetabular cup only.

MATERIALS AND METHODS

It was a Descriptive observational study done at National Institute of Traumatology and Orthopedic Rehabilitation and two private hospitals in Dhaka (City Hospital and Care Hospital). The study period was from August 2015 to June 2017. Eighteen (18) patients were included in the study following selection criteria by purposive sampling from the study population. Patients of more than 6 months old neck of femur fracture between 20 to 60 years of age attended in OPD of NITOR and two private hospitals of Dhaka (City Hospital and Care Hospital).

Inclusion criteria:

1. Femoral neck fractures
2. Age between 20 – 60 years
3. More than 6 months old fracture
4. Sex – Both sex

Exclusion criteria:

1. Active infection of the hip or any other region
2. Insufficiency of abductor musculature
3. Severe comorbid conditions that would significantly increase the risk of morbidity or mortality
4. Female patient with pregnancy

Data were collected by interview, observation and clinical examination. The relevant history was taken and general, systemic and local examination of the patient were done to assess physical condition and operability by the desired methods.

Preoperatively patient's fitness was assessed with routine investigations. Standard AP and lateral radiograph of hip joint and AP view of pelvis including both hip were done. A detail preparationwas made including operative procedure and implant selection.If limb length discrepancy were found after clinical and radiological examination, then preoperative skeletal traction was used.

At least 6th month follow up was targeted to evaluate final functional outcome. The study patients were followed up with a subjective assessment of their post-operative quality of life using standardized questionnaire, and an objective evaluation of their clinical status and its documentation via a Harris Hip scoring system. In every follow up clinical examination and radiological investigations were done. patients 12 cases (66.67%) were males and 6 cases (33.33%) were females.One patient had stayed 15 days postoperatively. Mean hospital stay was 4.67±2.76 days.Thirteen patients needed

preoperative skeletal traction. All the patients were advised to do isometric muscle strengthening exercise.

Out of 18 patients only 3 patients could be followed up for 12 months. Most of them (11 patients) attended for follow-up up to 6 months. However, 4 patients could not be followed up for more than 3 months due to time constraints.

One patient had stayed 15 days postoperatively. Nine patient were stayed between 4-5 days and 6 patients between 2-3 days. Mean hospital stay was 4.67±2.76 days.Thirteen patients came after 6-9 months following injury whereas 3 patients came after 10-12 months and 2 patients came after 12 months. Mean interval was 10.22±7.27 months.Out of 18 patients only 3 patients could be followed up for 12 months. Most of them (11 patients) attended for follow-up up to 6 months.

Analysis of functional outcome using Harris Hip score showed that limping of the patients improved significantly (p value <0.05) after operation where 94.44% patients had none or slight limping. Following operation 12 (66.67%) patients could walk without any support which was significant compared to preoperative support. The postoperative walking distance of the patients increased significantly (p <0.05) where 55.56%

Statistical analysis:
After data collection, the raw data was compiled and tabulated according to key variables. All the information was collected in a data sheet. All data were analyzed by Statistical Package for Social Sciences (SPSS) software and expressed in percentage unless mentioned otherwise. Results were presented by tables and graphs.Preoperative and postoperative data were compared by using paired 't' test and proved significant if p value is <0.05. Hip score of Harris was analyzed in confidence duration.

Every participants of the study was informed verbally and were taken written informed consent for authority approval.

RESULTS:
The mean age of the studied patients was 46.22 ±11.39 years where youngest patient was 25 years old and elder one was 60 years old.Out of 18 patients could walk unlimited distance. After operation, almost all patients (94.44%) were able to walk in the stairs normally with or without railing which was significant improvement from the preoperative ability. Statistical analysis also showed significant increase in range of motion where about 88.89% patients had more than 160° range of motion postoperatively.

The pain status of patient was assessed by Harris Hip score and showed that it decreases significantly following operation. Only 1 patient have significant pain following operation.

Final outcome based on Harris hip score:

Table 1: Functional outcome using Harris hip score (n=18)

Harris Hip Score	Preoperative		Postoperative		Paired 't' test
	No	%	No.	%	
Excellent	0	0	8	44.44	Mean of difference 79.44±17.73 t=19.01 P Value is <0.05
Good	0	0	6	33.33	
Fair	0	0	3	16.67	
Poor	18	0	1	5.56	
Total	**18**	**100**	**18**	**100**	

According to the clinical outcome of our study were graded in excellent, good and fair. All the 18 patients before operation was categorized as poor according to Harris Hip score where mean score was 8.50±6.42 ranging from 0 to 22. The Harris hip scores at the end of our study ranged from 47 to 100 and mean was 87.94±13.96. Following operation 8 (44.44%) patients had hip scores from 91 to 100 (excellent), 6 (33.33%) had hip scores 81 to 90 (good), 3 hips (16.67%) were rated 71 to 80 (fair) and 1 (5.56%) were rated <70 (poor). Comparing this score preoperative score using paired 't' test it was statistically significant (<0.05%).

Confidence level of the final outcome:
Among the population we will find almost 68% to 88% satisfactory result by this procedure. So it is quite acceptable outcome.

Postoperative complications:
Table 2: Postoperative complications (n=18)

Postoperative complications	No. of patient	Percentage
Stem in varurs/ valgus	2	11.11
Periprosthetic fracture	1	5.56
Others	0	0
Total	**3**	**16.67**

A periprosthetic fracture was noted in the immediate post-operative X ray of 1 patient. Otherwise, valgus/varusmalpositioning of the stem was the most common radiological finding in our study, seen in 2 patients (11.11%).

DISCUSSION
Hemiarthroplasty using modular bipolar prosthesis is not routinely performed for neglected fracture neck of femur. Research continues to search for ideal treatment modalities for neglected fracture neck of femur in case of younger patients.

We under took the present study of 18 cases of neglected intracapsular fracture neck of femur treated with hemiarthroplasty with modular bipolar prosthesis of both the sexes. In all cases uncemented modular femoral prosthesis were used.

Pain following hemiarthroplasty is a major concern. Bhandari et al. (2003) showed arthroplasty was a good option with regard to provision of pain relief with a relative risk of no or little pain of 1.12 (95% confidence interval,0.88 to 1.35). Keating et al. (2006) showed significant decrease of pain out of 102 patients at 12-month follow-up. In this study pain were reduced in 17 (94.44%) patients which was statistically significant and comparable to different international study. It was evident from the study that preoperative mean Harris Hip score was 8.50±6.42 which was increased to 87.94±13.96 postoperatively which was statistically significant. Ozer et al. (2012) showed 47% excellent result, 23% good result, 18% fair and 12% poor result treated with modular prosthesis in fracture neck of femur. Ali (2007) showed 75% satisfactory result out of 13 patient of fracture neck of femur treated with modular bipolar prosthesis. Balan et al. (2016) described 94% satisfactory outcome in intracapsular neck of femur fracture treated with modular bipolar prosthesis. Sakthivel et al. (2016) showed 20% excellent result and 80% good result in a study of hip arthroplasty using bipolar prosthesis. In this study according to Harris hip score results were 44.44% excellent, 33.33% good, 16.67% fair and 5.56% poor which was similar to different international study.

In our study there was a periprosthetic fracture found on 2nd postoperative day. Otherwise, valgus malpositioning of the stem was found 2 patients (11.11%). There were no major postoperative complications like wound infection and other. Sullivan et al. (2015) found 3.7% periprosthetic fracture Following Modular Hip Hemiarthroplasty out of 429 patients. Balanet. al (2016) found no periprosthetic fracture out of 34 patient treated with modular bipolar prosthesis. In our study the patient with periprosthetic fracture had osteoporosis and this may be the cause of fracture. Later she had revision surgery with circular wiring.

CONCLUSION:
Hemiarthroplasty with modular bipolar prosthesis for neglected fracture neck of femur gave satisfactory functional outcome. Patients were, for the most part, without pain. Even if there, pain was usually not disabling and did not affect routine ambulation, except 1 case who was suffering from osteoporosis. The complications were the exception rather than the norm.In view of late presentation, the outcome was good with decreased pain, improved daily living and function.

Satisfactory functional results, minimal incidence of major radiological complications and the biomechanical advantage that comes with modular bipolar prosthesis made it a dependable endoprosthesis in orthopaedic practice. A longer follow up, along with a larger sample population should be able to throw more light on the durability and overall patient satisfaction with the modular bipolar prosthesis.

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