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Acetabular erosion after hemiarthroplasty

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ABSTRACT

Background: Neck of femur fractures are one of the devastating injuries in the old age. Their incidence is on the rise causing immense stress on the society. One of the most commonly done procedure is bipolar hemiarthroplasty. In our study we have evaluated the acetabular erosion after hemiarthroplasty, in neck of femur fracture patients after a minimum period of 2 years and have tried to correlate it with activity level of the patient. The aim of the study were early detection of acetabular erosion; to assess the functional outcome after minimum of 2 years after hemiarthroplasty by modified UCLA score; to correlate the functional activity level and radiological acetabular erosion.
Methods: This is a retrospective radiological and clinical study. The post hemiarthroplasty plain radiographs, showing AP view of hip joint taken in the Department of Radiodiagnosis, PSGIMS&R will be studied along with activity level assessment. By Convenient sampling method, all the patients undergone cemented bipolar hemiarthroplasty, for fracture neck of femur after minimum of 2 years were assessed both radiologically and clinically. Functional activity level was assessed by Modified UCLA scoring system.
Results: By this study we suggest an easy and effective way of evaluating acetabular erosion and clinical activity. There is significant increase in acetabular erosion as the duration after surgery increases.
Conclusions: By this study we suggest an easy and effective way of evaluating acetabular erosion and clinical activity. There is significant increase in acetabular erosion as the duration after surgery increases. The clinical activity is by and large not significantly altered as the erosion progress at mid-term follow up.

Keywords: Neck of femur fractures, Bipolar hemiarthroplasty, Acetabular erosion

INTRODUCTION

Neck of femur fractures are one of the devastating injuries in the old age. It is well recognized even from the era of Hippocrates. The accurate number of hip fractures worldwide is impossible to determine, but the global incidence in the year 2000 has been estimated at 1.6 million and the projections for the future suggest further increasing numbers. In addition to the suffering of the individual the economic strain on society due to hip fracture is immense.

Management of displaced intracapsular hip fracture in elderly remains controversial. Options include hemiarthroplasty or total hip arthroplasty. Total hip arthroplasty has shown better clinical outcome and lesser reoperative rate, but in the elderly frail population who often suffer from fracture of the neck of the femur, morbidity rates are high.[1]

Hemiarthroplasty is one of the commonest procedures done for neck of femur fractures. It provides pain relief and early mobilization. The Moore and Thompson prostheses have been successful implants in treating

fracture neck of femur. Disabling pain and acetabular erosions are frequent complications after the use of Moore prosthesis.[1] So in an attempt to retard the acetabular wear, prolong the life of the implant and delay the need for revision surgery the bipolar prosthesis was developed by Bateman in Toronto in 1974, which had the advantage of hip motion occurring at 2 interfaces, primarily at the prosthetic interface and secondarily at the metal cartilage interface, thus minimizing the articular wear.

This prosthesis was found to be very useful and results were encouraging. However in long-term studies show that the bipolar prosthesis starts acting as unipolar prosthesis with time and hence leads to some erosion. However not all patients with acetabular erosions were symptomatic.

In our study we have evaluated the acetabular erosion after hemiarthroplasty, in neck of femur fracture patients after a minimum period of 2 years and have tried to correlate it with activity level of the patient.

Aim and objective

1. Early detection of acetabular erosion.
2. To assess the functional outcome after minimum of 2 years after hemiarthroplasty by modified UCLA score.
3. To correlate the functional activity level and radiological acetabular erosion.

METHODS

Source of data

This is a retrospective radiological and clinical study. The post hemiarthroplasty plain radiographs, showing AP view of hip joint taken in the Department of Radiodiagnosis, PSGIMS&R during the period between June 2015 to May 2016 will be studied along with activity level assessment. A total of 22 patients were evaluated.

Mode of data collection

By convenient sampling method, all the patients undergone cemented bipolar hemiarthroplasty, for fracture neck of femur after minimum of 2 years were assessed both radiologically and clinically.

Inclusion criteria

All patients operated for neck of femur fracture with cemented bipolar hemiarthroplasty after a minimum period of 2 years.

Exclusion criteria

Exclusion criteria were surgical site hip Infection; any preexisting pathologies around the hip; previous hip surgeries; post-operative periprosthetic fractures; neurological conditions like CVA, parkinsonism.

X-ray technique

A plain anteroposterior view of the operated hip joint is taken and assessed for acetabular erosion grading (Figure 1) following the technique of SakrMazen, MD, Girard Julien, MD and FakihRiad, MD. Patient positioned in supine, using digital X-ray, cassette tube distance is set to 100 cms and the beam is centered directly over the hip.

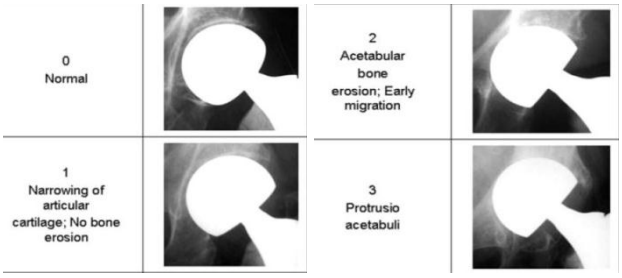

Figure 1: Grades of acetabular erosion.[2]

Activity level assessment[3]

Table 1: Functional activity level was assessed by modified UCLA scoring system.

Modified UCLA scoring system
1. Completely inactive, dependent on other and cannot leave the residence.
2. Mostly inactive or restricted to minimum activities of daily living
3. Sometimes going to social outdoor activities or visiting neighbours.
4. Regularly going to social outdoor activities or visiting neighbours.
5. Sometimes engaging in unlimited house works or shopping.
6. Regularly engaging in unlimited house work or shopping.
7. Regularly using staircase to climb.
8. Lifting or playing with small children.
9. Involving in heavy labour works.
10. Regularly using public transport.
Good --- 7 to 10 Fair-- 4 to 6 Poor--- below 4

Data analysis

Data collected were entered in Excel Spread sheet and analyzed using STATA statistical software package release 11. We used the two-sided independent-samples t test to compare means across dichotomous variables (i.e. men v. women); the one-way ANOVA test for comparison of means across multilevel variables. Simple calculations like Percentages, Proportions and Mean

values were derived. A type I error of 0.05 was considered in all analyses.

RESULTS

Table 2: Total number of participants according to gender.

Gender	Number of participants
Male	12
Female	10

Table 3: Total number of participants according to age.

Age in decades	Number of participants
60-69	9
70-79	11
80-89	1
90+	1

Total number of patient included in this study was 22. Total number of male patients 12, total number of female patients 10 and mean follow up age was 65 years. Right side hip involved was 11 and left side hip was 11. The mean follow up period was 3.54 years. The mean modified UCLA score was 6.22.

Table 4: Mean Modified UCLA score according to gender.

Gender	N	Modified UCLA score
Men	12	6.08±0.9
Women	10	6.4±0.7

The number of patients in Grades 0 and 1 acetabular erosion was 16 (72.70%) and in Grades 2 and 3 were 6 (27.30%).

Table 5: Mean acetabular erosion grade according to side affected.

Hip side	Number of participants
Left	11
Right	11

Table 6: Distribution of patients according to acetabular erosion grades.

Acetabular erosion grades	No. of patients	
Grade 0 and Grade 1	16	72.70
Grade 2 and Grade 3	6	27.30
Total	22	100%

The mean acetabular erosion when correlated with duration since surgery was statistically significant with p<0.001. Grade 0 & 1 has a mean value of 2.81 years and Grade 2 & 3 has a mean value of 5.75 years. This shows there was increased acetabular erosion as the duration post-surgery increases.

Table 7: Distribution of the study participants based on duration since surgery and grades of acetabular erosion.

Duration since surgery	Number of study participants	Erosion	No.	%
<4 years	18	0 and 1	16	88.9
		2 and 3	2	11.1
4 years	4	0 and 1	0	0
		2 and 3	4	100

Table 8: Mean duration since surgery (in months) according to acetabular erosion grades.

Acetabular erosion Grades	N	Duration since surgery
Grade 0 and Grade 1	16	2.81±0.32
Grade 2 and Grade 3	6	5.75±2.36

P<0.001.

The acetabular erosion grade when correlated with modified UCLA score was not clinically significant with p=0.71. In acetabular erosion Grade 0 and 1 the modified UCLA score was 6.33 and in Grade 2 and 3 the modified UCLA score was 6.18. Since the sample size was small the significance could not be correlated statistically. As the age of the patient increases there was a gradual reduction in activity.

Table 9: Mean Acetabular erosion grades according to duration since surgery (in months).

Duration since surgery	N	Acetabular erosion grades
<4 years	18	0.67±0.69
4 years	4	2.25±0.51

P<0.001

Table 10: Distribution of patients according to modified UCLA score.

Modified UCLA score	N	%
5	5	22.73
6	7	31.82
7	10	45.45
Total	22	

Table 11: Mean modified UCLA score according to acetabular erosion grades.

Acetabular erosion grades	Modified UCLA score
Grade 0 and Grade 1	6.33± 0.83
Grade 2 and Grade 3	6.18 ± 0.82

P=0.71(not significant).

Table 12: Mean modified UCLA score according to age in decades.

Age in decades	N	Modified UCLA Score
60-69	9	6.44±0.73
70-79	11	6.18±0.87
80-89	1	6±0
90+	1	5±0

Table 8 and shows description about Mean acetabular erosion grades according to duration since surgery (in months). This is statistically significant with P-value (<0.001) Erosion increases as the duration increases.

DISCUSSION

Incidence of fracture neck of femur is increasing gradually, probably due to increase in life expectancy of individuals.[4] The ideal treatment is still controversial[5]. Two common procedures done for elderly people are hemiarthroplasty and total hip arthroplasty. Some people advocate primary total hip arthroplasty for neck of femur fracture in elderly. Total hip arthroplasty results in more functional activity level and lesser reoperative rates but has more morbidity.

Hemiarthroplasty is more economical especially in developing countries like India and has lesser morbidity, but has a higher reoperation rate when compared to total hip arthroplasty.

The long term complications of bipolar hemiarthroplasty are acetabular erosion, aseptic loosening and infection.[6] Bipolar prosthesis is thought to have lesser incidence of acetabular erosion than unipolar prosthesis due to reduced movement occurring at acetabular prosthesis interface.

In this study we have tried to assess the acetabular erosion by radiological grading and functional outcome by modified UCLA scoring after a minimum period of 2 years after hemiarthroplasty.

Total numbers of patients assessed in this study were 22 and all underwent cemented bipolar hemiarthroplasty. The mean period of follow up was 42 months (range 2 years - 7 years). Six patients (27.30%) had a moderate to severe acetabular erosion and sixteen patients (72.70%) had minimal or no erosion. The grade of erosion was found to increase with follow up interval. With the follow up period of less than 4 years (18 patients) 16 patients (88.9%) had nil or minimal erosion and 2 patients (11.1%) had moderate to severe erosion. With follow up period of more than 4 years 4 patients had moderate to severe erosion. The mean follow up period in our study was 3.54 years and the significant acetabular erosion noted was 27.3% this could be compared with the study of Mazen et al, they had 33% erosion grade at the follow up period of 3 years.[7]

In this study all the patient's functional activity level were assessed by modified UCLA score, the mean modified UCLA score was found to decrease with increase in the age of the patients. Due to small study group the correlation of the modified UCLA score anti acetabular erosion was not statistically significant. One patient who had the longest period of follow up and maximum grade of acetabular erosion had a good level of functional outcome with modified UCLA score of 7. The pain did not restrict her functional activity.

Philips, London in his study found that the factors that had highest correlation were the level of physical activity and duration of follow up.[8]

Moon et al also found in their study that the progression of acetabular erosion correlated directly with the duration of articulation of the prosthesis within the acetabulum and this degeneration of articular cartilage becomes the cause of migration of bipolar cup, which is the major cause of failure of cemented bipolar arthroplasty. They also found the cause of degeneration to be multifactorial and it is accurately difficult to distinguish and measure the contributory level of each factor. They also found that all acetabular cartilage will show degeneration approximately 7 to 8 years after surgery.[9]

In our study all the 4 patients who had a follow up of more than 7 years had significant acetabular erosion. Hence the choice of total hip arthroplasty or a hemiarthroplasty in a fracture neck of femur may be determined by the life expectancy and the activity of the patient.

CONCLUSION

By this study we suggest an easy and effective way of evaluating acetabular erosion and clinical activity. There is significant increase in acetabular erosion as the duration after surgery increases. The clinical activity is by and large not significantly altered as the erosion progress at mid-term follow up.

Limitations of the study

Small study group, short period of follow up.

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Conflict of interest: None declared
Ethical approval: The study was approved by the institutional ethics committee

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