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ABLE◊ Advanced Anterior Approach for total hip arthroplasty (THA): a single-centre case series of over 6,000 patients

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Summary

- The ABLE Advanced Anterior Approach is a minimally invasive, muscle-sparing approach, with no barriers to adoption, complementing the value-based care system of limiting healthcare dollar spend while maintaining or improving outcomes for patients
- Performed in the supine or lateral position, ABLE Advanced Anterior Approach allows the surgeon to transition to the surgical approach with which they feel most comfortable
- From a large retrospective analysis (n=6,251), the ABLE Advanced Anterior Approach has been shown to be efficient and effective with minimal complications, good outcomes and high patient satisfaction
- This report summarises unpublished findings from a Smith+Nephew sponsored study[1]

Introduction

ABLE Advanced Anterior Approach is a muscle sparing, minimally invasive THA surgical approach. With this approach, the hip is replaced through an interval between the anterior border of the gluteus medius and the posterior border of the tensor fascia lata (Figure 1). It can be performed with the patient in the supine or a lateral decubitus position. This surgical approach was first described by Sayre in 1854 who utilised the interval for the treatment of a sequela of septic arthritis in a 9-year old patient.[2]

The surgical approach has been modified, first by Watson-Jones[3] and more recently by Bertin and Rottinger[4] who placed the patient in the lateral decubitus position with the surgeon standing in front of the patient. This intermuscular interval through a small incision provides good exposure for THA: it preserves muscle integrity facilitating rapid rehabilitation and, with the posterior capsule remaining intact, posterior dislocation rates are greatly reduced.[5]

The ABLE Advanced Anterior Approach has been adopted by three surgeons at the Maine Medical Centre, Maine, USA for several years. This report summarises a retrospective analysis of a case series of unilateral THA patients in which this approach was used.

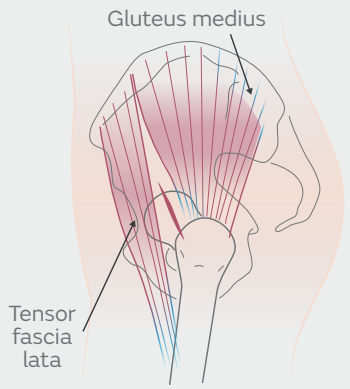

Figure 1. ABLE Advanced Anterior Approach: an approach using the interval between the anterior border of the gluteus medius and the posterior border of the tensor fascia lata

Study overview

Retrospective analysis of primary, unilateral THA performed using the ABLE Advanced Anterior Approach by three surgeons at a single centre between January 2013 and August 2020.

Major outcomes included: surgical time, blood loss, transfusion, pain medication requirements, length of stay, discharge destination and home health utilisation, complications (dislocations, infections, periprosthetic fractures), 30-day emergency department (ED) rate, 90-day unplanned readmission rate and patient reported outcome (PROM) data. All THAs were performed with the patient in the lateral position.

The surgical technique for this approach is described in the ABLE Advanced Anterior Approach surgical guide.[6]

Patient demographics

Over the 7-year period, 6,251 primary unilateral THAs were performed using the ABLE Advanced Anterior Approach by three surgeons (surgical volume: surgeon A, 3,449; surgeon B, 1,529; surgeon C, 1,273). Patient demographics are summarised in Table 1. Mean BMI was 29.4kg/m^2 (median, 28.4; range 14.3–64.6), although 40.2% were classified as 'Obese' (BMI >30kg/m^2). The majority of patients underwent THA due to osteoarthritis (98.2%, n=6,139), other pre-operative diagnoses included avascular necrosis (1.4%, n=87), dysplasia (0.2%, n=10), post-traumatic arthritis (0.1%, n=8) and rheumatoid arthritis (0.1%, n=7).

Table 1. Patient demographics

	Value
Age in years (mean±SD)	65.3±10.2
Female/male (%)	55/45
BMI (mean±SD; kg/m^2)	29.4±6
Mean ASA rating (±SD)	2.1±0.5

Results

Length of surgery

The mean length of surgery (incision start to incision close) was 65 minutes. There was variation between surgeons; surgeon-specific average length of surgery was 57 minutes, 65 minutes and 84 minutes. One surgeon takes an intra-operative x-ray which can account for the deviation from the average. These data suggest a reproducible and time-efficient technique.

Blood loss and transfusion

Mean intraoperative blood loss per patient was 204ml. The range of volumes was 20–750ml. With a minimally invasive procedure, not encountering the lateral circumflex femoral artery, and an achievable operating time of approximately 1 hour, the ABLE◊ Advanced Anterior Approach optimises blood conservation. Overall, only 0.5% of patients received a transfusion within 7 days of their index surgery, increasing slightly to 0.7% within 90 days.

Length of stay (LoS) and discharge destination

Mean LoS was 1.4 days (33.1 hours), with very small variation between surgeons (1.3, 1.4 and 1.5 days) and essentially no variation over the years. Mean LoS was reported as 1.4 days consistently between 2013 and 2019 with a reduction in LoS to 1.2 days in 2020. ABLE Advanced Anterior Approach allows for immediate weight-bearing and therefore patients complete required physical therapy immediately following surgery and are cleared ready for discharge when medically appropriate.

Overall, 93.4% of patients were discharged home, 5.6% were discharged to a skilled nursing facility and 1.0% to a rehabilitation facility, (Figure 2). Of the patients discharged home, only 32.8% utilised home health services. Between 2013 and 2020, there was very little variation in the mean number of patients discharged home (range 92.2 to 97.6%).

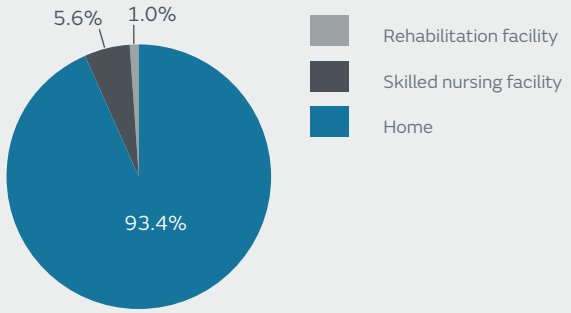

Figure 2. Discharge destination following THA using the ABLE Advanced Anterior Approach

Complications

Overall, 1.9% of patients visited an ED within 30 days of their surgery and 2.9% of patients were readmitted to the hospital within 90 days of surgery. Of the patients readmitted, 56% of patients had a direct admission to the hospital that was unplanned prior to their THA and 44% were admitted from the ED.

These relatively low rates show that despite a short LoS and high rate of discharge home, the majority of patients did not require unplanned care via the ED or readmission, an important consideration in the age of value-based care.

Intraoperative and postoperative complication rates were low (Figure 3). Overall, 0.29% of patients sustained an intraoperative fracture; 0.26% sustained a calcar fracture and 0.03% a greater trochanter fracture. Using the Centers for Medicare and Medicaid Services (CMS) definition, postoperative complications were experienced by 1.22% of patients: 0.11% had a dislocation; 0.19% had a deep joint infection; 0.11% had a superficial wound infection requiring an irrigation and debridement under anaesthesia.

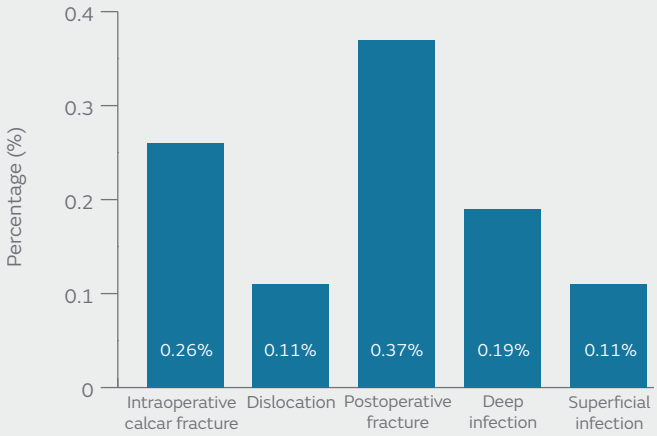

Figure 3. Major intraoperative and postoperative complications within 90 days of THA

Patient reported outcomes measures (PROMs)

Compared to baseline data, patients reported improved hip function, reduced pain and increased activity level following THA with the ABLE Advanced Anterior Approach (Table 2). They also reported high satisfaction.

Table 2. PROMs data summary (mean values)

Patient reported outcome measure	Pre-operative	6 weeks	1 year
HOOS Jr interval score (range: 0–100)	41.0	76.5	88.0
VAS Pain (range: 0–10)	5.6	1.5	0.9
SANE (range: 0–100)	41.6	77.1	90.2
UCLA activity score (range: 0–10)	4.3	4.9	6.4
Pain satisfaction (range: 0–10)	N/A	8.9	9.4
Functional improvement satisfaction (range: 0–10)	N/A	8.6	9.3
Meeting expectations satisfaction (range: 0–10)	N/A	9.0	9.4

Abbreviations: HOOS Jr (hip disability and osteoarthritis outcome score, joint replacement); VAS (visual analogue scale); SANE (single assessment numerical evaluation; UCLA (University of California, Los Angeles)

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29218-en V1. Published March 2021.

✚ Evidence in focus

Benefits to surgeons and patients

As patients increasingly expect more from their THA surgery, an advanced anterior approach may meet the needs of patients requesting a minimally invasive surgery. Shorter recovery times and expedited rehabilitation allow patients to return to everyday life, without compromising the long-term outcome. The key benefits of ABLE◊ Advanced Anterior Approach to surgeons and patients seen in this study are summarised in Table 3.

Table 3. Key benefits of ABLE Advanced Anterior Approach for surgeons and patients

Surgeon	Patient
Standard surgical table	No hip precautions
Can be performed supine or lateral	High stability
No weight/BMI limitations: in lateral position pannus falls forward providing better visualization	Low blood loss, low transfusion rate
May be performed with the use of fluoroscopy (supine only)	Short hospital stay with high rate of discharge to home
Allows for intra-operative range of motion testing	High pain satisfaction score
No restriction on implant design, including reamed or cemented implants	High patient satisfaction

Study considerations

This is a single institution database, therefore complications and/or readmissions from non-Maine Health hospitals are not included in this study. The study was sponsored by Smith+Nephew. This report summarises unpublished findings (EO.REC.PCSgen.001.v1).

Conclusions

The ABLE Advanced Anterior Approach facilitates correct placement of implants through a minimally invasive, muscle-sparing approach, **driving efficiencies, with few complications and no barriers to adoption**.

This **high-quality, low-cost** approach is ideal to consider during the current era of value-based care. ABLE Advanced Anterior Approach can be **performed either supine or lateral**, with or without fluoroscopy, using any femoral and acetabular components. This allows **considerable flexibility** for a surgeon adopting the approach.

Ethics approval and consent to participate

Ethical approval for the conduct of this work was reviewed by the local Institutional Review Board (IRB) at Maine Medical Center, and determined to be exempt, effective September 17 2020.

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29218-en V1. Published March 2021.