

Anterior Approach

Evidence Summary

In-Hospital Outcomes with Anterior Versus Posterior Approaches in Total Hip Arthroplasty: Meta-Analysis of Randomized Controlled Trials²

Miller LE, Kamath, AF, Boettner F, and Bhattacharyya SK. *Journal of Pain Research*. 2018 July. 11: 1327-1334

A meta-analysis of 7 randomized controlled trials (RCTs) including 609 patients compared in-hospital and recovery outcomes between anterior approach (AA) and posterior approach (PA) in primary total hip arthroplasty (THA).

Compared to PA, AA patients experienced:

- **significant reduction in hospital stay** (0.5 day shorter stay; $p=0.01$; 5 studies)
- **1.4 cm shorter incision** ($p=0.045$; 5 studies)
- **reduction in pain** (0.5 points lower on 0-10 pain scale; $p=0.007$; 2 studies)
- **reduction in opioid use** (SMD=-0.39 corresponding to 12 fewer morphine equivalents per day, $p=0.01$; 2 studies)

Although AA was 16 minutes longer than PA ($p=0.002$) no significant differences were observed in operative blood loss, blood transfusions, and hospital complications.

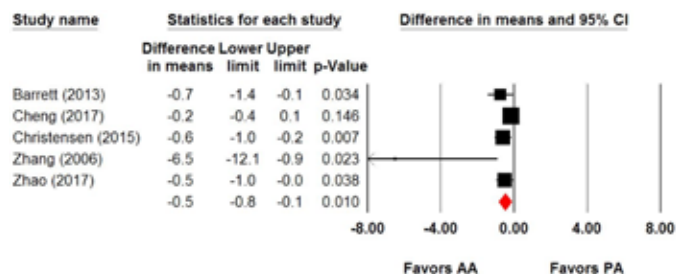


Figure 1. Hospital length of stay (days) with AA vs. PA in primary THA. Note a negative difference in mean indicates a more favourable outcome for AA compared to PA

Conclusion

The results of this study demonstrate AA patients experience slightly less pain, require less opioid medication, and leave the hospital earlier.

Does Surgical Approach Affect Outcomes in Total Hip Arthroplasty Through 90 Days of Follow-Up? A Systematic Review with Meta-Analysis¹

Miller LE, Gondusky JS, Bhattacharyya S, Kamath AF, Boettner F, Wright J. *Journal of Arthroplasty*. 2018. 33(4):1296-1302.

The objective of this meta-analysis was to compare postoperative outcomes through 90 days in AA compared to PA THA. 13 prospective comparative studies were included in this review; 7 of the which were RCT's. A total of 1044 patients were included in this meta-analysis.

Compared to PA, AA had significantly favourable postoperative outcomes through 90 days. A similar pattern was observed following sensitivity analyses.

Patients undergoing AA experienced:

- **reduced pain severity** (SMD = -0.37 (95%CI -0.52, -0.21); $P<0.001$)
- **fewer narcotics consumed** (SMD = -0.36 (95%CI -0.60, -0.13); $p=0.002$)
- **better hip function** (SMD 0.31 (95%CI 0.11, 0.51); $p=0.002$)

Over 90 days of follow-up, no statistical differences in complication rates were detected between AA and PA.

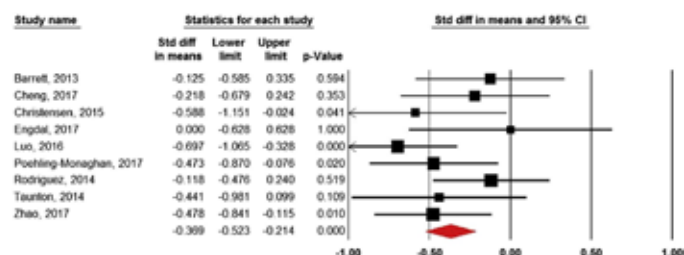


Figure 2. Pain severity in recovery of anterior v posterior approach in primary THA. Negative Standardised Mean Difference (SMD) indicates less pain severity

Conclusion

In this study comparing postoperative outcomes through 90 days, patients treated with AA reported better hip function, less pain and consumed fewer narcotics. Furthermore, no statistical differences in complication rates were detected between AA and PA.

ANTERIOR ADVANTAGE™

A defined solution for the Anterior Approach

Key message: Comparative Findings

Compared to posterior approach, anterior approach is associated with

IMPROVED SHORT-TERM OUTCOMES AND FASTER RECOVERY

Several studies showed that compared to the posterior approach, ANTERIOR ADVANTAGE is associated with:^{4,5}

27.8%

reduction in hospital LOS

(70 ± 3.3 vs. 97 ± 5.5 hours,
p < 0.001)¹⁰

58%

lower pain score at
2-week follow-up

(2.2 vs 5.2 p<0.001)⁹

30.8%

lower narcotic usage on
post-operative days 1-3

(101 ± 12 vs. 146 ± 12 morphine
equivalent dose, p = 0.010)¹⁰

ANTERIOR ADVANTAGE CLINICAL RESULTS

EQUIVALENT 5-YEAR SURVIVORSHIP

Registry data from Australia and Norway demonstrate no statistical difference in survivorship rates between Anterior Approach and posterior approach at 3 and 5-year follow-up respectively.^{6,7}

REGISTRY DATA

LOWER RISK PROFILE

Meta analysis findings showed that compared to posterior approach, Anterior Approach is associated with:

35%

Lower risk of
dislocation

(RR=0.65, p=0.03)³

16%

Lower risk of
reoperation

(RR=0.84, p<0.001)³

ANTERIOR APPROACH META ANALYSES FINDINGS

REDUCED COST OF CARE

Anterior Approach decreases in-hospital and post acute care costs compared to other approaches^{5,8}

\$6,206[^] Cost savings per patient at 90 days with anterior approach compared to the cohort of all other THA.⁸

ANTERIOR APPROACH RESULTS

Influence of Surgical Approach on Complication Risk in Primary Total Hip Arthroplasty: A Systematic Review and Meta-Analysis³

Miller LE, Gondusky JS, Kamath AF, Boettner F, Wright J, Bhattacharyya S. *Acta Orthop.* 2018 Feb. 89(3): 289-294

The objective of this meta-analysis was to compare the complication risk with at least 1 year mean follow up for AA compared to PA THA. 19 studies consisting of 164,307 patients were included.

Compared to the PA, AA is associated with:

- **45% lower rate of infection**
(RR=0.55, p=0.002 from 7 studies)
- **35% lower rate of dislocation**
(RR=0.65, p=0.03 from 11 studies)
- **16% lower rate of reoperation**
(RR=0.84, p<0.001 from 16 studies)

AA was associated with a higher rate of patient-reported nerve injury from 2 studies, which was described as patient-reported sensory deficit or patient-reported nerve injury with no distinction between sensory or motor involvement.

Outcome	Effect Size Rate Ratio	Lower CI	Upper CI	P-Value
Infection (7 Studies)	0.55	0.38	0.8	0.002
Thromboemboli Even (4 Studies)	0.59	0.14	2.43	0.5
Heterotopic Ossification (4 Studies)	0.63	0.35	1.13	0.1
Dislocation (11 Studies)	0.65	0.44	0.95	0.03
Reoperation (16 Studies)	0.84	0.75	0.93	<0.001
Wound (5 Studies)	0.93	0.54	1.63	0.8
Fracture (10 Studies)	1.02	0.75	1.38	0.9
Nerve Injury (2 Studies)	2.31	1.22	4.39	0.01

Table 1. Complication rates with anterior versus posterior approach in primary total hip arthroplasty; expressed as a risk ratio (RR).

Note: RR>1 indicates higher complication incidence rate with anterior approach; RR<1 indicates lower complication incidence rate with anterior approach

Conclusion

The results of this study comparing PA and AA at greater than 1 year follow up highlights AA in THA is associated with lower risk of reoperation, dislocation, and infection, but a higher risk of patient-reported nerve injury.

In-Hospital Cost Analysis of Total Hip Arthroplasty: Does Surgical Approach Matter?⁴

Petis SM, Howard JL, Lanting BA, Marsh JD, and Vasarhelyi EM. *Journal of Arthroplasty.* 2016. 31(1): 53-58

This study investigated the impact of surgical approach on the costs of THA from a hospital perspective in a publicly funded healthcare system. A micro costing approach was used to prospectively record costs of operating room time, length of stay, and medical and surgical interventions using. This cost data was obtained for the ANTERIOR ADVANTAGE, PA and lateral approach (LA). The paper concluded that compared to PA and LA; ANTERIOR ADVANTAGE significantly lowered the total cost of THA.

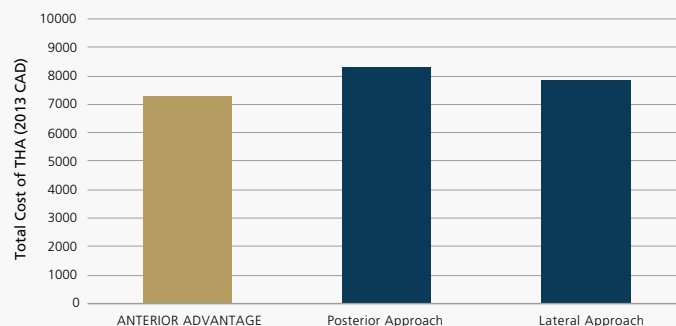


Figure 3. Total cost per procedure by approach

Medical resource utilization and costs for total hip arthroplasty: benchmarking an anterior approach.⁸

Kamath AF, Chitnis AS, Holy C, Lerner J, Curtin B, Lochow S, DeCook C, & Matta JM. (2017). *Journal of Medical Economics.* 21(2): 218-224 technique in the Medicare population

This study based on the Medicare population benchmarked healthcare resource utilization and costs for patients with THA via the ANTERIOR ADVANTAGE relative to a matched cohort that considered all approaches. The authors concluded the ANTERIOR ADVANTAGE is associated with significantly lower in-hospital and post-acute care costs when compared to PA and LA.

Conclusion

The consistent results reported in both these cost analysis studies demonstrates the positive impact of AA on hospital costs and resource use.



Anterior Approach

Total hip arthroplasty (THA) is a clinically successful and cost effective procedure with patients typically experiencing meaningful improvements in function and pain severity.¹ The shift towards value-based healthcare and the need to deliver more in a financially constrained environment means healthcare providers are increasingly looking for ways to improve outcomes and the cost effectiveness of procedures.

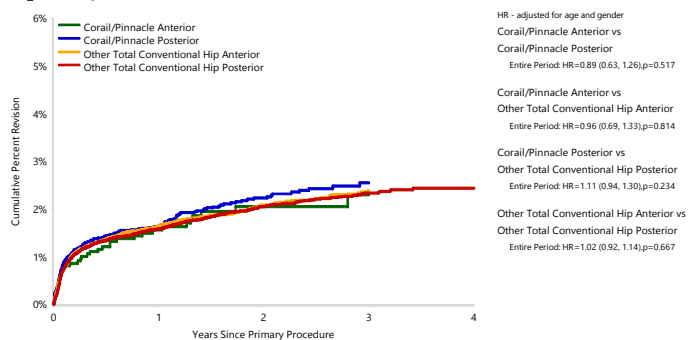
The Anterior Approach is a surgical approach which allows surgeons to work between the muscles and tissues without the need to release any muscles or tendons from the pelvis or femur. An increasing body of evidence suggests the Anterior Approach supports faster recovery,^{1,2} improvements in short term outcomes^{1,3} and reductions in the total cost of care,^{4,5,8} while also showing equivalent mid-term survivorship.^{6,7}

ANTERIOR ADVANTAGE™ is a defined solution for the Anterior Approach, inclusive of DePuy Synthes hip implant products, instrumentation, enabling technologies, and world class professional education. These resources are designed to help decrease the learning curve, increase OR efficiencies and surgical reproducibility, with the goal of better patient outcomes. As a defined solution for the Anterior Approach, ANTERIOR ADVANTAGE delivers the clinical benefits of Anterior Approach¹⁻³ with measurable reductions in narcotics consumption and pain compared to traditional approaches.¹⁰

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2. Miller LE, Kamath AF, Boettner F, Bhattacharyya SK. In-hospital outcomes with anterior versus posterior approaches in total hip arthroplasty: meta-analysis of randomized controlled trials. *Journal of Pain Research*. 2018 Jan 1;11:1327-34.
3. Miller LE, Gondusky JS, Kamath AF, Boettner F, Wright J, Bhattacharyya S. Influence of surgical approach on complication risk in primary total hip arthroplasty: Systematic review and meta-analysis. *Acta orthopaedica*. 2018 May 4;89(3):289-94.
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Figure 1: Cumulative Percent Revision of Primary Total Conventional Hip Replacement by Model (Primary Diagnosis OA)



HR - adjusted for age and gender
 Corail/Pinnacle Anterior vs
 Corail/Pinnacle Posterior
 Entire Period: HR=0.89 (0.63, 1.26), p=0.517

Corail/Pinnacle Anterior vs
 Other Total Conventional Hip Anterior
 Entire Period: HR=0.96 (0.69, 1.33), p=0.814

Corail/Pinnacle Posterior vs
 Other Total Conventional Hip Posterior
 Entire Period: HR=1.11 (0.94, 1.30), p=0.234

Other Total Conventional Hip Anterior vs
 Other Total Conventional Hip Posterior
 Entire Period: HR=1.02 (0.92, 1.14), p=0.667

Number at Risk	0 Yr	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs	6 Yrs	7 Yrs
Corail/Pinnacle Anterior	2216	1468	794	276	0	0	0	0
Corail/Pinnacle Posterior	8079	5908	3520	1274	3	2	0	0
Other Total Conventional Hip Anterior	26171	18201	10533	3979	17	1	0	0
Other Total Conventional Hip Posterior	50424	35448	20355	7697	57	23	4	2

Note: Procedures using metal/metal bearings are excluded

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