In-hospital cost comparison between the standard lateral and supercapsular percutaneously-assisted total hip surgical techniques for total hip replacement

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Introduction

In 2008, 13.4 million patients in the United States aged 65 years or older incurred some expense due to treatment of osteoarthritis (OA) resulting in health care expenditures of $24.8 billion [1]. Total hip replacement (THR) is one of the most common treatments of OA in the hip joint, with annual volumes expected to reach 572,000 THRs in the United States alone by 2030 [2]. As a result, THR represents an excellent target for reducing the overall economic burden of OA.

One aspect of THR with the potential to reduce costs is the surgical technique. The supercapsular percutaneously-assisted total hip (SuperPath®, MicroPort Orthopedics, Arlington, TN, USA) surgical technique is a tissue-sparing approach that preserves the external rotators and does not require the cutting of any muscles or tendons to access the capsule [3]. Recently published multicentre results for this technique showed substantial reductions in length of stay, 30-day readmission rates, and transfusion rates compared to the national average in the United States [4]. That study also provided examples of postdischarge cost savings associated with the reduction of these key variables. This is significant as post-discharge costs have been shown to account for nearly 40 % of a THR episode of care [5].

While potential post-discharge savings have been shown, the in-hospital cost benefits associated with this technique have yet to be examined. The primary objective of this study was to compare the in-hospital costs associated with the SuperPath® and standard Lateral surgical techniques.

Methods

In-hospital costs were reviewed for all SuperPath® THRs performed by a single surgeon and all standard Lateral THRs performed by another surgeon at the same institution between April 2013 and January 2014. The total costs, both direct and indirect, minus the cost of implants were considered in the analysis.

All aspects of cost associated with an in-hospital episode of care were considered including secondary items like patient food services. An episode of care was defined as beginning at the time of admission prior to the THR procedure and ending at the time of discharge from the hospital. Cost comparisons were presented as the percent difference between the two groups to protect proprietary hospital costing information. Cost per patient values were used instead of total costs to account for the different patient numbers in each group.

Results

There were 49 SuperPath® and 50 Lateral THRs performed during the selected time period. Table 1 shows the patient demographics for each group. The mean length of stay was 2.1 days (range, 1-4 days) for the SuperPath® group and 5.1 days (range, 2–26) for the Lateral group. The mean total in-hospital cost per patient in the Lateral group was 28.4 % higher than that for the SuperPath® group.

Table 2 shows a breakdown of in-hospital cost categories and which technique had higher costs for each. Imaging costs were those associated with obtaining and interpreting any imaging (e.g. radiographs, ultrasound, computed tomography) performed during the episode of care. Narcotics costs included those associated with the costs of the drugs, distribution and monitoring, pharmacy labour, and intravenous admixture. Laboratory testing costs included any related to laboratory testing (e.g. microbiology, routine chemistry, routine haematology, pathology) performed during the episode of care.

Table 1: Patient demographics for the SuperPath® and Lateral groups

	SuperPath®	Lateral
N THAs	49	50
Male (%)/Female (%)	38%/62%	34%/66%
Mean Age (years)	68.1	73.1
Mean BMI	29.4	30.1

Table 2: In-hospital cost categories and comparison for the two groups

Cost Category	Group with Lower Cost	% Cost Difference
Overall	SuperPath®	Lateral 28.4% higher
Admissions	Lateral	SuperPath® 1.9% higher
Operating room	Lateral	SuperPath® 0.1% higher
Post-anaesthesia care unit	Lateral	SuperPath® 13.5% higher
Transfusions	SuperPath®	Lateral 92.5% higher
Imaging	Lateral	SuperPath® 105.9% higher
Narcotics	SuperPath®	Lateral 42.5% higher
Laboratory testing	SuperPath®	Lateral 17.0% higher
Patient room	SuperPath®	Lateral 60.4% higher
Patient food	SuperPath®	Lateral 62.8% higher
Physical therapy	SuperPath®	Lateral 52.5% higher
Occupational therapy	SuperPath®	Lateral 88.6% higher
Social work	SuperPath®	Lateral 92.9% higher

Discussion

The in-hospital costs for the SuperPath® and standard Lateral approaches were compared to determine if use of a tissue sparing surgical technique resulted in any in-hospital cost benefits. It was anticipated that costs would be reduced for SuperPath® patients, as the technique has several features that allow for early patient mobilisation and in turn reduced length of stay. SuperPath® utilises the interval between the piriformis and the gluteus medius to access the hip capsule superiorly without requiring the cutting of muscles or tendons, which preserves the natural structures that resist dislocation. In contrast, the Lateral approach requires the dissection of a significant portion of the gluteus medius, and often the minimus, as well as splitting of the iliotibial band. This muscular dissection likely leads to increased postoperative pain requiring more narcotics usage, decreased postoperative abductor strength, and reduced overall function and mobility that may all contribute to increased in-hospital costs.

The results confirmed what was expected and showed that mean total costs per patient were 28.4 % higher in the Lateral group. The Lateral group also had higher costs in nearly all individual cost categories, with imaging costs being the major exception. Mean imaging costs were 105.9 % higher in the SuperPath® group. This was largely attributable to radiograph costs, which were 198.8 % higher for SuperPath®. Although not required by the technique, the SuperPath® surgeon collected radiographs on all patients as a precaution because he was performing these procedures during his learning curve with the technique.

The study is not a randomised comparison of patients implanted by the same surgeon. Efforts were made to minimise the bias introduced from this limitation by selecting patients implanted during the same time period at the same institution. This ensured patients were treated with identical anticoagulation and transfusion protocols, while also receiving pre- and postoperative care at the same facilities. Patients in the Lateral group were five years older on average and this has the potential to play a role in increased hospital length of stay. Another limitation was the different levels of experience the implanting surgeons had with the two surgical techniques. The SuperPath® surgeon was completing his first 49 THRs using the technique, while the other surgeon had significant experience with the Lateral technique.

Future work is needed to examine if there any longer term benefits for SuperPath®, as a recent report for the direct anterior approach showed similar outcomes when compared to the lateral at midterm follow-up [14]. Future studies of interest could also determine if there are benefits for select patient populations (e.g. obese patients) as have been examined recently for other surgical techniques [15].

Conclusions

In conclusion, the use of the SuperPath® surgical technique resulted in in-hospital cost reductions of over 28 % when compared to the standard Lateral performed at the same institution. Pre-operative and operative costs were similar between the two groups, with the majority of savings occurring due to reductions in length of stay, narcotics, transfusions, physical therapy, occupational therapy, and social work costs. These outcomes suggest this tissue-sparing surgical technique can be cost effective primarily by facilitating early mobilization and patient discharge even during a surgeon's initial experience with the approach.

*References on file at MicroPort Orthopedics Inc.