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Original Research Article

Outcome of dual mobility total hip arthroplasty in patients who are at high risk for dislocation

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ABSTRACT

Background: Dislocation after total hip arthroplasty (THA) remains a major concern, because it is reported to range from 1% to 5%. The concept of dual mobility articulation was developed in 1970 by Bousquet to decrease dislocation risk. Several studies have looked at the outcome of dual mobility articulation in primary THA and in revision THA.
Methods: This is a prospective study of 33 patients undergoing dual mobility THA during 24 months period from October 2017 to September 2019. Patients undergoing total hip replacement (THR) to have dual mobility cup (DMC) were those at high risk of dislocation. Patients were followed up for a mean period of 18 months.
Results: 33 patients (mean age 67 years) underwent DMC THA. 27 patients underwent primary hip replacement. The follow-up of our cases has ranged from 13 months to 3 years with a mean follow-up of 18 months. none of the patients had hip dislocation.
Conclusions: The DMC is an effective solution for the management of high-risk cases undergoing total hip replacement to reduce the incidence of postoperative instability.

Keywords: THA, DMC, Polyethylene, Intra-prosthetic dislocation

INTRODUCTION

Dislocation after total hip arthroplasty (THA) remains a concern, because its frequency is reported to range from 1% to 5%.[1-4] The concept of dual mobility articulation was developed in 1970 by Bousquet to increase the range of motion and to decrease dislocation risk. It combined a small head to decrease wear (low friction arthroplasty principles stated by Charnley) and a large head to increase stability (MacKee and Farrar).[5,6] Several studies have looked at the outcome of dual mobility articulation in primary total hip replacement (THR) and in revision THR.[7-20]

METHODS

This is a prospective observational study of 33 patients undergoing dual mobility THA conducted in the department of orthopedics, Sagar hospitals DSI, Bangalore and all the patients admitted during the study period of 24 months from October 2017 to September 2019 were considered for the study sample by time-based sampling technique. The clearance from hospital ethical committee was obtained before starting the study.

The inclusion criteria for a patient undergoing total hip replacement (THR) to have DMC (dual mobility cup) were those at high risk of dislocation. These included patients who were either more than 60 years, had poor soft tissue coverage around the hip, non-compliant, neuromuscular diseases, cognitive dysfunction, elderly with femoral neck fracture, failed hip surgeries, and those who require revision THR irrespective of the cause.

Patients were admitted and examined according to protocol both clinically and radiologically, and functional

outcome was assessed by modified Harris hip score both preoperatively and postoperatively.

Surgery was performed by Moore's approach to hip using dual mobility acetabular cup and femoral stem. 21 cases underwent uncemented THA and 12 cases cemented THA.

Post operatively limb is kept in abduction with abduction pillow. Static quadriceps exercises, knee and ankle exercises done, and patients were ambulated from first postoperative day itself. DVT prophylaxis with injection enoxheparin 40 mg sc OD for 3 days and oral anticoagulants (Ecospirin 150 mg OD) continued for 1 month. Patients were advised not to squat/sit cross legged/not to cross the lower limb across the midline and not to use Indian toilets.

The sutures were removed at two weeks after surgery. Patients were followed up with X-rays and modified Harris hip score immediate postoperatively, one, three months, and one year after surgery and yearly thereafter.

Figure 1: Fracture neck femur.

Figure 2: Postop day 1.

Figure 3: 7 months follow-up.

RESULTS

Out of 33 cases, 22 were male and 11 females (Figure 4). The age of the patient ranged from 55 years to 94 years with a mean age of 67 years.

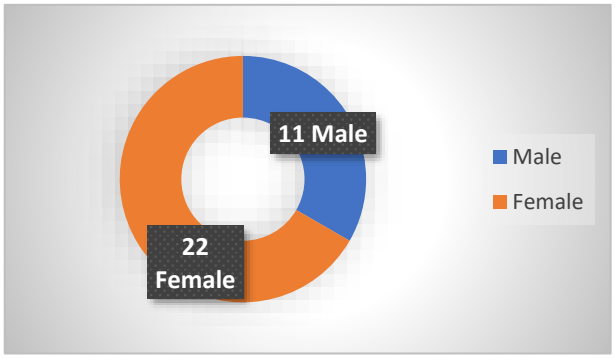

Figure 4: Gender.

27 patients underwent primary hip replacement (femoral neck fracture 18, osteoarthritis 9) and 6 patients underwent revision surgery/complex THR (failed DHS 1, failed hemiarthroplasty 2, revision THA 2, failed osteosynthesis 1).

The follow-up of our cases has ranged from 13 months to3 years with a mean follow-up of 18 months.

Mean preoperative Harris hip score was 34.3, ranging from 30 to 54. This score improved to 81.44 (76-85) immediate post-operative and 91 (86-97) at latest follow up. ($p<0.05$, Mann-whutney U test) (excellent-90 to100 score, good-80 to 90, fair-70 to 79 points, poor-below 70).

In our study 87.88% (29) of the cases had no complications.

12.12% (4) of cases had complications which included superficial infection (2 cases, 6.06%) which resolved 3 weeks postoperatively, Vancouver type A periprosthetic femur fracture involving lesser trochanter (1 case, 3.03%) and pulmonary thromboembolism (1 case, 3.03%) (Figure 5).

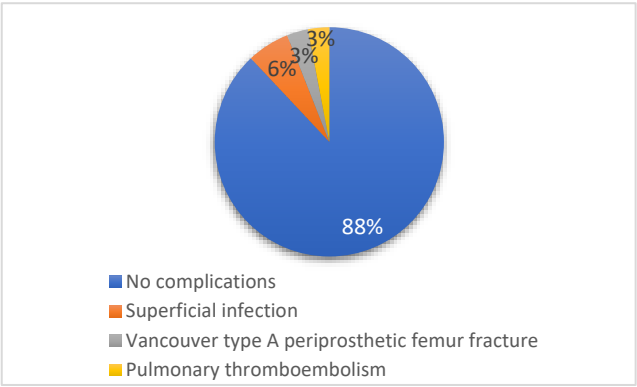

Figure 5: Complications.

At the latest follow-up none of the patients had hip dislocation, X-rays taken during follow-up have not shown any evidence of loosening around the acetabulum.

DISCUSSION

In our series, the DMC has been used for selective cases of hip replacement, who are at high risk for postoperative instability. The indication of DMC included patients who were either more than 60 years, were non-compliant with a history of substance abuse, who had a history of prior hip surgery, had a compromised soft tissue envelope around the hip, and who were elderly and had sustained a femoral neck fracture.

Our early results with these implants have shown a 100% survivorship at a mean follow-up of 18months without implant loosening. studies have showed 93 to 99% survivorship of DMC implants at 10 years and 80% survivorship at 22 years.[31,32]

We have had no dislocations till latest follow-up. Studies have shown a dislocation rate of 0-3.6% in primary THR and 5-30% in complex THR because of the bone loss, compromised muscles, and soft tissues around the hips. The use of DMC in complex THR has shown the dislocation rate to range from 1 to 10% at eight-year follow-up.[21-30]

The use of DMC for THR in the case of a femoral neck fracture has shown a dislocation rate of 1.4%.[31] A comparison of dislocation rates has been done for conventional hip replacement and DMC replacement; there was a postoperative dislocation incidence of 14.3% in a conventional total hip and no dislocation was observed in the dual mobility group.[32] We had 18 patients with femoral neck fracture in our study, all underwent DMC THA and no postoperative dislocation occurred.

Intra-prosthetic dislocation (IPD) is peculiar to the DMC. It occurs between the smaller head and polyliner due to a ‘‘bottle opener’’ effect and it results in excessive metallosis and failure of the DMC. The head lies asymmetrically in the cup and might be mistaken for polywear. The dislocated liner has been described as a bubble sign and is pathognomic of IPD. In younger patients, these cups should be used with caution as they are high demand cases and have high chances of polyethylene wear and higher incidence of IPD.[33] Boyer et al in a series of 240 hips followed for 9 years and 11 months reported a 4.1% incidence of IPD. In our mean follow-up of 18 months, we have not encountered this complication.[32]

One case (3.03%) had Vancouver type A periprosthetic femur fracture (un-displaced) involving lesser trochanter during procedure, which united without intervention. Our results are comparable with Berry (5.4% of periprosthetic femur fractures) two cases (6.06%) had superficial infection, culture was negative and wound healed completely 3weeks postoperatively.one case (3.03%) had pulmonary thromboembolism.[34]

Limitations

Limitations of the study were like-small sample size, short duration of study and long-term follow-up is needed to assess complications like IPD and polyethylene wear rates and implant survivorship.

CONCLUSION

Instability remains a significant issue after THA in patients who are at high risk for dislocation. The DMC is an effective solution for the management of high-risk cases undergoing total hip replacement to reduce the incidence of postoperative instability. its use in younger, high demand patients should be used with caution in view of complications like intra-prosthetic dislocation and accelerated wear.

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