Conversion vs Primary Total Hip Arthroplasty: Increased Cost of Care and Perioperative Complications

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Abstract

With the increasing incidence of hip fractures and hip preservation surgeries, there has been a concomitant rise in the number of conversion total hip arthroplasties (THAs) performed. Prior studies have shown higher complication rates in conversion THA. However, there is a paucity of data showing differences in cost between these 2 procedures. Currently, the Center for Medicare and Medicaid Services bundles primary and conversion THA in the same Medicare Severity–Diagnosis Related Group for hospital reimbursement. More evidence is needed to support the recategorization of conversion THA.

Methods: The cohort provided by the institutional database included 163 conversion THAs between January 1, 2012 and December 31, 2015. Intraoperative complications, estimated blood loss, operative time, postoperative complications, and perioperative cost data were analyzed for 163 primary THA patients matched to the conversion THA cohort.

Results: Compared with primary THA, conversion THA had significantly (P < .05) greater cost for direct labor, other direct costs, intermediate nursing services, other diagnostic/therapy, surgery services, physical/occupational/speech therapy, radiology, laboratories, blood, medical/surgical supply, and total direct costs. In addition, the conversion THA group had significantly greater operative times, estimated blood loss, length of stay, intraoperative complications, and postoperative complications.

Conclusion: Conversion THA, as compared with primary THA, is associated with greater costs (approximately 19% greater), increased surgical times, and perioperative complications. To prevent these additional expenses from creating patient selection bias and a barrier to care, the conversion THA Medicare Severity–Diagnosis Related Group should be reclassified, or modifiers created.

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The incidence of total hip arthroplasty (THA) in the United States is continuing to increase, with an estimated 572,000 yearly cases to be performed by 2030 [1]. Although partially driven by the expansion of the aging “baby boomers,” the number of procedures is also increasing because of the successful outcomes and expanding indications for THA. Consequently, for current arthroplasty surgeons, conversion to THA from prior interventions stemming from femoral or acetabular pathology may constitute a significant portion of their practice. Common interventions undergoing conversion to THA may include, but are not limited to, operative fixation of femoral neck, intertrochanteric, and acetabular fractures, hip arthroscopy for femoroacetabular impingement (FAI) or labral tears, proximal femoral osteotomies or periacetabular osteotomies for dysplasia, and free vascularized fibular grafts (FVGs) or core decompression for avascular necrosis (AVN) [2–9].

These different index procedures undergoing conversion THA are classified as equivalent to primary THA by the Center for Medicare and Medicaid Services (CMS). CMS determines hospital reimbursement by categorizing procedures into Diagnosis Related Groups (DRGs) [10,11]. Over time, DRGs have evolved for THA to account for revision surgery and medical comorbidities (Medicare Severity–DRGs [MS-DRGs]), as evidence throughout the literature showed that these patients had higher complication rates and require greater hospital resource, ultimately resulting in a financial burden to high-volume tertiary care centers [11–15]. Currently, primary and conversion THA share MS-DRG 469 (primary THA with...
major complication/comorbidity) and 470 (primary THA without major complication/comorbidity). Although multiple studies have shown that conversion THA has a higher complication rate compared with primary THA, there are limited data regarding the different cost of care for these 2 procedures [3,5,16–25]. The available early studies suggest that conversion THA may consume a disproportionate number of hospital resources [11,26]. Furthermore, because Medicare is the primary payer for most THAs [27], discrepancies in reimbursement could result in financial losses for conversion THA procedures performed, and ultimately limit patient access to care.

The purpose of this study is to (1) compare postoperative complications between primary and conversion THA whether or not hardware was in place at the time of conversion and (2) compare resource utilization through cost of care analysis for conversion and primary THA. We hypothesize that conversion THA will have significantly higher cost as well as intraoperative and postoperative complications compared with primary THA. Given the limited research in this arena, this could have significant impact on future CMS classifications.

Materials and Methods

After institutional review board’s approval, the study population was retrospectively obtained from a prospectively collected database at a single tertiary referral center. The cohort was established by searching for Current Procedural Terminology code 27132 (conversion THA) from January 1, 2012 to December 31, 2015. This search yielded 288 possible conversion THAs. The electronic medical record was then manually reviewed for inclusion criteria of absence of prior surgery on the same joint, and nonrevision THAs. A total of 103 patients were excluded for revision THA and 22 patients excluded with prior hip resurfacing or hemiarthroplasty, which were felt to be most similar to revision arthroplasty, leaving 163 patients who underwent conversion THA. This group was then further subdivided based on the presence or absence of implants/hardware (including suture anchors during hip arthroscopy) from the surgery preceding conversion THA.

The primary THA control group was then established using Current Procedural Terminology code 27130 (primary THA), resulting in 2457 procedures within the study dates identified. These encounters were randomized and the electronic medical records were reviewed for inclusion criteria of absence of prior surgery on the same joint, lack of prior periarticular infection, and lack of primary THA for an acute fracture. Demographic information including age, gender, body mass index (BMI), and American Society of Anesthesiologists (ASA) score were then collected for primary and conversion THA groups. One hundred sixty-three primary THA patients were then selected as a group for comparison with the conversion THA cohort based on mean age (matched within 2 years), BMI (matched within 1 kg/m²), and ASA score (matched within 1).

Progress notes, operative reports, and discharge summaries were reviewed for primary and conversion THA patients. Outcome variables evaluated included operative time, estimated blood loss (EBL), presence of intraoperative or postoperative complications, length of stay (LOS), discharge disposition, and need for revision surgery. Intraoperative complications included the need for transfusion or fracture. Postoperative complications included the need for transfusion during admission, hematoma that required additional clinic visits/care, wound dehiscence, deep venous thrombosis, pulmonary embolism (PE), periprosthetic fracture, dislocation, aseptic loosening of the components, surgical site infection (SSI), and the need for any revision surgery.

Hospital expenses were collected for each patient encounter through the use of EPSi, a comprehensive financial platform housing all cost, pricing, and budget data used at the investigating institution. Cost variables for comparison included direct labor costs, other direct costs (which include all supplies, drugs, and equipment expenses), intermediate nursing services, pharmacy, other diagnostic/therapy services, surgery services, respiratory care, physical/occupational/speech therapy (PT/OT/Speech), radiology, laboratories, blood, medical/surgical supply, and total direct costs.

Three comparisons were made for patient outcomes: (1) conversion THA vs primary THA, (2) hardware conversion THA vs primary THA, and (3) nonhardware conversion THA vs primary THA. For cost variables, primary and conversion THAs were compared directly, and hardware/nonhardware conversion subgroup analysis was then performed. Lastly, cost analysis of the 3 most common conversion procedures (open reduction internal fixation [ORIF], hip arthroscopy, and FVFG conversion) was performed to directly compare each with primary THA resource utilization. Chi-squared or Fisher exact test was used to compare categorical data, whereas continuous variables were compared using Student t test. Statistical analysis was performed using JMP Pro 13 software (SAS Institute, Inc., Cary, NC) and Mac Wizard Pro software (E Miller, Chicago, IL). Data are reported as mean (standard deviation). A P value <.05 was considered to be statistically significant.

Results

A total of 326 patients were included after primary and conversion THA groups were matched for mean age, BMI, and ASA score. There was no significant difference in gender (P = .428; Table 1). The indications for conversion THA included osteoarthritis (n = 87), AVN (n = 45), malunion/non-union (n = 28), and failure of hardware (n = 3). The index procedures included ORIF (n = 57), hip arthroscopy (n = 43), FVFG (n = 25), percutaneous pinning (n = 11), intramedullary nailing (n = 10), core decompression and bone grafting for AVN (n = 7), periacetabular osteotomy (n = 4), femoral osteotomy (n = 3), and surgical hip dislocation (n = 3). There were 132 patients (81.0%) with hardware and 31 patients (19.0%) without hardware placed at the index procedure before conversion THA. The hardware group had mean age, BMI, and ASA score of 51.5 (19.0) years, 28.4 (6.4) kg/m², and 2.41 (0.67), respectively. The nonhardware group had mean age, BMI, and ASA score of 52.5 (11.2) years, 29.6 (8.1) kg/m², and 2.32 (0.60), respectively. The mean time to conversion THA was 62.7 months (range 0.73–634.2 months). The indications for primary THA in the control group included osteoarthritis (n = 92), AVN (n = 65), rheumatoid arthritis (n = 5), and pigmented villonodular synovitis (n = 1).

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Patient Demographics.</th>
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<tbody>
<tr>
<td>Group</td>
<td>Age, y [Mean (SD)]</td>
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<tr>
<td>---------</td>
<td>-----------------------</td>
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<tr>
<td>Primary THA (n = 163)</td>
<td>53.6 (15.7)</td>
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<tr>
<td>Conversion THA (n = 163)</td>
<td>51.7 (17.7)</td>
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<td>P value</td>
<td>.313</td>
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</tbody>
</table>

Patient age, BMI, and ASA score are reported as mean (SD). Gender is reported as male (female). ASA, American Society of Anesthesiologists; BMI, body mass index; SD, standard deviation; THA, total hip arthroplasty.
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