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EDITORIAL

Conversion total hip arthroplasty: Primary or revision total hip arthroplasty

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Abstract

Total hip arthroplasty (THA) is an increasingly common procedure among elderly individuals. Although conversion THA is currently bundled in a diagnosis related group (DRG) with primary THA, there is a lack of literature supporting this classification and it has yet to be identified whether conversion THA better resembles primary or revision THA. This editorial analyzed the intraoperative and postoperative factors and functional outcomes following conversion THA, primary THA, and revision THA to understand whether the characteristics of conversion THA resemble one procedure or the other, or are possibly somewhere in between. The analysis revealed that conversion THA requires more resources both intraoperatively and postoperatively than primary THA. Furthermore, patients undergoing conversion THA present with poorer functional outcomes in the long run. Patients undergoing conversion THA better resemble revision THA patients than primary THA patients. As such, patients undergoing conversion THA should not be likened to patients undergoing primary THA when determining risk stratification and reimbursement rates. Conversion THA procedures should be planned accordingly with proper anticipation of the greater needs both in the operating room, and for in-patient and follow-up care. We suggest that conversion THA be reclassified in the same DRG with revision THA as opposed to primary THA as a step towards better allocation of healthcare resources for conversion hip arthroplasties.

Key words: Conversion total hip arthroplasty; Primary total hip arthroplasty; Revision total hip arthroplasty; Hip fracture; Post-operative complications

Core tip: Conversion total hip arthroplasty (THA) is a challenging procedure that requires more resources both intraoperatively and postoperatively than primary THA. As such, these procedures should be planned to anticipate the greater needs in the operating room, and for in-patient and follow-up care. Patients undergoing conversion THA should not be likened to

patients undergoing primary THA when determining risk stratification and reimbursement rates. We suggest that conversion THA be reclassified in the same group with revision THA as a step towards better allocation of hospital resources.

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INTRODUCTION

Hip fracture is an increasingly common complaint encountered by orthopedic surgeons in the United States. With the elderly population steadily expanding, the number of hip fractures is expected to rise to over 580000 in 2040[1,2]. These fractures are typically treated with open reduction internal fixation, implantation of an intramedullary device or dynamic hip screw and plate, hemiarthroplasty, or total hip arthroplasty (THA)[3,4].

While operative treatments for hip fractures are generally successful, postoperative complications commonly occur. Complications that may occur following surgery include non-union and mal-union of the fracture, migration of hardware, osteonecrosis of the femoral head, infection, and post-traumatic osteoarthritis[5-11]. Failed surgical fixation of hip fractures for any of these reasons often necessitates conversion arthroplasty as a salvage treatment. Conversion THA is also performed due to a failed acetabular fracture fixation, a failed hemiarthroplasty, or after the development of osteoarthritis in patients with a history of previous hip surgery for developmental dysplasia of the hip.

The increasing incidence of fractures and osteoarthritis due to an aging population may contribute to rising numbers of conversion THA procedures performed today in the United States. Currently, the Center for Medicare and Medicaid Services classifies conversion THA in the same diagnosis related group (DRG) as primary THA. However, there is an absence of literature on whether patients receiving conversion THA and primary THA have similar clinical characteristics and success rates to support this classification. This report aims to fill that void by comparing the intraoperative and postoperative factors and success rates following conversion THA, primary THA, and revision THA.

INTRAOPERATIVE FEATURES OF CONVERSION THA

Conversion hip arthroplasties pose unique obstacles that make these procedures more challenging than primary THAs. Due to the additional time required for removal of internal fixation devices and previous implants, conversion THAs are longer cases on average[8,10]. Furthermore, there are often broken screws or other hardware defects that require even more time to remove and address successfully during conversion THAs[12]. Winemaker *et al*[9] reported that conversion THA cases last 95 min (± 32.8) compared to 76.7 min (± 26.1) for primary THA cases (P = 0.015). A study by Zhang *et al*[10] reported even longer surgical times, with conversion THA procedures lasting 176 min on average.

Previous studies also state that conversion THA procedures result in increased intraoperative blood loss[8-10,12]. This is because of the need to operate through old scar tissue during conversion THA that is not encountered in primary THA[8,10]. Srivastav *et al*[8] and Zhang *et al*[10] both reported mean blood loss of the conversion arthroplasties at about 1300 mL. Schnaser *et al*[12] compared the average blood loss during conversion THA to primary THA and demonstrated a significant difference between the groups, with 668 mL (SD 230 mL) lost in the conversion THA group and 270 mL (SD 230 mL) lost in the primary THA group (P = 0.01)[12]. Winemaker *et al*[9] reported results that trended towards a significant difference between the groups, with 521.7 mL (± 218.9) blood lost during conversion THA and 406.5 mL (± 190.9) during primary THA (P = 0.06).

POSTOPERATIVE FEATURES OF CONVERSION THA

Many surgical and medical complications have been reported to occur following conversion THA. Archibeck *et al*[5] reported that 12 of 102 patients (11.8%) who underwent conversion THA experienced early surgical complications. A study by D'Arrigo *et al*[6] reported similar complication rates at 9.5% following conversion THA. Some studies listed even higher complication rates, with Zhang *et al*[10] stating that complications occurred in 9 of the 19 conversion THA patients (47%). The most common surgical complications include fractures either intraoperatively or postoperatively, dislocations, and infections[13]. Other less common surgical complications include limb-length discrepancies, loosening of prosthesis components, heterotopic bone formation, muscle disruption and dysfunction, injury to the sciatic nerve, and hematomas[13]. Medical complications have included acute myocardial infarction, congestive heart failure, atrial fibrillation, pulmonary embolism, gastrointestinal bleeding, acute renal failure, paralytic ileus and urinary tract infections[13].

Studies have shown that the complication rates following conversion THA are higher than the rates following primary THA[12,14,15]. This is in accordance with previous literature that states infection rates increase in previously operated areas with additional hardware[16]. McKinley *et al*[15] identified a statistically higher rate of superficial infections and dislocations following conversion THA than primary THA. That study also

indicated that the patients who underwent conversion THA are more likely to require a revision procedure after one year than the patients who received primary THA.

FUNCTIONAL OUTCOMES OF CONVERSION THA

Researchers commonly use the Harris Hip Score (HHS) to determine a patient's level of function either before or after a hip arthroplasty. A review of seven papers by Schwarzkopf *et al*[13] demonstrated that the mean pre-conversion HHS was 36.9 (range, 13 to 74), and the mean post-conversion HHS was 80.7 (range, 30 to 100). Overall, the functional outcomes of these patients were significantly better after conversion THA, with a mean improvement in HHS of 43.7 (range, 37 to 47.6) ($P < 0.05$). However, two studies have compared the HHS of patients receiving conversion THA to those of patients receiving primary THA and they both reported significantly lower HHS in the conversion THA cohort, which indicates a worse level of function in this population[12,15]. Schnaser *et al*[12] listed an average HHS of 70 in the post-conversion THA group, compared to an average HHS of 90 in the post-primary THA group. According to these studies, conversion THA results in lower success rates than primary THA overall.

CONVERSION THA COMPARED TO PRIMARY THA AND REVISION THA

Despite the overall success of conversion THA as a procedure to improve pain and function in patients who have had previous surgery in their hips, studies have demonstrated worse intraoperative and postoperative courses for patients following conversion THA compared to primary THA. Conversion arthroplasties require more time in the OR, result in more intraoperative blood loss, lead to more postoperative complications, have a higher return rate to the OR, and result in poorer functional outcomes[8-10,12,14,15]. Nevertheless, conversion THAs are classified with primary THAs under the same DRG.

There are many studies in the literature that compare the course of conversion THA to primary THA. However, there is a lack of research comparing conversion THA and revision THA to understand if the intraoperative and postoperative courses of these two procedures are more similar. We recently accessed the American College of Surgeons National Surgical Quality Improvement Project database to compare preoperative, intraoperative, and postoperative factors between conversion, primary and revision THA procedures[17]. Our study revealed that that conversion and revision THAs are more similar than conversion and primary THAs; there were many fewer significant differences in the patients' preoperative, intraoperative, and postoperative factors between conversion and revision hip arthroplasties than between conversion and primary hip arthroplasties[17]. Although conversion THA is currently associated with primary THA, these results may suggest that conversion and revision THA are more similar procedures in terms of complexity and outcomes. Therefore, the burden of conversion THA on the health system is more similar both in cost and resources to revision THA, and not to primary THA.

CONCLUSION

Conversion THA is a challenging procedure that requires more resources both intraoperatively and postoperatively than primary THA. Furthermore, patients undergoing conversion THA have poorer functional outcomes and success rates than patients undergoing primary THA. As such, these procedures should be planned to anticipate the greater needs in the OR, and for in-patient and follow-up care. Patients undergoing conversion THA should not be likened to patients undergoing primary THA when determining risk stratification and reimbursement rates. We suggest that conversion THA be reclassified in the same DRG with revision THA as a step towards better preparing for conversion hip arthroplasties, as well as for more accurate planning of institutional resource utilization.

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