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Early institutional experience and results of outpatient direct anterior hip replacement

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INTRODUCTION

Primary joint replacement surgeries have traditionally been associated with inpatient admission and observation. Previously, it was not uncommon for THA patients to be hospitalized for prolonged periods post-operatively to facilitate adequate pain control, supervised mobilization and early intervention if complications develop. In recent years, a trend of reducing length of inpatient stays has been observed.[1,2] This is due to increasing fast-track protocols being introduced worldwide allowing for optimisation of perioperative recovery, as well as refinements in surgical methods and improvement in pharmacologic regimens.[3] With reducing length of inpatient stays, there has been increased veering of interest towards evaluating the feasibility of outpatient total hip arthroplasty in recent years. This is in view of possible medical benefits to patients as well as reduction in healthcare costs and thus reduced burden on the healthcare system. While several definitional differences of 'outpatient' have been observed, due to differing terms of different hospitals, for the purposes of this study, the outpatient experience will be defined as a length of stay of <23 hours, in line with preceding literature.[4] The feasibility and safety of outpatient THA was not quantified and qualified until recently. In a recent study published by Gregg et al[5] involving 549 patients who underwent mini-posterior THA, it was demonstrated that same day discharge THA in an ambulatory surgical centre is safe, effective and reproducible. Other approaches to THA have gained increasing recognition, with one notable approach being the direct anterior approach (DAA). DAA THA has been shown in preceding literature to be associated with reduced pain, length of stay as well as operative time.[6,7] While there have been many of such studies describing feasibility of THA in an outpatient setting for selected patients, few have dwelled on DAA THA alone. We aim to describe our institution's initial experience and early results of DAA THA in an outpatient setting.

METHODS

This study was approved by our local institutional review board. A single-institution prospective cohort study was between October 2018 and October 2019 yielding 25 primary DAA THAs performed in an outpatient setting at an ambulatory surgical centre. 2 patients underwent bilateral DAA THA at different time periods, 25 primary DAA THAs were performed in an outpatient setting at an ambulatory surgical centre by a single fellowship trained surgeon. Retrospective analysis of prospectively collected data was performed. In this prospective cohort study, all patients were on follow up for radiographic and clinical diagnosis of unilateral or bilateral hip osteoarthritis. All included patients were on active follow up and deemed to have failed a trial of at least 6 months of conservative therapy including physiotherapy and oral analgesia. An ASA grade of 2 or lower was taken as criteria for selection. Charlson Comorbidity Index scores (CCI) were also collated. We ensured all patients had preoperative haemoglobin exceeding 10 mg/dL. Family support was explored during preoperative counselling, where we ensured that all recruited patients would have family available to care for them after the operation. The presence of at least one caregiver was required to qualify as having good family support. Selected patients were also required to have 1 caregiver present on the day of discharge as per ambulatory surgery regulations. This full-time caregiver was instructed and certified by an occupational therapist prior to discharge. Our enhanced recovery after surgery (ERAS) protocol involved preoperative joint classes by physiotherapists, occupational therapists and specialist nurses to prepare them for the day surgery. Patients were taught physiotherapy exercises and encouraged to install grab bars and anti-slip mats in the house. Our specialist nurses also prepared them for wound care.

All patients were assessed for surgical fitness by an anaesthetist at a minimum of 1 week prior to surgery with clinical history of existing co-morbidities, biochemical and

radiological investigations. Patients with abnormal bloodwork, such as preoperative anaemia, or abnormal imaging findings were referred to an internist for further evaluation and optimization before approval for surgery. For those suffering from significant cardiopulmonary issues, especially having undergone prior stent placement or bypass, a cardiologist was consulted to ascertain their cardiovascular fitness prior to surgery. Exclusion criteria include: 1) BMI above 35, 2) history of thromboembolic events such as deep vein thrombosis (DVT) or pulmonary embolism (PE), 3) significant cardiovascular impairment 4) known inflammatory arthritis, 5) active or suspected infection or sepsis and 6) previous surgery on affected hip.

All operations were performed by the same orthopaedic surgeon using the direct anterior approach to the hip joint. Pre-operative sizing of the femoral prosthesis is done with the aid of a templating software (TraumaCAD), and the hip checked for stability, impingement and limb length discrepancy.

On the day of operation, patients were given 200 millilitres of carbohydrate drinks 2 hours before operation to maintain fluid balance. Spinal anaesthesia was preferred and no blocks were given. IV 1g of Tranexamic acid and IV 8 mg Dexamethasone was given at induction. For the operative procedure, the patient was placed supine, with both legs cleaned and draped to facilitate limb length assessment. Incision for DAA was marked from anterior superior iliac spine extending down obliquely pointing towards lateral aspect of the patella. The tensor fascia lata (TFL) was identified by the presence of its bluish tinge and its overlying fascia was incised. The TFL muscle was then bluntly freed from its intermuscular and the ascending branches of the lateral femoral circumflex artery were identified and cauterised. The capsule was exposed by placing a retractor over anterior acetabulum, retracting the rectus femoris medially and excised. The femoral neck was exposed, and neck osteotomy performed in situ with no hip dislocation. Removal of the femoral head exposed the acetabulum. Reaming

was performed using a reamer 2 sizes smaller than the templated cup size. Cup placement was done with the assistance of image intensifier. 1 or 2 screws may be used depending on the quality of the bone. The femoral delivery was performed next by initially releasing the superior capsule while sparring the external rotators. The piriformis may be recessed in the case with severe chronic contractures, but the obturator interns was meticulously protected. The femur was externally rotated and adducted by passing the leg under the contralateral leg in a figure of 4 position. Femoral broaching was done until a good fit was achieved taking into account the templated size. Trial ball was placed, metal or ceramic, and the hip checked for stability, impingement and limb length discrepancy. For the acetabulum, a hemispherical porous Coated shell was used. For the femur, a fully Hydroxyapatite-coated tapered stem with metal or ceramic ball on polyethylene was utilised. The wound was then washed with diluted povidone iodine and a cocktail injection was given together with tranexamic acid injection into surrounding muscle. The peri-articular cocktail injection administered at closing included 100 mg Marcaine, 10 mg morphine, 50 mg ketorolac and 10 mg triamcinolone. Closure was done in layers with the use of absorbable barbed sutures. For wound dressing, we utilized Prineo dressing- Dermabond mesh. Aspirin 100mg was prescribed postoperatively for one week.

Postoperatively, the patients were reviewed by the physiotherapist at the ambulatory centre within same working day during the afternoon. Analgesia was optimised according to the principles of the World Health Organization (WHO) analgesic ladder, with a focus on ameliorating breakthrough pain. Intravenous Zofran and Maxolon were given immediate postop to reduce nausea. Patients were encouraged to increase oral fluid intake. The following discharge criteria were utilised: (1) Patient able to ambulate with walking aid independently (2) Pain score of 2 or less based on the visual analogue (3) Minimal Nausea. Patients who experienced significant postoperative nausea and vomiting (PONV) were lodge in an overnight

short stay ward (SSW) facility for them to rest and be discharged the next morning. No postoperative haemoglobin checks were performed. All patients were allowed to weight bear as tolerated and began home physiotherapy upon discharge. 100mg Aspirin every morning was prescribed for 1 month for deep vein thrombosis (DVT) prophylaxis. Patient were seen within two weeks from point of discharge in the outpatient physiotherapy department, where ambulation was assessed and reinforced. Clinical outcomes such as Oxford hip score (OHS), Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), and RAND-36 scores were assessed preoperatively and at 6 months postoperatively. All complications, readmissions, and reoperations were registered and analysed. Where applicable, amount and type of perioperative blood transfusions were also recorded.

RESULTS

60 cases of DAA were performed in our institution during the study period, of which 23 patients comprising 25 hips (2 cases of staged bilateral DAA) were shortlisted for outpatient direct anterior hip arthroplasty based on our inclusion and exclusion criteria. 23 patients were included for final analysis (Table 1). Mean age of our study participants was years 58.6 years ± 11.3 years. There were 14 (56%) men and 11 (44%) women. Mean body mass index was 26.0 ± 4.4 kg/m2. Charlson Comorbidity Index was collated, of which 21 patients had a score of 0 and 2 patients had a score of 1. Average blood loss was 296mls, with no blood transfusions required any of the patients. Out of 23 patients, 19 were discharged within 23 hours with mean duration of stay of 14.7 hours. The 4 cases who were converted to inpatient stay comprised of 2 patients who experienced significant post-operative dizziness and nausea on a background of known ENT conditions Benign paroxysmal positional vertigo (BPPV), and 2 patients who were

unable to be discharged due to social reasons. There was 1 case of stitch sinus, conservatively treated with antibiotics, which made an uneventful recovery 1 month post-op.

Mean operative time was 169 minutes and mean VAS score was 0.3 on discharge, down from 1.6 at recovery area. Mean ambulatory distance during same day physiotherapy exceeded 20m. All patients were ambulant with a walking stick on discharge. There were no readmissions noted. Our patients demonstrated a general improvement in all three hip scores (Oxford Hip Score, WOMAC Hip Osteoarthritis Index and Rand 36-Item Health Survey) 6 months after surgery, as demonstrated in Table 2.

DISCUSSION

To the best of our knowledge, this is the first Southeast Asian study to report on primary DAA THA in an outpatient setting. There have been increasingly satisfactory outcomes reported in outpatient joint THA in recent years. Outpatient joint replacement confers various benefits such as reduced exposure to multi-resistant hospital organisms, reduced risk of nosocomial infection, and economical benefit.[8,9]

The topic of outpatient THA was first covered by Berger et al in 2004,[10] where successful results for 97 patients who underwent outpatient THA and same-day discharge were attained. There have since been a number a small-scale case series reporting its feasibility, until a recent study by Nelson et al[11] retrospectively reviewed prospectively collected data from the 2005-2014 American College of Surgeons National Surgical Quality Improvement Program Database, identifying 63,844 THA patients. It was demonstrated that patients undergoing outpatient instead of inpatient THA were not at greater risk of 30 days adverse events or readmission. The outpatient group was also noted to have lower readmission rates. However, there appeared to be a gross disparity in numbers between inpatient and outpatient groups, with the

inpatient group consisting of 63,424 subjects (99.34%). The approach of THA was not specified but was likely to be varied considering data was gathered from 517 participating hospitals in the US.

While there have been many studies describing feasibility of THA in an outpatient setting for selected patients, few have dwelled on DAA THA alone. One such notable study is a multicentre, randomised study conducted by Nitin et al[12] in the USA, involving 220 participants, where it was demonstrated that there was no significant difference in visual analog scale (VAS) pain scores between the inpatient and outpatient groups that underwent DAA THA. In addition, there was no difference in reoperation, readmission rates or visits to emergency department postoperatively. Another study conducted in the US, by Toy et al demonstrated that same-day discharge to home following THA can be safely done without increased complications, readmissions, reoperations, or emergency room visits.[13]

In our present study, 82% of patients were discharged within same day of surgery as intended. All immediate outcome measures had improved significantly, and no major complications were observed. This is consistent with the 2 previous studies conducted. There have been notable concerns of complications highlighted in preceding total hip literature. The most common early postoperative complications include thromboembolic events, hematoma formation, heterotopic ossification, nerve injury and fractures.[14] Proponents may argue thus argue that outpatient THA may be less feasible in view of risk of missing early complications.

However, in 2018, Berend et al[15] studied 1472 cases of outpatient THA and found that only 0.3% experienced major complications within 48 hours. The low rate of major complications addresses this concern. The findings are also is in line with our results which show absence of significant complications in our current study group. The success of DAA THA requires meticulous planning, starting from initial consultation in the outpatient clinics. A

cohesive multi-disciplinary team well-versed in outpatient THA will aid in optimization of care perioperatively.

Limitations of this study include the lack of a matched control group. However, the focus of this study was descriptive in nature with a main aim of evaluating feasibility of outpatient direct anterior hip arthroplasty in our local setting. Further comparative studies should be conducted to evaluate and compare outcomes between conventional and outpatient DAA THA.

There may be future benefit in evaluating through future prospective randomized clinical trial, if there is any significant difference in postoperative results between inpatient and outpatient surgery for DAA THA.

In conclusion, outpatient DAA THA appears to be a feasible surgical procedure in selected patients that can provide satisfactory results up to 3 months postoperatively with no major complications observed.

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Table 1. Demographic and Anthropometric Data in Mean (SD) where applicable or n (%) (n=23)	
Variables	**Mean ± SD (where applicable)**
Age (Years)	58.6 ± 11.3
BMI	26.0 ± 4.4
ASA	ASA 1: 4 patients
	ASA 2: 19 patients
CCI Score	CCI Score of 0: 21 patients
	CCI Score of 2: 2 patients
Mean duration of surgery (minutes)	169 ± 34.5
Average blood loss (mls)	296
Transfusion Rate (%)	0
Conversion To Inpatient, n (%)	4 (16%)
Mean duration of stay for non-converted cases (hours)	14.7 ± 5.2
Mean hours of stay inpatient before discharge for converted cases (hours)	47.8 ± 2.1
Orthopaedic Complication Rate	1 case of stitch sinus, treated with antibiotics (4%)
Readmission rate (%)	0
Reoperation Rate (%)	0

ASA = American Society of Anesthesiologists physical status score; BMI: body mass index; CCI = Charlson Comorbidity Index; SD: standard deviation

Table 2: Statistical Analysis Of Functional Outcome Scores						
Functional Outcome (Mean) (SD)	OHS	WOMAC (Pain)	WOMAC (Stiffness)	WOMAC (Physical)	RAND-36 (PCS)	RAND-36 (MCS)
Preoperative	39.6 (8.9)	41.8 (22.0)	40.6 (25.5)	45.1 (25.5)	30.2 (9.4)	43.6 (13.7)
Postoperative (6 months)	14.1 (2.5)	98.8 (2.7)	91.5 (16.7)	95.3 (5.4)	51.4 (5.1)	59.2 (12.3)
p-value (by paired t test)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

OHS: Oxford Hip Score; WOMAC: Western Ontario and McMaster Universities Osteoarthritis Index; RAND-36: RAND-36 Measure of Health-Related Quality of Life; PCS: Physical Component Summary; MCS: Mental Component Summary