MANAGEMENT OF FRACTURE NECK OF FEMUR BY HIP ARTHROPLASTY WITH BIPOLAR HIP PROSTHESIS

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ABSTRACT

BACKGROUND

Fracture neck of femur as well as hip fractures in general, represent a major challenge to today's healthcare systems, probably due to higher mortality and morbidity, frequent lengthy hospitalisation and post-operative complications. Problems of the hip joint, whether due to trauma or arthritis need considerable skill and judgment on the part of the surgeon. Bipolar hip replacement offers a durable and versatile solution for many problems of the hip, in which replacement of the head and neck of the femur results in a rapid return of function and a painless hip.

The aim of the study is to evaluate the efficacy of bipolar hip prosthesis in treatment of intracapsular fracture neck of femur in the elderly and physiologically younger patients. The emphasis is on treating with bipolar hip prosthesis in physiologically younger patients.

MATERIALS AND METHODS

Twenty-five patients of age 40 to 70 years were referred to Department of Orthopaedics, Dr. Pinnamaneni Siddhartha Institute of Medical Sciences and Research Foundation. They were screened and enrolled for this study. Patients were counseled and an informed consent taken for enrolment in the study after fulfilment of inclusion criteria. Upon enrolment into study, all patients were subjected to clinical and laboratory investigations as necessary. All surgeries were performed under standard aseptic precautions through Moore's/Southern Exposure and Hardinge approach. All patients were followed-up at regular intervals.

RESULTS

In our study, uncemented technique was used in bipolar hemiarthroplasties for 21 patients. Five cases had associated injuries. Leg length discrepancy (3) and sciatic nerve injury (1) were immediate complications of surgery. Early complications were haematoma (2) and deep infections. Late complications were sinking (2 patient) and death of a patient. The Mean Harris Hip Score was 86. Fair, good and excellent results were observed in 16%, 60% and 16% of the study patients.

CONCLUSION

Bipolar hip prosthesis offers a long-term solution in patients with intracapsular fractures of the neck of femur due to multiple advantages. The procedure offers advantages like painless mobility, ease of rehabilitation and return of function.

KEYWORDS

Fracture Neck of Femur, Bipolar Hip Prosthesis, Hip Arthroplasty.

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BACKGROUND

Fracture neck of femur as well as hip fractures in general, represent a major challenge for today's healthcare systems, probably due to higher mortality and morbidity, frequent lengthy hospitalization and post-operative complications.

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Usually the fracture neck of femur is entirely intracapsular. Generally, in intracapsular fractures, the synovial fluid bath the fracture, which may interfere with the healing process due to absence of periosteal layer, hence all healing must be endosteal. Fracture healing is inhibited by angiogenic inhibitory factors, which is present in synovial fluid. Considering the above-mentioned factors and precarious blood supply to the femoral head, makes healing unpredictable and non-unions common.

Problems of the hip joint, whether due to trauma or arthritis need considerable skill and judgment on the part of the surgeon. Bipolar hip replacement offers a durable and versatile solution for many problems of the hip, in which replacement of the head and neck of the femur results in a rapid return of function and a painless hip.

When compared to the unipolar arthroplasties, the bipolar hip arthroplasty provides a reduction in the complications and a better joint function. In addition, this

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can be easily converted to total hip replacement without much surgical trauma, which offers higher advantage over unipolar hemiarthroplasty. The bipolar hip prosthesis offers an additional advantage in salvage of failed total hip and unipolar arthroplasties, the only alternative available for which was an excision arthroplasty.

Aims and Objectives

The study was conducted to evaluate the efficacy of bipolar hip prosthesis in the treatment of intracapsular fracture neck of femur, where replacement of the head and neck of the femur offers the advantage of rapid return of joint function. The importance is on treating with bipolar hip prosthesis in physiologically younger patients with neglected intracapsular fracture neck of the femur, whose life expectancy is more and who would place considerable demands on the prosthesis.

MATERIALS AND METHODS

Twenty-five patients referred to Department of Orthopaedics, Dr. Pinnamaneni Siddhartha Institute of Medical Sciences and Research Foundation, were screened and enrolled for this study. The patients were counseled and an informed consent taken for enrolment in the study. Upon enrolment into study all patients were subjected to clinical and laboratory investigations as necessary.

Inclusion criteria were displaced intracapsular fracture neck of femur with adequate calcar, neglected intracapsular fracture neck of femur more than 3-4 weeks old in patients less than 70 years of age, non-union of intracapsular fractures neck of femur, intracapsular fractures neck of femur with changes of early avascular necrosis, non-union or avascular necrosis of head of femur following internal fixation of intracapsular fracture neck of femur, and nonunion of intracapsular fracture neck of femur in 40 -70 years. All surgeries were performed in the elective theatre using standard aseptic precautions. Approaches for bipolar hip prosthesis are Moore's approach/ Southern Exposure and Hardinge approach. From the first postoperative day, the patient was allowed free in bed. Weight bearing was permitted depending in his / her pain tolerance and encouraged to walk thereafter. Sitting cross legged and squatting were not allowed. Suture removal was done on 9th to the 11th postoperative day and the patients were discharged later. Antibiotics were given intravenously, starting at induction of anaesthesia and 48 hours thereafter. All patients were followed up at regular intervals (6 weeks, 3 months, 6 months and 1 year with the longest interval being 1.5 years).





Figure 1. Type of Prosthesis



Figure 2. Associated Injuries

| Associated Injury | Complication | No. of Cases | | |
|--|---------------------------------------|--------------|--|--|
| 1 | Sciatic Nerve Injury | 1 | | |
| 2 | Leg Length Discrepancy (> 1.5 cms) | 3 | | |
| Table 1. Immediate Complications of Bipolar Hemiarthroplasty of the Hip | | | | |

| S. No. | Complication | No. of Cases | |
|---|-----------------------|--------------|--|
| 1 | Superficial Infection | 0 | |
| 2 | Deep Infection | 1 | |
| 3 | Dislocation | 0 | |
| 1 | Haematoma | 2 | |
| Table 2. Early Complications of Bipolar | | | |

Hemiarthroplasty of the Hip

| S. No. | Complication | No. of Cases | | |
|---|----------------------------|--------------|--|--|
| 1 | Infection | 0 | | |
| 2 | Heterotrophic Ossification | 0 | | |
| 3 | Protrusion | 0 | | |
| 4 | Sinking | 2 | | |
| 5 | Implant Failure | 0 | | |
| 6 | Death | 1 | | |
| Table 3. Late Complications of Bipolar Hemiarthronlasty of the Hin | | | | |

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| S. No | Results | No. of Cases | Percentage | |
|-----------------------------|-----------|--------------|------------|--|
| 1 | Excellent | 4 | 16 | |
| 2 | Good | 15 | 60 | |
| 3 | Fair | 4 | 16 | |
| 4 | Poor | 2 | 8 | |
| 5 | Total | 25 | 100 | |
| Table 4. Results of Bipolar | | | | |

Hemiarthroplasty of the Hip



Figure 3. X-Ray Showing Bipolar Hemiarthroplasty of Hip for Garden Type IV Intracapsular Fracture Neck of Left Femur



Figure 4: X-Ray Showing Bipolar Hemiarthroplasty of Hip for Garden Type IV Intracapsular Fracture Neck of Right Femur

DISCUSSION

In our study we have evaluated 25 cases of bipolar hemiarthroplasty of the hip, which were enrolled and operated in Department of Orthopaedics, Dr. Pinnamaneni Siddhartha Institute of Medical Sciences and Research Foundation over a period of 2 years.

Dual bearing surfaces concept offers a considerable advantage over other procedures. The two surfaces share

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the motion and reduce net wear at either surface, thus reducing erosion at the acetabular – joint interface. In addition, the total range of movement at the hip joint is increased.

The Mean Harris Hip Score for Unipolar arthroplasties was 77^1 for Bateman's bipolar prosthesis, in other series it was 85^2 and, in our study, it was 86.

In our study, uncemented technique was used in bipolar hemiarthroplasties. Some studies showed better clinical ratings with un- cemented bipolars than with cemented bipolars³. This is probably because of absence of stress shielding of the proximal femur and near physiologic transfer of stress to the medial femoral cortex.

In study by Bochner & Pellicci,⁴ there was no deterioration of results of the bipolar hemiarthroplasties overtime in the short duration. In our study also, there was no deterioration of results over the short period.

According to Merlo et al.⁵ although protrusion was present radiologically in his study, there was no clinically significant correlation. In our study, there were no cases with incidence of protrusion.

According to Lausten et al,⁶ acetabular protrusion and erosions were reduced in bipolar arthroplasties; hence it is the good alternative to the unipolar prosthesis in fracture neck of the femur in the elderly and physiologically younger patients.

The proportion of good to excellent results was observed in 76% in our study, which is a testimony to the efficacy of bipolar Hemiarthroplasty.

The survival of the bipolar implant and the acetabular cartilage was proved by Dr. James Ennis Bateman, the originator of the bipolar prosthesis. In study of 1213 unipolar hip replacements that he had done (including in 760 osteoarthritic hips), he reports healthy acetabular bone preservation as long as 15 years after surgery.⁷ In addition, clinical results after as long as 15 years compare favourably with conventional 2-piece total hip replacement techniques.⁷

According to Me Conville et al.⁸ thigh pan in anterior side, attributed to femoral component loosening, which would be reduced by use of proportionately sized femoral components and use of cement when indicated.

In our study, we have used the bipolar prosthesis with satisfactory results in physiologically younger patients with neglected intracapsular fractures, in whom internal fixation was thought to yield unsatisfactory results.

Polyethylene wear debris and Metallosis causing failure of the bipolar hemiarthroplasty were reported as isolated instances by Kim et al.⁹ and Kobayashi et al.¹⁰ respectively. We did not see any of the above complications in our short study period. Dislocation of the bipolar prosthesis is a rare phenomenon. It has been reported in literature as ranging from 1% (Vazquez, Vela et al)¹¹ to 2.3% (Wada et al)³ and 2.63% (Maricevic).¹² However, in our study no dislocation has occurred. Incidence of infection in other series¹² was 2.63% to 3.9% (deep infection) (Nottagea).¹ We had one case of superficial infection (4%), which cleared of with local treatment and systemic antibiotics. Peri Operative mortality was 1.31% (Maricevic)¹² to 4.6% (Nottage).¹ There was no

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mortality in our study. Revision rate in fractures neck of femur treated with bipolar prostheses was 6.5% according to Maricevic¹² and 10% according to La Belle¹³ over 7 years and 5 months. With a short period of follow up in our study, we have not seen any case, which required revision surgery.

CONCLUSION

This study concludes that bipolar hip prosthesis offers a long-term solution in patients with intracapsular fracture neck of femur, with multiple advantages. The procedure advantages like painless mobility, ease of offers rehabilitation and return of function in the elderly, and in neglected cases in physiologically younger patients. The surgery is relatively easy to perform, takes less operating time, has less blood loss, and hence, safer and preferable. The bipolar hip prosthesis in our study, has a high rate of good to excellent results. The durability of the implant and potential for preservation of acetabular cartilage, allow this prosthesis to be used in physiologically younger, more active patients. The low rates of complications when compared to unipolar prosthesis indicates the superiority of the implant. The potential for its use in varied indications and in different age groups shows the versatility of the implant.

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