



Research Paper

No consensus on implant choice for oligometastatic disease of the femoral head and neck

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ABSTRACT

Objectives: Metastatic disease involving the femoral head and neck is often treated with a hemiarthroplasty or total hip arthroplasty (THA) to prevent pathologic fracture but there are no outcome studies demonstrating superiority of one option over the other.

Methods: This investigation was designed as a survey of the current members of the Musculoskeletal Tumor Society (MSTS). The survey contained seven clinical vignettes with identical imaging of a pathologic lesion of the femoral head and neck. The primary outcome measured was decision to treat the lesion with hemiarthroplasty or THA. Secondary outcomes included method of fixation of the femoral/acetabular components and head type utilized.

Results: A total of 93 members (30.0%) of the MSTS completed the survey. Across all clinical vignettes, 73.3% ($p < 0.001$) of the responses were in favor of hemiarthroplasty; however, there was no significant difference between hemiarthroplasty and THA in Cases 1 & 2 ($p = 0.08$, $p = 0.6$, respectively); the cases representing younger patients with a more favorable histologic diagnosis. When THA was selected the majority of respondents preferred hybrid or cementless fixation construct (56.1% and 27.0%, respectively, $p < 0.001$). When hemiarthroplasty was selected respondents selected a cemented, bipolar construct (86.4% and 64.2%, respectively, $p < 0.001$).

Conclusions: When treating metastatic lesions of the femoral head and neck orthopaedic oncologists do not agree on reconstructing with THA versus hemiarthroplasty for patients with younger age and favorable histology. This investigation highlights the controversy of this clinical decision and indicates the need for a collaborative prospective trial among this specific patient population in order to determine the optimal treatment method.

1. Introduction

The proximal femur is the most common location of appendicular skeletal metastases [1]. While lesions affecting the intertrochanteric and subtrochanteric region are typically treated with prophylactic intramedullary nails to prevent pathologic fracture or endoprosthetic reconstruction in the case of severe destruction [2], disease involving the femoral head and neck has historically been treated with a hemiarthroplasty [3]. There has been increasing evidence that certain patients with non-pathologic adult hip fractures may have better long term outcomes when treated with total hip arthroplasty (THA) versus

hemiarthroplasty [4–7].

Given the increased 5-year survival of patients with cancers that commonly metastasize to bone including lung, breast, prostate, thyroid and kidney cancer [8], the prevalence of metastatic bone disease is increasing. Some surgeons now favor using THA versus hemiarthroplasty in an attempt to improve the long term outcome of patients with skeletal metastatic disease. Currently, there are no outcome studies championing one option over the other in this clinical scenario. There is also no outcomes based research to guide head choice (monopolar or bipolar) in hemiarthroplasty, or choice of fixation (biologic or cemented) in this patient population. This investigation

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seeks to identify the current practices of orthopaedic oncologists with regard to implant choices when treating metastatic lesions of the femoral head and neck. We hypothesized there would be disagreement regarding optimal treatment in a variety of clinical scenarios. We hope to use this information to identify the areas of substantial disagreement that may be addressed by future investigations.

2. Materials and methods

This investigation was designed as an online survey of the 310 current members of the Musculoskeletal Tumor Society (MSTS) using a commercial internet survey tool (SurveyMonkey®, Palo Alto, CA, USA). The investigation was reviewed by our Institutional Review Board and assigned a status of exempt. The Research and Executive Committees of the MSTS each reviewed and approved the content of the survey.

2.1. Survey contents

Surgeon respondents were asked to provide their demographic information including location of practice, additional areas of fellowship training, additional fields of active orthopaedic practice, practice environment, membership status within MSTS, and age. The survey then presented each surgeon with seven clinical vignettes with identical imaging of a pathologic lesion of the femoral head and neck (Fig. 1, Table 1). The baseline clinical vignette is a 68 year-old female with one month of right groin pain exacerbated by weight bearing and biopsy proven metastatic breast cancer to the proximal femur (only site of metastatic disease) with a plan for surgical treatment followed by postoperative radiation. The subsequent vignettes individually altered patient age, histologic type, and extent of metastatic disease from the baseline in order to better isolate which factors the respondents gave greatest importance. Respondents were asked to choose between the treatment options of: cemented hemiarthroplasty, uncemented hemiarthroplasty, uncemented THA, THA with cemented stem and uncemented acetabular liner (hybrid THA), and THA with both components cemented. Depending on the choice of procedure, respondents were then asked to rank why a hemiarthroplasty or THA was chosen. For hemiarthroplasty, the six options were: less operative time, less blood loss, concern for acetabular fixation, decreased risk of dislocation, decreased implant cost, and patient survival is not sufficiently long to warrant THA. If the surgeon respondent chose THA, the three options to rank were: improved pain and functional outcome, avoid risk of

Table 1
Summary of clinical vignettes presented to respondents.

Vignette	Age	Histology	Metastasis			Plan for radiation
			Solitary bone	Multiple bone	Bone and visceral	
1	68	Breast	X			X
2	55	Breast	X			X
3	80	Breast	X			X
4	68	Breast		X		X
5	68	Breast			X	X
6	68	Lung	X			X
7	68	Lung			X	X

future acetabular resurfacing procedure, and patient survival is sufficiently long to warrant THA. Respondents were also asked to choose between a monopolar or bipolar head type for their hemiarthroplasty reconstruction, if chosen.

2.2. Outcomes

The primary outcome measured was the decision to treat with hemiarthroplasty or THA. Secondary outcomes measured included the method of component fixation (cemented or cementless) and use of monopolar or bipolar heads in hemiarthroplasty. The primary outcome was analyzed by age of the surgeon respondent, whether the respondent had completed an adult reconstruction fellowship, and whether the respondent had an elective adult arthroplasty practice.

2.3. Statistical analysis

Chi-squared tests, or Fisher's exact test when appropriate, were used to evaluate significance of the primary and secondary outcomes. Physician responses to the most important reasons for choosing a particular treatment were ranked via lowest mean score. Pairwise Kappa statistics were used to determine the inter-rater reliability between each vignette on the primary treatment decision of hemiarthroplasty compared to THA. P-values less than 0.05 were considered statistically significant. Due to small sample sizes, p-values were not adjusted for multiple comparisons and inflation of type I error. All analyses were conducted using SAS v9.4 (SAS Institutes, Cary, NC)



Fig. 1. Plain AP hip radiograph and coronal computed tomography (CT) scan provided with each clinical vignette.

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