ORIGINAL ARTICLE

The Outcome of Austin Moor vs Bipolar Hemiarthoplasty in elderly patients in terms of Harris Hip Score and Charnley Hip Score

MIAN MUHAMMAD AZHAR

ABSTRACT

Aim: To determine the outcome of hemiarthroplasty using unipolar and bipolar prosthesis and to evaluate their results in terms of Harris hip score and Charnley hip score.

Place and duration of study: The study was conducted at Khawaja Muhammad Safdar Medical College/Allama Iqbal Memorial Teaching Hospital, Sialkot from January, 2010 to January, 2013.

Methods: Total 44 patients; 22 in each group were selected for the study which was conducted from January, 2010 to January, 2013 at Khawaja Muhammad Safdar Medical College/Allama Iqbal Memorial Teaching Hospital, Sialkot and were followed up for a period of 1 year to 3 years with an average follow up of 2.3 years. In unipolar group there were 14 male (63.63%) and 8 female (36.36%) where as the bipolar group had 16 male (72.72%) and 6 female (27.27%). In unipolar group right side was involved in 9 cases (64.28%) and left side in 5 cases (35.7%) while in bipolar group right side was involved in 12 patients (75%) and left side in 4 patients (25%).

Results: Seventeen patients (36.36%) had Gardon type-III fracture and 27 patients (61.36%) had gardon type-IV fracture neck of the femur. All patients were assessed post operatively via Harris hip score and charnley hip score and radiologically with special reference to fracture of implant, dislocation of implant, acetabular erosion, acetabulum protusia, loosening, calcar resorption and osteolysis. Results in terms of Harris hip score were excellent in 17 patients (77.26%), good in 3 patients (13.63%) and poor in 2 patients (9.09%) where as in bipolar group excellent results were obtained in 18 patients (81.81%), good in 3 patients (13.63%) and poor in 1 patient (4.54%). As per charnley hip score system; in unipolar group, satisfactory results were found in 90.9% and in bipolar group 95.44% while 9.09% poor results in unipolar and 4.54% in bipolar group. The complications observed in unipolar group were; pain 6 patients (27.27%), wound infection 5 patients (22.72%), loosing of implant 3 patients (13.63%), calcar resorption in 1 patient (4.5%) while in bipolar group pain 5 patients (22.72%), wound infection 3 patients (13.63%), loosing of implant in 2 patients (9.09%) whereas fracture of implant, dislocation, acetabulum protusia, sciatic nerve injury with foot drop was not observed in any of the groups.

Conclusion: Short term results of hemiarthroplasy with Austin Moor prosthesis and bipolar prosthesis are more or less similar with slightly better results with bipolar prosthesis.

Keywords: Fracture neck of the femur, hemiarthoplasy, Austin Moor prosthesis, bipolar prosthesis

INTRODUCTION

Femoral neck fractures are most common fractures in elderly patients; with increased morbidity and mortality and its management poses an immense challenge to the orthopaedic surgeon. Mortality rate of 20 to 30% in a year following this fracture have been reported by many authors.

Different surgical techniques have been reported in the literature and the goal of management is to return to preinjury status of function as soon as possible. The aim of internal fixation for these fractures is to reduce the risk of secondary displacement from undisplaced and displaced fractures and to maintain the fracture reduction for displaced fractures. But this type of treatment is associated with high incidence of non-union and avascular necrosis that leads to revision surgery. Moreover it also complicates the future THR surgery and also increases the morbidity and mortality in old age patients. Replacement of femoral head and neck is an attractive alternative to prevent complications of internal fixation in this age group.

Dr. Austin T Moor in 1942 was the first to introduce and perform hemiarthoplasty to which he lent his name. With Austin Moor prosthesis immediate weight bearing is achieved and satisfactory outcome is reported and problem of avascular necrosis and non-union is eliminated as

---

Department of Orthopaedic Surgery, Kh. Muhammad Safdar Medical College, Sialkot

Correspondence to Dr. Mian Muhammad Azhar, Associate Professor Email: drazharskt@gmail.com

head and neck is replaced by metallic implant. The disadvantages of Austin Moor implant are relatively poor results in young and active patients as there is an increased incidence of acetabular erosion, acetabulum protusia, calcar resorption and loosing have been reported in different long term studies.

The development of bipolar prosthesis was based on clinical experience, with limited success of unipolar prosthesis due to progressive erosion of acetabulum. In 1947 Dr. James Ennis Bateman, an orthopaedic surgeon and Averill, a bioengineer devised bipolar prosthesis which is a self articulating prosthesis. Based on Charnley's pioneer arthoplasty, two bipolar designs emerged in early 1970s, the Bateman and Gilberty prosthesis. In both designs acetabular cup was believed to prevent the grinding of metallic head over the bony acetabulum and was also considered to be an important factor in preventing degenerating changes of wear and tear in the acetabulum.

The study was conducted to assess the end results of unipolar and bipolar prosthesis in order to ascertain which prosthesis is better; and the results were evaluated using Harris hip score and Charnley hip score scales.

MATERIAL AND METHODS

The study was conducted at Khawaja Muhammad Safdar Medical College/ Allama Iqbal Memorial teaching Hospital Sialkot from January, 2010 to January, 2013 in 44 elderly patients having basicervical fracture neck of the femur and hemiarthoplasy with Austin Moor prosthesis and bipolar prosthesis was done in each 22 patients. All patients were assessed post-operatively in terms of Harris hip score and Charnley hip score and radiologically with special reference to loosening, migration and dislocation of the implant, acetabular erosion, acetabulum protosia and calcar resorption. There were 14 male (63.63%) and 8 female (36.63%) in group 1 and 16 male (72.72%) and 6 female (27.27%) in group two patients. Age ranged b/w 60 to 85 years. In group one 5 patients (22.72%) were b/w 60 to 65 years, 11 patients (50%) b/w 65 to 75 years and 6 patients (27.27%) b/w 75 to 85 years of age as compared to group 2, in which 6 patients (27.27%) were b/w 60 to 65 years, 12 patients (54.54%) b/w 65 to 75 years and 4 patients (18.88%) b/w 75 to 85 years of age. 9 patients (40.90%) had gardon type-III in group one as compared to 13 patients (59.09%) in group two whereas 8 patients (36.36%) had type-IV in group one compared to 14 patients (63.63%) in group two patients.

Routine investigations like blood C/P, Sugar, Urea, Creatinine, LFTs, HBs, HCV, blood grouping, ECG, X-Ray Chest and pelvis was done in both groups. Pre-operative anaesthesia fitness was also carried out. Pre-operative antibiotics were given to all the patients. All patients were operated through the same posterior southern approach. All the patients were encouraged to walk on 2nd post Op day with walker or as soon as the pain settled. Stitches were removed two weeks after the surgery. Every patient was followed up at weekly intervals for one month, then fortnightly for three months and then every three to six months till the completion of the follow up. The follow up ranged from 1 to 3 years with an average follow up of 2.3 years.

RESULTS

As per Harris hip score scale; we achieved excellent results (90-100 points) in 05 patients (22.72%), good (80-90) in 12 patients (54.54%), fair (70-80) in 03 patients (13.65%) and poor (60-70) in 2 patients (9.09%) of group one; whereas, in group two excellent results were obtained in 8 patients (36.36%), good in 10 patients (45.45%), fair in 3 patients (13.65%) and poor in 1 patient (4.45%). The results were rated satisfactory b/w 80-100 points, good b/w 70-80 points and poor 60-70 points. Therefore according to Harris hip score, satisfactory results were noted in 72.26% of group one as compared to 80.81% of group two patients, 13.63% were good in group one and 13.63% in group two, 9.09% were poor in group one as compared to 4.5% in group two. According to Charnley hip score overall satisfactory results were 90.9% in group one compared to 95.44% in group two and poor results of 9.09% in group one and 4.54% in group two were observed.

Harris hip score (unipolar group)

Score (points)	n	Male	Female
90-100	05(22.72%)	03(13.63%)	02(09.09%)
80-90	12(54.54%)	9(40.90%)	3(13.63%)
70-80	3(13.63%)	01(4.54%)	02(13.63%)
60-70	02(09.09%)	1(4.54%)	01(4.54%)

Harris hip score (bipolar group)

Score (points)	n	Male	Female
90-100	08(36.36%)	06(27.27%)	02(09.09%)
80-90	10(45.45%)	08(36.36%)	02(09.09%)
70-80	3(13.63%)	02(9.09%)	01(4.54%)
60-70	01(4.54%)	0%	01(4.54%)

Overall results

Score (points)	Unipolar Group	Bipolar Group
Excellent 80-100	08(77.26%)	18(81.81%)
Good 70-80	03(13.63%)	03(13.63%)
Poor 60-70	02(09.09%)	01(4.54%

Charnley hip score (unipolar group)

Score (points)	n	Male	Female
5-6	15(68.11%)	10(45.45%)	04(18.18%)
3-4	05(22.72%)	02(09.09%)	03(13.63%
1-2	02(9.09%)	02(9.09%)	01(4.54%)

Charnley hip score (Bipolar group)

Score (points)	n	Male	Female
5-6	18(81.81%)	15(68.18%)	03(13.63%)
3-4	03(13.63%)	01(4.54%)	02(9.09%)
1-2	1(4.54%)	0%	01(4.54%)

Overall results

Score (points)	Unipolar Group	Bipolar Group
Satisfactory 3-6	20(90.9%)	21(95.44%)
Poor 1-2	02(9.09%)	01(4.54%)

Comparison of results b/w Harris hip score vs Charnley hip score

Score (points)	Harris hip score		Charnley hip score	
	Unipolar	Bipolar	Unipolar	Bipolar
Satisfactory	77.26%	81.81%	90.09%	95.44%
Good	13.63%	13.63%	-	-
Poor	9.09%	4.54%	9.09%	4.54%

In group one the complications observed during the study were; pain 6 patients (27.27%), wound infection 5 patients (22.72%), loosing of implant 3 patients (13.63%), shortening less than one centimeter in one patient (4.54%) and calcar resorption in 1 patient (4.54%). In group two; pain 5 patient (22.72%), wound infection 3 patients (13.63%), loosing of implant in 2 patients (9.09%) was observed. Dislocation of implant, implant failure, acetabulum protusia, Sciatic nerve injury with foot drop was not noted in any group.

Descriptive and inferential statistical analysis using two tale independent was carried out whereas intergroup analysis was done using Chi-Square analysis. Fisher exact test was also used to assess the significance of the study among two groups.

DISCUSSION

Twenty two patients in each group were operated with the same surgical approach and were followed up for an average period of 2.3 years. The proposed advantages of using bipolar design over Austin Moor design for fracture neck of femur in old age are still controversial. The bipolar prosthesis has got two observing surfaces; so that the load and friction torque can be absorbed in part by the metal on polyethylene inner bearing surface reducing the magnitude of friction between the implant and acetabulum theoretically thereby decreasing acetabular erosion.

Drinker and Murray in a retrospective series compared the bipolar prosthesis with Thomson prosthesis and could not prove significant advantage of bipolar prosthesis over unipolar prosthesis.

Calder et al also concluded that there is no justification of using bipolar prosthesis over unipolar prosthesis as the surgical outcome is not different. On the other hand La Belle et al reported that bipolar prosthesis gives good results with respect to pain and acetabular protusia compared with fixed head prosthesis.

Lestrange after reviewing 496 patients operated with bipolar prosthesis reported better results in terms of stability, decreased acetabular erosion and improved function as compared with unipolar prosthesis.

In our study although the results of bipolar prosthesis in terms of Harris hip score with reference to pain, function, deformity and range of movement and Charnley hip score with reference to pain, movement and walking ability was better in patients operated with bipolar prosthesis as compared to unipolar prosthesis but the difference is not statistically significant that directs us to use expensive bipolar prosthesis keeping in view rural background and poor socio economical conditions of majority of our patients.

In our study the age ranged b/w 60 to 85 years in both the groups whereas maximum number of patients was b/w 65 to 75 years. Nielson Anderson has reported an average age of 77 years but the reports from other western authorities show that the average age is 70 years. In our study the average age is 69 years and the probable reason being more life expectancy in western population as compared to Asian population.

In our series male to female ratio was more contrary to most of the series reported in literature in which fracture neck of femur is more common in females.

Lunceford J.T reported that pain after hemiarthoplasty should not be the reason to condemn this procedure. He reported that infection, improper prosthetic setting, metallic corrosion, tissue reaction, improper size femoral head fitting; periarticular ossification, contracture and redundant ligamentum teres are the sources of pain. We are of the opinion that while evaluating the pain after hemiarthoplasty the lower lumber region with special reference to degenerative arthritis, spinal stenosis, spondylolisthesis along with degenerative arthritis of the knee joint must be taken into consideration to assess the pain and limp. Limping is commonly observed after hemiarthoplasty and usually due to more excision of neck during surgery.

Cornell et al reported that patients with bipolar prosthesis shows good results on walk test and had better range of motion at six months. Sabnis and Brenkel et al reported that 40% of the patients can walk without support compared to 54% of patients in bipolar group. In our series we did not notice any statistical difference b/w the two groups after an average follow up of 2.3 years.

The reason of dislocation of hemiarthoplasty is due to disruption of posterior stablizers while operating which ultimately leads to failure. Sikorski and Barrington reported dislocation rate of 10% in unipolar prosthesis. Belwitt and Mortimore after reviewing 1600 cases reported that dislocation rate is related to mal-alignment, improper size and improper soft tissue tensioning. Bochnner et al reported that incidence of dislocation is less in bipolar prosthesis. The theoretical advantage of bipolar prosthesis, combined arc of motion of dual joint, should reduce the incidence of dislocation because most of the daily life activities take place at the inner articular surface. Aharian et al reported that bipolar prosthesis has self centering mechanism which prevents dislocation or subluxation and hence the incidence is low.

Radiological assessment of complications noted in our series were calcar resorption in 1 patient, loosing of implant in 3 patients with AM prosthesis; and calcar resorption in one patient and loosing of implant was observed in 2 patients in bipolar group whereas dislocation, fracture of implant, acetabulum protusia, sciatic nerve injury with foot drop was not observed in both the group. Whittaker et al reported that 5% cases have acetabulum protusia and 25% narrowing of joint space after 1 to 4 years of follow up and 25% have acetabulum protusia and 64% narrowing of joint space after more than 5 years follow up in his study. Wetherell and Hinvess reported 11% of erosion. The possible reason for decrease in joint space and erosion is constant pressure of femoral head to acetabular cartilage leading to loss of cartilage and decrease in joint space. Yamageta et al in his series of 1001 cases of hip arthoplasty with 682 unipolar and 319 bipolar cases reported that patient undergoing bipolar arthoplasty exhibit high hip score and lower incidence of acetabular erosion rate as compared to unipolar arthoplasty.

In our series although bipolar arthoplasy results with reference to Harris hip score and Charnley hip score and complications showed better results but the results were not statistically significant to out class the Austin Moor prosthesis specially keeping in view the socio economical condition. Our study is of short term duration and we need to have long term follow up in order to have conclusive evidence of superiority of bipolar prosthesis over to unipolar prosthesis.

CONCLUSION

I concluded that the results of bipolar hemiarthoplasty over unipolar hemiarthoplasy for short duration of follow up are slightly better with negligible difference.

REFERENCES

1. Addison JR, Prosthetic replacement in the primary treatment if fracture if the femoral neck proceedings of the royal society of medicine 1959; 52:908.
2. Andersson G, Nielsen JM. Results after arthroplasty of the hip with Moore's prosthesis Acta orthop scand 1972; 43:397.
3. Attarian DE. Bipolar arthroplasty for recurrent total hip instability. J Southern Orthop Assoc.1999;8(4):249–253.
4. Bateman bipolar hips with autologous bone graft reinforcement for dysplastic acetabular . Philips TW, Rao DR. 104-112, s.l.: Clin Orthop , 1990, Vol. 251:.
5. Bipolar arthroplasty for 496 hip fractures. NR, Lestrange. 7- 19, s.l. : Clin Orthop, 1990, Vol. 251.
6. Bipolar hemiarthroplasty in femoral neck fractures. Malhotra R.Area.R, Bhan .S. (2) 79-82.1995, s.l.: Arch Orthop Trauma Surg, Vol. 114.
7. Blewitt N, Mortimore S. Outcome of dislocation after hemiarthroplasty for fracture neck of femur Injury 1992; 23:320–322
8. Bochner RM, Pellicci PM, Lyden JP. Bipolar hemiarthroplasty for fracture of the femoral neck. Clinical review with special emphasis on prosthetic motion. J Bone Joint Surgery Am. 1988;70:1001–1010.
9. Cornell CN, Levine D, O'Doherty J, Lyden J. Unipolar versus bipolar hemiarthroplasty for the treatment of femoral neck fractures in the elderly. Clin Orthop Relat Res. 1998; 348:67–71.
10. Christopher C, Ninh AS. Hip dislocation after modular unipolar hemiarthroplasty. J Arthroplasty. 2009;24:768 –775
11. Chan RNW, Hoskinson J. Thompson prosthesis for fractured neck of femur: a comparision of surgical approaches. J Bone Joint Surg Br. 1975;57:437–443.
12. D'arcy J, Devas M. Treatment of Fractures of Femoral Neck by replacement with Thompson Prosthesis. J Bone Joint Surg Br. 1976 Aug;58(3):279-86.
13. Decas M, Hinces B, prevention of acetabular erosion after hemiarthoplasty for fracture neck of femur j of bone and joint surg 1983;65:13-15.
14. D'Arcy J, Devas M. Treatment of fracture of the femoral neck by replacement with Thompson prosthesis. J Bone Joint Surg Br. 1976;58:279–286.
15. Efthekar NS, Status of femoral head replacement in treating fracture of the femoral neck, part ll: the prosthesis and the surgical procedure. Orthop Rev 1973; 2:6.
16. Experience with bipolar prosthesis in femoral neck fractures in the elderly and debilitated. Gillinaro P, Tabasso G, Negretto R.Brach del Prever EM. 26-30, s.l. : Clin Orthop., 1990, Vol. 251.

17. Gebhard JS, Amstutz HQ, Zinar DM, Dorey FJ, A comparison of total hip arthoplasty and hemarthroplasty for the treatment of acute fracture of the femoral neck clin orthop 1992;282:123.
18. Hinchey JJ, Day PL. Primary prosthetic replacement in fresh femoral neck fractures. J Bone Joint Surg Am. 1960;42:633–640.
19. Hunter GA, A comparison of the use of internal fixation and prosthetic replacement for fresh fractures if the neck of femur, B J S.1069;56:229.
20. Jensen JS. Holstein P.A long-term follow-up of Moore Arthoplasty in femoral neck fractures. Acta orthop scand 1975; 46:764.
21. Jay magazine: outcome after hemiarthroplasty of femoral neck fractures in the elderl. E .Kenzora, John. 51-58, s.l. : Clin. Ortho. Rel .Research, 1998, Vol. 348.
22. Long term results of bipolar arthroplasty in osteoarthritis of hip. Bateman JE, Berenji AR, Bayne O, Geyson ND. 54-66, s.I: Clin Orthop 1990, Vol. 251.
23. Lunceford Jr EM. Use of Moore self-locking Vitallium prosthesis in acute fractures of the femoral neck. J Bone Joint Surg Am. 1965;47:832–841
24. Lestrange NR. Bipolar arthroplasty for 496 hip fractures Clin Orthop Relat Res. 1990;251:7–19.
25. Meyer S. prosthetic replacement in hip fractures. A comparison between the Moore and the Christiansen encloprostheses clin orthop 1981;160:57.
26. Moore AT, Bohlman HR. Metal Hip Joint. A Case Report. J Bone Joint Surg. 1943;25:688–692.
27. Nottag WM, McMaster WC, comparison of bipolar implants with fixed neck prostheses in femoral neck fractures. Clin orthop1990; 251:38.
28. Nicoll EA. The unsolved fracture. J Bone Joint Surg Br. 1963;45:239–241.
29. Salvati EA, Wilson PD. Long-term results of femoral head replacement. J bone and joint surg 1073, 55-A: 516.
30. Sarmiento A. Austin Moore prosthesis in the arthritic hip. Clin orthop 1972; 82:14.
31. .Sabnis BM, Brenkel IJ. Unipolar versus bipolar uncemented hemiarthroplasty for elderly patients with displaced intracapsular femoral neck fractures. J Orthop Surg. 2011;19(1):8–12.
32. Sikorski JM, Barrington R. Internal fixation versus hemiarthroplasty for the displaced subcapital fracture of the femur: a prospective study. J Bone Joint Surg Br. 1981;63:357–361.
33. Skála-Rosenbaum J, Bartonícek J, Bartoska R. Acetabular erosion after hip hemiarthroplasty. Clinical and biomechanical study. Rozhl Chir. 2009; 88(10): 596–602.
34. Transcervical fractures of hip treated with bateman bipolar prosthesis. Moshein .J, Alter AH, Elconin KB, Adams WW, Isaacson J. 48-53, s.l.: Clin Orthop., 1990, Vol. 251.
35. Unipolar VS Bipolar Hemiarthroplasty for the treatment of femoral neck fractures in the elderly. Charles .N.Cornell, David Levine. 61-71, s.l. Clin Ortho. Rel. Research , 1998, Vol. 348.
36. Whittaker RP, Abeshaus MM, Scholl HW, Chung SMK Fifteen years' experience with metallic endoprosthetic replacement of the femoral head for femoral neck fractures. J trauma 1972; 12:799.
37. Wrighton JD. Woodyar JE. Prosthetic replacement for subcapital fractures of the femur, a comparative survey. Injury 1971; 2:287.
38. Yamagata M, Chao EY, Ilstrup DM, Melton III IJ, Coventry MB, Stauffer RN. Fixed head and bipolar head endoprosthesis-a retrospective clinical and roentgenographic study. J Arthroplasty. 1987;2:327–341.