

Anterior Approach Hip Replacement Surgery Yields Increased Volume and Reduced Resource Utilization

A Case Study from St. Mark's Hospital (Salt Lake City, UT)

Greater Efficiencies With Anterior Approach

In 2006, St. Mark's Hospital in Salt Lake City, Utah introduced the Anterior Approach to hip replacement surgery, also known as total hip arthroplasty (THA). This White Paper is a case study highlighting the cost and time efficiencies experienced by St. Mark's Hospital as it transitioned 91% of its conventional hip replacement surgeries to the Anterior Approach by the end of 2009.

The case study explains the Anterior Approach, and details the hospital's strong commitment to this technique. As a result of their commitment, St. Mark's experienced a 72% increase in the monthly volume of hip replacement surgeries since the introduction of the Anterior Approach (Table 1), reversing a multi-year decline in volume for THA.

With its increased visibility as a go-to institution for hip replacement surgery, St. Mark's has observed significant improvements in patient satisfaction, and less post-operative resource consumption, leading to increased contribution margins per case.

Table 1: Increased Monthly Volume Of THA

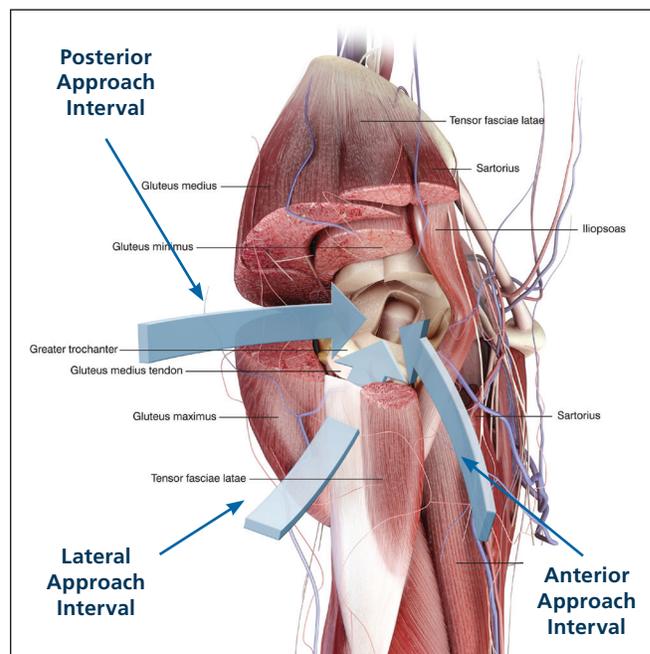
	2006	2009	% Change
Anterior Approach	2.4	28.2	1,008%
Traditional	14.8	1.3	(91%)
Total	17.2	29.5	72%

Source: St. Mark's Hospital

What Is The Anterior Approach?

The Anterior Approach is a minimally invasive tissue-sparing surgical procedure that exposes the hip with one small incision on the anterior of the hip and allows the surgeon to work between the muscles and tissues without detaching them from either the hip or thighbone.¹ The procedure can be performed on a hana® orthopedic table, which is designed to improve access and help achieve alignment and positioning of the implant. The same prostheses that are used for a traditional hip replacement are used for the Anterior Approach, but implants with a design that enables the Anterior Approach, including a reduced lateral shoulder, a broach only femoral preparation and instrumentation designed to facilitate the Anterior Approach are available. The CORAIL® Total Hip System is used by the Anterior Approach surgeons at St. Mark's Hospital.

Figure 1: Anterior Approach



Source: DePuy Orthopaedics

With this technique, a wide range of patients of all ages—including patients with higher BMIs—may be candidates for this tissue-sparing procedure.

The Opportunity: Anterior Approach Advantages

With the number of primary hip replacements estimated at approximately 200,000 annually in the United States, and this number expected to grow,² the Anterior Approach offers significant advantages to hospitals and patients. For St. Mark's Hospital, the goal was to implement the Anterior Approach as a driver of increased volume of hip replacement surgeries, thereby enhancing its reputation in the community as a provider of high quality orthopedic services and a leading regional center for the operation.

In pursuing this objective, the hospital saw an opportunity for:

- Less post-operative resource consumption as compared to traditional methods
- Engaging orthopedic surgeons in a state-of-the-art procedure that could meet increasing patient volume
- Potentially less painful recovery for patients, compared to traditional approaches as measured by improved post-operative pain scores

- Patients experiencing potentially less blood loss and possibly less scarring due to smaller incision size
- Improved patient activity level six weeks post-surgery, such as stair climbing, walking unlimited distances, and walking without assistive devices
- Improved cost predictability

The Solution

The decision to implement the Anterior Approach at St. Mark's Hospital was largely surgeon-driven as the surgeons strongly believed that this approach would lead to reduced recovery time and improved recovery. No other institution in the Salt Lake City area offered the technique at that time (2006).

To understand the impact that offering the Anterior Approach would mean to St. Mark's, the hospital set about working with the operating room (OR) staff to analyze outcomes, in terms of impact on the organization, throughput of patients in the OR, and time needed to turnover the room. There was also discussion around how the Anterior Approach could advance market share and enhance the hospital's reputation as an outstanding provider of orthopedic services. Lastly, the hospital considered the financial impact of offering the Anterior Approach. After completing the analysis, the hospital purchased its first hana table, and within the next year, purchased a second table.

The Results

St. Mark's Hospital realized measurable benefits from its increased use of the Anterior Approach. As shown in Tables 2-4, there were significant improvements in:

- Contribution margins (Table 2)
- Limited variable costs per procedure (Table 3)

Table 2: Contribution Margins/Case: 2006 vs. 2009

Approach	2006	2009	% Change
Anterior	44.8%	49.6%	10.7%
Traditional	44.5%	44.3%	(-0.4%)
Total Contribution Margin/Case	44.5%	49.4%	11%

Source: St. Mark's Hospital

- Reduction in operating room (OR) time utilization (Table 4)

Table 2 depicts an 11% rise in total contribution margin/case over the three-year time frame. It is noteworthy that there was also a doubling in contribution margin for Medicare patients who underwent THA using the Anterior Approach. In 2006, contribution margin per case for Medicare patients was 12%, surging to 24.8% in 2009. In contrast, those patients receiving

Table 3: Variable Cost (\$) per Case

Approach	2006	2009	% Change
Anterior	8,966	9,030	1.0%
Traditional	8,096	9,985	23.0%

Source: St. Mark's Hospital

THA via traditional methods represented a decline in contribution margin per case, specifically 23.5% in 2006, sliding to 10.3% in 2009.

Table 3 illustrates how the Anterior Approach helps St. Mark's control and estimate costs per procedure.

There are several reasons for the consistency in cost per case for surgeries using the Anterior Approach (1%) while large swings typified the traditional cases (23%). The key reason is that as volume grew and once the Anterior Approach reached maturity at St. Marks, the case mix changed. The majority of procedures utilized the Anterior Approach, including procedures for patients with comorbid conditions because the surgeons at St. Mark's found their recovery to be less eventful with the Anterior Approach versus the traditional approach. Further, traditional cases tended to be longer, requiring more OR time and longer lengths of stay.

An additional reason for stability in variable cost with the Anterior Approach is that over time, surgeons became increasingly familiar with the procedure. Variable cost stability is particularly meaningful as the cost of supplies rose over the three-year period.

Table 4 shows the reduction in OR time utilization for Anterior Approach cases, but an increase for traditional techniques. This can be explained by the increased proficiency of the surgeons performing the Anterior Approach.

Table 4: Operating Room Time Utilization: (Avg Hours/Case)

Approach	2006	2009	% Change
Anterior	2.91	2.50	(14%)
Traditional	2.50	3.10	24%

Source: St. Mark's Hospital

In addition to these statistics generated by St. Mark's Hospital, staff surgeons Michael H. Bourne, M.D., and E. Marc Mariani, M.D., performed an outcomes analysis with data from October 2003 to March 2008.³ They compared post-operative results from patients receiving the Anterior Approach for THA to patients receiving a traditional anterolateral procedure. In contrasting the two surgical approaches, 214 Anterior Approach procedures in 201 patients to 259 anterolateral surgeries in 238 patients, results showed statistically significant superior outcomes for the Anterior Approach at six weeks, six months, and one year post-operatively (Tables 5-6)³. Outcomes measured included:

- Harris Hip scores
- Pain
- Ambulation
- Need for support devices
- Use of stairs without banister
- Ability to don socks and shoes
- Full activity

Additional Benefits

St. Mark’s Hospital broad implementation of the Anterior Approach was based on an institution-wide goal of achieving greater predictable cost and time efficiencies for hip replacement procedures while simultaneously boosting volume. This venture has proven successful as evidenced by:

1. The growth in margins/case
2. A reduction in OR utilization time
3. Predictable and stable cost/case
4. Improved patient outcomes

In addition to these benefits, there have been other benefits for St. Mark’s, including:

- Creation of a local/regional market niche for Anterior Approach to THA
- Improved patient satisfaction
- Shorter average length of stay
- No change in nosocomial infection rates or other complications have been observed

Going forward, St. Mark’s seeks to expand the number of THAs using the Anterior Approach, focused on patients under the age of 65, a strong growth market for this procedure. Table 7 shows an analysis of the age range of patients receiving THA at St. Mark’s between 2007 and 2009. There is high growth opportunity in the under age 65 demographic and stability in the 65+ age group. Interest in the Anterior Approach by younger patients may be due to the possibility of faster return to activities of daily living and earlier return to work because of a potentially shorter recovery period.⁴

Table 7: Volume of Anterior Approach Cases by Age Group

Age Group	2006*	2007	2008	2009	%Change From 2007-2009
Under Age 65	5	104	131	159	53%
> Age 65	5	179	171	179	0
Total	10	283	302	338	

* Anterior Approach introduced at St. Mark’s Hospital
Source: St. Mark’s Hospital

Table 5: Post-Operative Summary Statistics at Six Weeks (p<0.0001 for each measure)

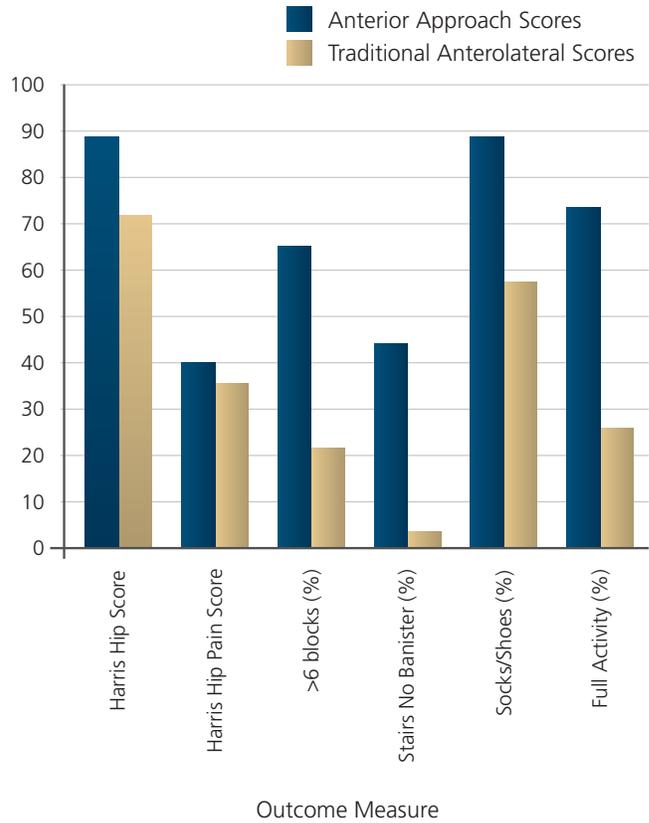
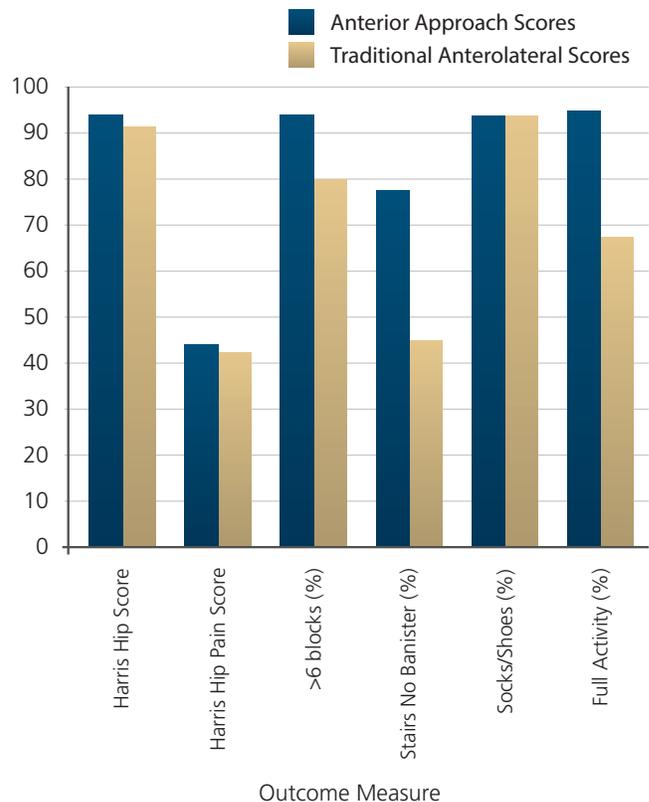


Table 6: Post-Operative Summary Statistics at One Year



References:

1. DePuy Orthopaedics, Anterior Approach Surgery, www.hipreplacement.com
2. Kurtz, Steve; Ong, Kevin; Lau, Edmund; Mowat, Fionna; Halpem, Michael; Projections of Primary and Revision Hip and Knee Arthroplasty in the United States from 2005 to 2030; Exponent Inc., Philadelphia, Pennsylvania, *J Bone Joint Surg Am.* 2007;89:780-5
3. Bourne MH, Mariani EM. A comparison Between Direct Anterior Surgery of the HIP (DASH) and Anterolateral (AL) Surgical Approaches to Total Hip Arthroplasty: Postoperative Outcomes, Salt Lake City Orthopaedic Clinic, DePuy Orthopaedics, AAOS 2010, New Orleans, LA, Poster #014.
4. Kehlet H, Wilmore DW. Multimodal strategies to improve surgical outcome, *Am J Surg June 2002*;183:630-41.

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