

The Conversion Rate of Bipolar Hemiarthroplasty after a Hip Fracture to a Total Hip Arthroplasty

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Background: Bipolar hip hemiarthroplasty is used in the management of fractures of the proximal femur. The dual articulation is cited as advantageous in comparison to unipolar prostheses as it decreases acetabular erosion, has a lower dislocation rates and is easier to convert to a total hip arthroplasty (THA) should the need arise. However, these claims are debatable. Our study examines the rate of conversion of the bipolar hemiarthroplasty to THA and the justification for using it on the basis of future conversion to THA.

Methods: All cases of bipolar hemiarthroplasty performed in our unit for hip fractures over a 9-year period (1999-2007) were reviewed. Medical notes and radiographs of all patients were reviewed, and all surviving patients that were contactable received a telephone follow-up.

Results: Of all 164 patients reviewed with a minimum of 1 year from date of surgery, 4 patients had undergone a conversion of their bipolar prosthesis to THA. Three conversions were performed for infection, dislocation, and fracture. Only one (0.6%) conversion was performed for groin pain.

Conclusions: Our study show that bipolar hemiarthroplasties for hip fractures have a low conversion rate to THAs and this is comparable to the published conversion rate of unipolar hemiarthroplasties.

Keywords: *Hip fracture, Bipolar arthroplasty, Total hip arthroplasty*

Surgery for hip fractures is one of the most common orthopaedic procedures and is set to increase over the coming decades.^{1,2)} Although many surgical treatments are available for fractures of the proximal femur, most surgeons agree that older patients with a displaced intracapsular proximal femoral fracture should be treated by a hip arthroplasty.³⁾ This can be either a total hip arthroplasty (THA) or a hemiarthroplasty.³⁾ The ideal prosthesis is still debated and often depends upon surgeon, patient, and unit factors.²⁾ Bipolar hip arthroplasty has been in use

for the treatment of primary hip arthritis since 1974,⁴⁾ but is most commonly now employed in the management of fractures of the proximal femur.⁵⁾

The dual articulation is cited as advantageous in comparison to unipolar prostheses as it decreases acetabular erosion, has a lower dislocation rate and is "easy" to convert to a THA should the need arise. However, the published literature refutes the proposed bipolar benefits of less erosion and less dislocation, and demonstrates equal functional outcomes to unipolar hemiarthroplasty.⁶⁻¹⁰⁾ Therefore, the only remaining reason to use bipolar arthroplasty (when the unipolar alternative is available) would be for planned conversion to THA, should the patient develop groin pain. The latter is the most common cause of revision of failed hemiarthroplasty to THA. It usually reflects either a progressive arthritis or a loosening of the stem.^{11,12)}

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Universally, the cost of the bipolar arthroplasty implants are considerably greater than the cost of unipolar, therefore our aim was to examine the rate of conversion of bipolar hemiarthroplasty to THA and whether the additional expense of bipolar arthroplasty was justified on the basis of ease of future conversion to a THA because of groin pain.

METHODS

Ethical approval was sought for a retrospective review of all bipolar arthroplasties carried out for hip fracture in our institution which is a tertiary referral trauma centre receiving approximately 950 proximal femoral fractures per year and performing an average of 300 hip hemiarthroplasties per year. The inclusion criteria were patients with an intracapsular proximal femoral fracture, having undergone a bipolar arthroplasty with at least one postoperative radiograph available.

During this time, bipolar arthroplasty was used at the discretion of the surgeon when a patient was considered likely to outlive and outperform a unipolar arthroplasty thus facilitating conversion to a future THA if required. Theatre records were retrieved for all patients who had undergone bipolar arthroplasty for a hip fracture where an alternative option of unipolar was available over a 9-year period (1999-2007; corresponding to the start of the use of bipolar arthroplasty in our unit) with a minimum of 1 year from the date of the procedure. The medical notes were reviewed, looking specifically for documented conversions, or planned conversions to THA. The patients' serial radiographs were reviewed for evidence of revision surgery.

As this patient cohort is elderly it was felt to be inappropriate to ask patients to attend a face-to-face consultation for the purposes of the study. A telephone follow-up was therefore used to assess whether or not the patient had undergone any subsequent surgery to their hip either at our unit, or elsewhere that was not recorded in our available records. Three attempts at contact were made for each patient. In cases that we were unable to contact, or where the patient was no longer alive, only the patient's medical notes and radiographs were used for follow-up data.

To find the cost differences between the use of unipolar and bipolar implants, we calculated the cost for the components only excluding sterilisation costs, theatre time etc. The implants which are currently used in our unit are the Centrax Bipolar arthroplasty (Stryker UK Limited, Berkshire, UK) and the Exeter Trauma Stem (Stryker UK Limited). Further comparison in the cost was undertaken

to assess the cost difference of similar products from 3 different manufacturers.

RESULTS

One hundred and seventy six bipolar hip arthroplasties were identified as being implanted between 1999 and 2007 in patients with intracapsular proximal femoral fractures. Twelve patients were excluded from the study as we were unable to retrieve their postoperative radiographs leaving a study group of 164 patients.

The mean age at surgery was 75.5 years with 3:1 female:male ratio. The median time from surgery to this review was 4.8 years (range, 1 to 10 years). Of the 164 patients, 152 were simple intracapsular fractures and 12 were pathological fractures secondary to metastatic spread of malignancy.

Both clinical and radiographic follow-up ranged from 1 month to 6 years (median, 1 month) reflecting our unit policy of not routinely following up hip fracture patients. With a minimum time from surgery of 1 year, 4 patients out of 164 had undergone revision of their bipolar prosthesis into THA. One patient underwent revision to a THA due to groin pain after 2 years, with the remaining patients undergoing revision for infection, dislocation and fracture (one of each). Two patients had removal of their implants due to persistent infection. Both patients were not medically fit for further revision.

Of the 112 patients still alive, we were able to contact 62 using telephone follow-up. None had undergone any revision surgery or had revision surgery planned for their bipolar joints. Thus, of 164 bipolar arthroplasties at a median time from surgery of 5 years (range, 1 to 10 years), 1 prosthesis was revised to a THA for groin pain at 2 years postoperatively. The bipolar implant used in our unit is 5.3 times more expensive than the unipolar implant.

DISCUSSION

Our patient group that underwent the bipolar arthroplasty was positively selected out of our hip fracture population on the basis of their anticipated longevity and greater functional demand, but even in this group, conversion to THA was rare (1/164, 0.6%).

It is arguable whether this low revision rate reflects the functional benefits from the use of bipolar prosthesis or if it is an expected rate in this patient group i.e., similar to revision rate of unipolar prosthesis. Tanous et al.¹³⁾ reported a 1.3% revision rate of cemented unipolar hemiarthroplasty to THA within 97 months of follow-up. Wachtl

et al.¹⁴) had a 1.2% revision rate at 5 years follow-up due to stem loosening or protrusion of cemented unipolar prosthesis. Hence, the revision rate in our cohort is close to that in patients with unipolar prostheses.

A randomised controlled trial (RCT) comparing the use of bipolar hemiarthroplasty versus THA for displaced intracapsular fracture neck of femur, reported a 4% revision rate of bipolar hemiarthroplasty at 5 years.¹⁵ This revision rate is higher than our experience in this study. There might be two reasons for this difference. First, the authors in this RCT had a routine follow-up for their patient as part of their trial. Therefore, they reported less loss to follow-up than the patients in our cohort. The second reason is that patients who are involved in this RCT have more clinical and radiological reviews than patients who are in a routine clinical practice, therefore medical intervention may occur at an earlier time.

The published literature refutes the proposed bipolar benefits of less erosion and less dislocation, and demonstrates equal functional outcomes to unipolar hemiarthroplasty.⁶⁻¹⁰ Conversely, dealing with complications arising from bipolar arthroplasty can be more difficult. Dislocation of the bipolar hip implant for example, is more likely to require open reduction or to undergo dissociation of the implant.¹⁶

We cannot comment on the specific costs of implants in other institutions as these vary widely even for the same implant, however, the costs of a bipolar prosthesis would be anticipated to be considerably more than unipolar in all units.

As a bipolar arthroplasty is significantly more expensive than a unipolar arthroplasty, its cost effectiveness

is questionable unless the only remaining unproven benefit; a conversion to THA justifies its expense. Our data shows that the conversion of bipolar hemiarthroplasty to THA is rare and as the cost of the bipolar is more expensive than unipolar in use in our hospital, we have abandoned its use in our unit.

The predominant weakness in our study is regards the follow-up which is a well recognised problem in this patient group. We examined all available records, and all contactable patients received a telephone follow-up in order to strengthen the reliability of our data, but we cannot be certain that some patients did not have revision surgery elsewhere. However, as the tertiary centre for our region, we feel it unlikely that this would have taken place outside our unit or without documented visits to our unit in patients with ongoing problems after surgery. Ideally, the study population would have been recalled and clinically examined with repeat radiographs, but we felt this to be unrealistic given the age of the study population. The second weakness of our study is the lack of a control unipolar hemiarthroplasty group. However, the conversion rate of unipolar hemiarthroplasty to THA is previously documented in the literature.^{13,14}

In conclusion, this study shows that bipolar hemiarthroplasties for hip fractures have a low conversion rate to THAs and this is comparable to the published conversion rate of unipolar hemiarthroplasties.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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