

# Effect Technology has on Short-Term Outcomes in Total Hip Arthroplasty

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## INTRODUCTION:

The utilization of technology in total hip arthroplasty (THA) has significantly increased over the years. However, conflicting data exists regarding the effect of robotic- and computer-assisted surgery (CAS) on short-term clinical outcomes. The aim of this study was to describe the effect of different surgical preferences on postoperative outcomes following THA.

## METHODS:

A total of 13,268 patients who underwent primary THA from January 2016 - December 2022 were retrospectively reviewed. Three cohorts were created based on the utilization of technology: robotics, manual (no technology), and CAS. Patient demographics and short-term outcomes data, including Activity Measure for Post-Acute Care (AM-PAC) scores, a validated tool used to quantify postoperative recovery, was collected and analyzed using ANOVA and multivariate logistic regressions.

## RESULTS:

A total of 1,402 robotic-assist (10.6%), 7,213 manual (54.4%), and 4,653 CAS (35.0%) cases were included in our analysis. Mean lengths of stay (LOS) favored robot-assisted over manual and CAS cases (42.04 vs. 67.71 vs. 42.31 (hours);  $p < 0.001$ ), as did patient discharge to home (95.5 vs. 87.9 vs. 93.1%;  $p < 0.001$ ), respectively. In addition, 30- (1.4 vs. 2.3 vs. 2.0%;  $p = 0.045$ ) and 90-day readmission rates (3.1 vs. 4.5 vs. 4.1;  $p = 0.021$ ) were lowest in the robotics cohort, as were dislocation rates within 90-days (0.2 vs. 0.7 vs. 0.4;  $p < 0.001$ ). Multivariate analysis demonstrated use of robotics to be significantly associated with lower odds of 30-day ( $p = 0.023$ ) and 90-day readmission ( $p < 0.001$ ), independent from surgical approach, use of fluoroscopy, dual-mobility implants, or demographic characteristics. Multivariate analysis also showed patients had higher odds of achieving a perfect AM-PAC score on postoperative day 0 with robotic-assisted THA.

## DISCUSSION AND CONCLUSION:

This study demonstrates favorable clinical outcomes, including shorter LOS, greater discharge to home, lower 30- and 90-day readmission rates, and greater odds of achieving a perfect same day AM-PAC score, for patients receiving robot-assisted surgery compared to manual or CAS THA.

Table. Multivariable Analysis for Perfect AM-PAC Score Achievement on POD0 Odds Ratio

Surgical Technique	Perfect Score POD0 Odds Ratio (95% CI)	P-Value
Conventional		
Robot-Assist	2.14 (1.8-2.6)	<0.001*
Navigation	2.52 (2.2-2.9)	<0.001*
Dual-Mobility Implant	1.07 (0.81-1.40)	0.639
THA Approach		
Posterior	-	
Anterior	0.99 (0.82-1.22)	0.979
Preoperative EOS	0.99 (0.79-1.24)	0.938
Fluoroscopy	1.49 (1.04-2.17)	0.004*
Days to Last Ortho F/U	1.00 (0.99-1.00)	0.777
Date of Surgery	1.00 (0.99-1.00)	0.496

Table. THA Outcomes stratified by Conventional vs. Robotic vs. Navigation use

	Conventional (n=7213)	Robotic (n=1402)	Navigation (n=4653)	P-Value
LOS (hours)	67.71±54.7	42.04±33.3	42.31±33.8	<0.001*
Discharge Disposition – no. (%)				<0.001*
Home	6337 (87.9)	1339 (95.5)	4330 (93.1)	
Skilled Nursing Facility	714 (9.9)	45 (3.2)	263 (5.7)	
Acute Rehab Facility	153 (2.1)	15 (1.1)	51 (1.1)	
Other	9 (0.1)	3 (0.2)	9 (0.2)	
30-Day Readmissions – no. (%)	165 (2.3)	20 (1.4)	94 (2.0)	0.045*
90-Day Readmissions – no. (%)	326 (4.5)	43 (3.1)	191 (4.1)	0.021*
Days to Readmission	37.91±27.9	46.37±28.6	38.55±25.7	0.138
Reason for Readmission				0.906
Pain	6 (1.8)	0	3 (1.6)	
Dislocation/Instability	29 (8.9)	2 (4.7)	16 (8.4)	
Infection (+ wound/blood)	68 (20.9)	10 (23.3)	48 (25.1)	
Fracture	46 (14.1)	5 (11.6)	29 (15.2)	
Wound Complication	5 (1.5)	0	3 (1.6)	
Other	172 (52.8)	26 (60.5)	92 (48.2)	
90-Day Dislocations – no. (%)	51 (0.7)	3 (0.2)	19 (0.4)	<0.001*
Perfect Score Achieved POD0 – no. (%)	499 (19.5)	162 (55.5)	862 (33.9)	<0.001*