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Original Research Article

Comparative Study of Total Hip Arthroplasty versus Bipolar Hemiarthroplasty in Treating Neck of Femur Fractures in Geriatric Patients with Osteoporosis

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Conflict of interest: Nil

Abstract:

Background: Oesteoporotic femoral neck fractures in elderly patients have traditionally been Operated with total hip arthroplasty (THA) or hemiarthroplasty (HA) , Many studies suggested that THA may be the better option. Recently it was reported HA provide better outcomes. It is not clear as to whether BHA or THA is most appropriate. The purpose of this study was to conduct a randomized Prospective study, comparing the BHA with THA Intraoperative blood loss, duration of surgery and Complications rate for treating FNF in elderly patients.

Objective: Comparative Study of Total Hip Arthroplasty Versus Bipolar Hemiarthroplasty in treating Neck of Femur fractures in Geriatric Patients with Osteoporosis.

Methodology: Prospective study was conducted in January 2020, in the department of Orthopedics and Trauma Centre in J.A. Group of Hospitals, Gwalior (M.P.). 30 patients on the basis of inclusion criteria, Garden type 3 and 4 Intracapsular femoral neck fractures in the age group of 60 years and above, with independent ambulation before injury and requirement of high functional demand activity to be treated with either BHA or THR. Intraoperative Blood loss, duration of surgery, postoperatively Complications were compared and analyzed with functional assessment was done using Harris hip scores at Fourteen day, three month and six month, postoperatively.

Results: Within the THA group, 86.7% of patients achieved a harris hip score ranging from fair to excellent, while only 13.3% of patients had poor scores at the final follow-up. Among the patients in the bipolar hemiarthroplasty group, 53.3% had a low harris hip score at the final follow-up. The study findings demonstrate the benefits of total hip arthroplasty in facilitating early recovery of hip function. At the 6-month interval following surgery, the Harris score of the total hip arthroplasty (THA) group was greater compared to the bipolar hemiarthroplasty group. Additionally, the THA group had a substantially larger proportion of excellent and good scores compared to the bipolar hemiarthroplasty group (P-value <0.001).

This study shows the advantage of total hip arthroplasty in Post-operative complications while six month after surgery, the Harris score (P-value <0.001) of THA group was good score on other hand, duration of surgery and Intraoperative blood loss was lower in Bipolar hemiarthroplasty than total arthoplasty hemiarthroplasty group.

Conclusion: Two aspect i.e, Post-operative complications and Harris hip score at 6 months give better result in THA and Intraoperative blood loss with duration of surgery shows better result in bipolar hemiarthroplasty in treating femoral neck fractures in elderly osteoporotic patients.

Keywords: Bipolar hemiarthroplasty; femoral neck fractures; THA.

Introduction

Neck of femur fractures in geriatric patients with osteoporosis present a significant healthcare concern due to the associated morbidity and mortality. Surgical interventions such as Total Hip Arthroplasty (THA) and Bipolar Hemiarthroplasty (BHA) are commonly employed, but there is a lack of consensus regarding the superior choice for this specific patient population. Orthopaedic Surgeons faces femoral neck of fracture, challenge every year Every year 1.5 million hip fracture occurred approximately. By the year 2050, it is estimated that there will be 3.9 million fractures worldwide. [1] In older patients hip fractures are associated with impaired mobility, increased morbidity and

mortality, and loss of independence. [2,3] Due to trauma, osteoporotic bones of elder got fractured easily and the most susceptible region is femoral neck. Some factor Osteoporosis and instability leading to unsatisfactory results of treatment [4,5] The case of Osteoporosis worsen the result of surgery. This study aims to address this gap by comparing the outcomes of THA and BHA in the context of osteoporotic neck of femur fractures.

Objective:

Comparative Study of Total Hip Arthroplasty Versus Bipolar Hemiarthroplasty in treating Neck of Femur fractures in Geriatric Patients with Osteoporosis

Material and Methods:

Randomized prospectively study conducted in the Department of Orthopaedics and Trauma Centre in J.A. Group of Hospitals, Gwalior (M.P.). 30 patients have been selected in this study and intervention has been started from January 2020-April 2021, on the basis of inclusion criteria having Intracapsular femoral neck fractures of Garden type 3&4 with age 60 years above, Independent ambulation before injury and Patients with high functional demand and activity with exclusion criteria refusal to consent, age below 60 years, having pathological fracture and ridden in bed and using wheel chair. Total 30 patients are selected for this study. These patients were divided into two groups of 15-15 and Table generated online. Group A was treated with BHA and group B with THR. X-ray of pelvis with both hips (in 15 degree internal rotation) AP view andlateralviewofivolvedhip.Medicalandanesthesiafitnessweretaken. After preoperative assessment cases were prepared for surgery. Under aseptic precaution and prophylactic antibiotic coverage, a dose preferably of ceftriaxone 1 gm was given 30 minutes before the skin incision. Preparation of part was done half an hour before the surgery. Instruments were checked and sterilized beforehand. Cases are operated either with cemented bipolar hemiarthroplasty or primary cemented total hip arthroplasty via posterior approach. Postoperative:

Nil per oral for 6 hours. Patients were on standard intravenous antibiotic regimen apart from analgesics and supportive treatment. Soakage dressing was done if any soakage was present. On 3rd day, 1st check dressing of the surgical site was done under full a septic condition and postoperative x-ray was done.

The patients were encouraged early movement of the knee and ankle joints and muscular exercises. With 14thday: Stiches removed, 4th weeks: Patients were evaluated for infection and Review x-ray for alignment. In hemiarthroplasty: The postoperative mobilization protocol included immediate mobilization starting from the 3rd-4th postoperative day with partial weight bearing as tolerated with the use of crutches or a walker for 6 weeks and then full weight bearing. In total hip arthroplasty: Weight bearing was encouraged7th postoperative day, initially with support and then without support. The patients were encouraged early movement of the knee and ankle joints and muscular exercises.

Observations and Result:

This study was conducted in the Department of Orthopaedics, Jaya Aarogya Hospital, Gwalior (M.P) over a period of 18 months to evaluate the results of cemented hemiarthroplasty with bipolar prosthesis and primary total hip arthroplasty for fracture neck of femur and results are being presented here.

Table1: Age Wise Distribution

Age (years)	Male	Female	Total
60-65	07	12	19
66-70	02	03	05
71-75	03	00	03
76-80	02	01	03
Total	**14**	**16**	**30**

The age of the patients ranged from 60 to 80 years with the fracture being most common in age group of 61to70 years.

Table 2: Side affected

Side affected	No of patients	Percentage
Right	13	43%
Left	17	57%
Total	100	100%

There were 43% patients with right sided fractures and 57% patients with left sided fractures showing left sided preponderance.

Table 3: Gardens Classification

Gardens Type	No of Patients	Percentage
III	10	33%
IV	20	67%
Total	30	100%

67% patients were having Gardens Type IV fractures, 33% were having Gardens Type III.

Table 4: Intraoperative blood loss

Blood loss (ml)	Total hip arthroplasty	Bipolar hemiarthroplasty
200-300	00	05
301-400	02	09
401-500	05	01
Above500ml	08	00
	Avg-518ml	Avg-339ml

Groups	N	Mean Blood loss	SD	T	p
Primary Total HIP Arthroplasty	15	518.67	85.76		
Bipolar Hemiarthroplasty	15	339.00	48.85	7.05	0.000

Significant mean blood loss difference was found with (t=7.05, p=0.000) between groups, mean blood loss 518±85.78 ml was significantly higher in primary total hip arthroplasty as compare to bipolar hemi arthroplasty with mean blood loss 339.00±48.85 ml.

Table 5: Duration of surgery and mean duration of surgery

S.No.	Duration of surgery	Total hip Arthroplasty	Bipolar hemiarthroplasty
1	61-70	00	09
1	71-80min	01	03
2	81-90min	04	02
3	91-100	08	01
4	>100	02	00
5	Average time	94.8min	72.2min

Mean duration of surgery:

Groups	N	Mean duration of surgery (min)	SD	t	p
Bipolar Hemiarthroplasty	15	72.20	11.04	6.59	0.000
Primary Total HIP Arthroplasty	15	94.80	7.35		

Significant difference was found in mean duration of surgery with (t=6.59,p=0.000). mean duration of surgery 94.80+-7.35min was significantly higher in total hip arthroplasty group as compare to bipolar hemiarthroplasty with mean duration of surgery 72.20+-11.04 min.

Table 6: Harris Hip Score

Harris Hip Score	Total hip arthroplasty			Bipolar hemiarthroplasty		
	14days	3month	6month	14days	3month	6month
<70(Poor)	13	07	02	14	13	06
71-79(Fair)	02	06	04	01	01	05
80-89(Good)	00	02	04	00	01	03
90- 100(Excellent)	00	00	05	00	00	01
Total	**15**	**15**	**15**	**15**	**15**	**15**

Table 7: Mean HHS comparison between type of procedure

	Groups	N	Mean harris hip score	SD	t	p
HHS at15thpostop. day	Primary Total HIP Arthroplasty	15	57.00	8.510		
	Bipolar Hemi Arthroplasty	15	50.67	6.78	2.254	.032
HHS at 3month	Primary Total HIP Arthroplasty	15	70.87	9.30	2.789	.009
	Bipolar Hemiarthroplasty	15	61.47	9.16		
HHS at 6month	Primary Total HIP Arthroplasty	15	82.53	9.32	3.637	.001
	Bipolar Hemiarthroplasty	15	68.53	11.64		

Significant difference was found at 6 month of follow up in mean Harris Hip Score with (t=3.637, p=0.001). Mean Harris Hip Score 82.53+-9.32 was significantly higher in total hip arthroplasty group as compare to bipolar hemiarthroplasty with mean HHS 68.53+-11.64.

Table 8: Complications of Bipolar hemiarthroplasty

S. No.	Complications	No. of Cases	Percentage
1	Superficial Infection	01	6%
2	Deep Infection	01	6%
3	Dislocation	01	6%
4	Periprosthetic fracture	00	0%
5	Stem loosening	00	0%
6	Revision operation	02	13%

Table 9: Complications of THA

S. No.	Complications	No. of Cases	Percentage
1	Superficial Infection	00	0%
2	Deep Infection	00	0%
3	Dislocation	01	6%
4	Periprosthetic fracture	00	0%
5	Stem loosening	00	0%
6	Revision operation	01	6%

Table 10: Association between complication and type of procedure

Groups	Complications		Total
	No	Yes	
Primary Total HIP Arthroplasty	14	1	15
	93.3%	6.7%	100.0%
Bipolar Hemi Arthroplasty	12	3	15
	80.0%	20.0%	100.0%
Total	26	4	30
	86.7%	13.3%	100.0%
Chi-Square=1.154,p =0.598			

Table indicate that, no significant association was found between type of procedure and complication with p>0.05. In bipolar hemiarthroplasty 3 (20.0%) cases develop complications and in primary total HIP arthroplasty1 (6.7%) case develops complication.

Discussion

Our study, age of patients ranged from 60 to 80 years with the fracture occurring most commonly in the age group of 61 to 70 years (mean age 65.5years). Maini P Setal (2006) [6] cited in their study in which 270 patients of displaced fracture of femoral neck were treated by bipolar hemiarthroplasty and found the Mean age of the patients at the time of surgery as 69.80years.

On the other side, 33% patients had Garden type III fracture and 67% patients had Garden type IV fracture. Our study shows duration of surgery is more in THA compare to bipolar hemiarthoplasty. RB lowfeldt et al [7] studied120 elder patients with an acute intracapsular neck of femur fracture treated with bipolar hemiarthroplasty and THA. They found that the mean duration of surgery in hemiarthroplasty group was 78 min and in THA was 102 min (p<0.001) Patients in which total hip arthroplasty was done had greater blood loss in comparision to patients with bipolar hemiarthroplasty. During surgery average blood loss was more in total hip arthroplasty as compare to bipolar hemiarthroplasty. Fusheng Xu et al [8] retrospectively compared THA and Bipolar hemiarthroplasty in 78 patients with fracture neck of femur and found intraoperative blood loss was147.63+89.73 (50-300) in bipolar hemiarthroplasty group and 247.11+109.02 (150-500) in THA group which was significantly higher in THA (p<0.001).

In this study the result shows the advantage of total hip arthroplasty in the recovery of hip function early. After 6 month of surgery, the Harris hip score was significantly higher in total hip arthroplasty with comparison to bipolar hemiarthroplasty, and in total hip arthroplasty group excellent and good scores were more than that in bipolar group. Shukla R et al [9] did prospective study in which 47 patients of age >60 years were included. At 6 months average Harris hip score was 74.68 in bipolar hemiarthroplasty group and 80.68 in total hip arthroplasty group. Overall complications were more in bipolar hemiarthroplasty group than total hip arthroplasty group. [1] Patient (6.7%) in bipolar hemiarthroplasty got superficial infection and 1(6.7%) got deep infection for which he was reoperated. In total hip arthroplasty group no one got superficial or deep infection. No periprosthetic fracture or implant loosening or mortality was seen in both the groups.

Conclusions

Total Hip Arthoplasty is more applicable in Oesteoporotic femur neck fracture, as compare to Bipolar Hemiarthroplasty in Oesteoporotic

Geriatric patients, in the terms of Harris Hip score and Post-operative Complications. While Intraoperative blood loss and Duration of surgery in Bipolar Hemiarthroplasty is less as compared to THA.

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