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Bipolar hemiarthroplasty in displaced intracapsular femoral neck fractures-cemented versus non-cemented a comparative Kashmir study

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Abstract

Purpose: Bipolar Hemiarthroplasty in displaced intracapsular femoral neck fractures-cemented versus non-cemented-a comparative Kashmir study.

Methods: From January 2001 to June 2016,152 hemiarthroplasties were done for displaced intracapsular femoral neck fractures (Garden type III & IV). Ninety eight of these patients were followed up for more than twenty four months, while fifty four were lost to follow-up.

Results: The mean operative time for cemented and non-cemented groups were 57 minutes (40-85 minutes) and 50 minutes (40-75 minutes) respectively. The mean intra-operative blood loss in two groups were 378ml (268-579ml) for the cemented group and 291ml (225-431ml) for the non-cemented group. At last follow-up, the mean HHS in the cemented group was 76.7 points (41 -102 points) and in the non-cemented group,86 points(61 to 101 points) while as mean pain score was 2.8 points(1-4points) and 2.0 points(1-3.4points) respectively.

Conclusion: In the present study, overall results were slightly better in non cemented hemiarthroplasty group than in cemented group in terms of blood loss and HSS score on latest follow-up.

Keywords: Bipolar arthroplasty, cemented & non cemented arthroplasty, displaced intracapsular fractures

Introduction

Hip fractures are an important cause of mortality and morbidity in elderly patients. However, there is some controversy regarding the optimal surgical treatment for these injuries [1-5]. Hip fractures in elderly are associated with impaired mobility, excess morbidity and mortality, and loss of independence. It remains a public concern with reversing aging pyramid and high prevalence of osteoporosis. Incidence varies considerably among industrial countries [6-14]. Common sites for fractures of the proximal femur are neck of femur, intertrochanteric and subtrochanteric regions. The main surgical indication remains displaced, unstable fractures of neck of femur. Some authors advocate reduction and fixation for these injuries, yet the literature shows unacceptably high rates of non union and osteonecrosis of the femoral head after internal fixation of femoral neck fracture in elderly [2, 3, 15-17].

The main treatment options are internal fixation with cannulated screws or sliding hip screws, hemiarthroplasty or total hip replacement. The goal of surgical treatment are immediate pain relief, rapid mobilisation and ambulation, accelerated rehabilitation, and maintenance of independent living. Hemiarthroplasty is a quick and highly structured procedure that allows for early weight bearing and recovery. Bipolar hemiarthroplasty (BA) has a higher incidence of groin pain secondary to acetabular erosion, as well as increased probability of revision arthroplasty [18].

Although treatment of displaced intracapsular fracture by prosthetic replacement is a common procedure for elderly patients, the use of total hip arthroplasty (THA) presents a high risk of dislocation in femoral neck fractures (up to 20%) [19, 20]. While Harjeet *et al.* concluded that unipolar hemiarthroplasty is an efficacious and cost-effective treatment option for femoral neck fractures in the elderly, a meta-analysis by Lu-Yao reported that 6% to 18% of patients required a second surgery after unipolar hemiarthroplasty [21, 22].

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Furthermore, in a long-term study, Soreide *et al.* show that protrusion is a complication of unipolar hemiarthroplasty in 54% of cases studied [23]. On the other hand, others with 4 years experience of bipolar prosthesis found no protrusion [20].

Material and Methods

From January 2001 to June 2016, 152 hemiarthroplasties were done for displaced intracapsular femoral neck fractures (Garden type III & IV). Ninety eight of these patients were followed up for more than twenty four months, while fifty four were lost to follow-up. Inclusion criteria were: age > 65 years; active and independent life style and presentation with Grade III and IV femoral neck fractures. There were 34 males and 64 females. out of this 51 had non-cemented hemiarthroplasty [fig 1] and 47 patients underwent cemented bipolar hemiarthroplasty [fig 2]. Mean age at the time of surgery was 64.4 years in the noncemented group and 69.5 in case of cemented group. The mean follow-up was 23.8 months in cemented and 31.3 months in non cemented group.



Fig 1: Non cemented Bipolar Replacement



Fig 2: Showing cemented bipolar replacement

All surgeries were done through posterior or posterolateral approach. Implants used were from Inor, Sushrat and pitkar. Prophylactic antibiotics were administered prior to skin incision. Heparin 5000 to 10,000 in divided doses were given till patient was mobilised. Patient was encouraged to walk on crutches or walker as tolerated from the first postoperative day.

The cemented and noncemented groups were compared with respect to intra-operative, post-operative and total blood loss and complications were compared. Patient's functional status at last follow-up were evaluated using the Harris hip score (HHS), and pain score [33]. During radiological evaluation, acetabular erosion was checked in both hips in the anteroposterior view. Limb length discrepancies were determined by radiological comparison with distances between the upper margins of lesser trochanter to lines between both tear drops in the anteroposterior view (supine position). Varus and valgus alignment of the femoral components was evaluated by Khalily and lester's method and osteolysis of femoral components were assessed on anteroposterior and lateral radiographs using Gruen's classification [24, 25]. More than 3 degrees change and more than 2mm location change without bony ingrowth around femoral component were considered as component subsidence.

Results

The mean operative time for cemented and non-cemented groups were 57 minutes (40-85 minutes) and 50 minutes (40-75 minutes) respectively. The mean intra-operative blood loss in two groups were 378ml (268-579ml) for the cemented group and 291 ml (225-431 ml) for the non-cemented group. At last follow-up, the mean HHS in the cemented group was 76.7 points (41 -102 points) and in the non-cemented group, 86 points (61 to 101 points) while as mean pain score was 2.8 points (1-4points) and 2.0 points (1-3.4points) respectively. Intraoperative fracture occurred in a case of poliotic patient and was treated with cable wiring. One case of dislocation occurred in cemented group 2 weeks after operation which was reduced but patient developed deep vein thrombosis 10 days after surgery and patient died in the 4th post-operative week due to pulmonary embolism. In two cases of cemented group, there was loosening of stem in fifth post-operative year and both cases were converted to total hip replacement. In both groups acetabular erosion occurred in four patients in the fourth post-operative year.

Discussion

In the present series, intraoperative blood loss, postoperative blood loss and the mean operative time was lower in the uncemented group. Lo *et al.* reported a similar finding but found that cemented prosthesis provided better functional and radiological results [26].

In the present study one case of dislocation was found but incidence was less because of greater stability of bipolar prosthesis (because of its biomechanically increased range of motion) [34]. Dorr reported high dislocation rates in THA and cemented hemiarthroplasty when performed in femoral neck fractures. Similarly Ravikumar found upto 20% dislocation rate in THA [34, 19].

Emery in a randomised prospective trial found that the use of uncemented stems are associated with more hip pain and greater need for walking aids than cemented stems (when using Monk Duolet Bipolar prosthesis with Thompson and Austin Moore stem) [27]. It was also found that the incidence

of post-operative complications, early mortality, operating time and blood loss were not significantly different for cemented and non-cemented prosthesis [27]. In the present study, however, there was no statistically significant difference in operating time but blood loss was lower in the non-cemented group.

Overgaard reported that 4 of 62 patients, a relatively small proportion, complained of pain with weight-bearing 6 years after non-cemented bipolar hemi-arthroplasty [28]. In the present study the HHS was better in noncemented group and no significant difference was found in pain scores. In the present study no patient had pain during normal activities at follow-up, which is comparable to the Goldhill study in which patients with bipolar prosthesis for fracture femoral neck were found to have occasional or slight pain [29].

The general consensus, appear to be that cemented bipolar hemiarthroplasty is preferred for intracapsular femoral neck fracture, because it results in lower pain score post-operatively [30, 27]. Kenzora, in a prospective outcome study, concluded that the use of bipolar prosthesis (either a press fit or cemented) provided better pain relief and function and a lower complication rate than non-cemented unipolar prosthesis albeit at higher cost [31].

All the patients in this study were elderly (mean age 69.5 years) for cemented group and 64.4 for non-cemented group at the time of surgery) and all femorii were osteoporotic. We, experienced an intra-operative fracture in a poliottic patient which was cable wired and fracture united. Although, Chandran reported a rate of 7.4% for intra-operative periprosthetic fractures for non-cemented bipolar prosthesis, these occurred while attempting to secure a tight fitting uncemented stem [36]. In the present study, four cases of acetabular erosion were encountered (two in each group), which is comparable to rates reported by Devas *et al.* and one case of stem loosening in the cemented group due to technical error [32].

The present study has several limitations that require consideration. First, it was a retrospective case controlled study rather than a prospective randomised controlled study. Second the number of the cases included was small but the sample size was sufficient. Third, we cannot comment on the longevity of the implants in this study. In addition, the premorbid activity level of the patients was not considered-the HHS score and a 5 point pain scale were used to evaluate clinical and functional outcomes. Other scoring systems were hard to apply in this study because the patients were elderly and it was difficult to get proper responses to the other types of questions. Lastly, the mean follow-up time was 23.8 months in cemented group and 31.3 months in non-cemented group, which is not enough for evaluation of protrusion acetabuli.

Conclusion

From our relatively short-term retrospective nonrandomised study, we conclude that bipolar hemiarthroplasty produces good functional outcomes with minimal complications for displaced intracapsular femoral neck fractures and has several advantages, these results are comparable to other studies. In the present study, overall results were slightly better in non cemented hemiarthroplasty group than in cemented group in terms of blood loss and HSS score on latest follow-up.

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