Robot-Assisted Surgery Provides Greater Improvement in Patient-Reported Outcome Measures following Total Hip Arthroplasty

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INTRODUCTION:
Use of technology in total hip arthroplasty (THA) continues to rise, but data are sparse regarding any effects technology may have on clinical outcomes. Therefore, the aim of this study was to explore any influence robot-assistance and computer navigation may have on patient-reported outcome measures (PROMs) after THA.
METHODS:
We retrospectively reviewed 2,905 primary, elective THA cases from January 2016 to April 2022 with complete preoperative, 3-month postoperative, and 1-year postoperative PROM data available. Three cohorts were created based on technology utilization: robotic (n=195, 6.7%), manual (no technology used) (n=1140, 39.2%), or navigation-assisted THA (n=1570, 54.1%). Patient demographics along with Hip disability and Osteoarthritis Outcome Score, Joint Replacement (HOOS, JR), and pain scores (PROMIS Pain Interference) were collected and compared using ANOVA tests.
RESULTS:
While preoperative and 3-month HOOS, JR scores remained similar across the 3 groups, 1-year HOOS, JR (80.5 vs. 74.0 vs. 74.0; p=0.03), delta HOOS, JR at 3-months postoperative (20.3 vs. 17.9 vs. 16.3; p=0.01), and delta HOOS, JR at 1-year postoperative (33.4 vs. 27.2 vs. 25.8; p=0.04) scores all significantly favored the robotic cohort compared to the manual and navigation groups, respectively. In addition, pain score improvements were significantly greater in robot-assist cases compared to manual and CAS cases, with greater improvements in PROMIS Pain Interference scores at 3 months (12.5 vs. 10.1 vs. 9.7; p=0.02) and 1-year (11.06 vs. 10.03 vs. 8.42; p=0.02) postoperative.
DISCUSSION AND CONCLUSION:
We observed improved HOOS, JR and pain scores at 3-months and 1-year postoperatively in robot-assisted THA compared to manual and navigated cases. This has not been a consistent finding in the limited research on this topic. Additional well-powered. prospective, randomized trials are warranted.

Table 1. PROMs for THA cases stratified by Conventional vs. Robotic vs. Navigation use (Early Postop=0-42 days; Intermediate Postop=43-180 days; Late Postop=181-540 days)

	Conventional (n=1140)	Robotic (n=195)	Navigation (n=1570)	P-Value
HOOS, JR (Preop)	48.34	48.18	48.95	0.502
HOOS, JR (6 week)	66.09	66.55	65.03	0.145
HOOS, JR (3 month)	72.88	73.85	71.99	0.270
HOOS, JR (1 year)	74.00	80.48	74.00	**0.025***
Delta HOOS, JR (preop-6 week)	17.85	20.34	16.31	**0.026***
Delta HOOS, JR (preop-3 month)	24.72	30.19	23.85	**0.009***
Delta HOOS, JR (preop-1 year)	27.18	33.39	25.76	**0.042***
PROMIS Interference (Preop)	64.55	66.10	64.54	**<0.001***
PROMIS Interference (6 week)	58.80	60.78	59.73	**0.001***
PROMIS Interference (3 month)	54.09	55.53	54.95	**0.021***
PROMIS Interference (1 year)	53.90	56.07	55.91	**<0.001***
Delta PROMIS Interference (preop-6 week)	-5.92	-6.97	-4.77	**0.001***
Delta PROMIS Interference (preop-3 month)	-10.08	-12.45	-9.73	**0.019***
Delta PROMIS Interference (preop-1 year)	-10.03	-11.06	-8.42	**0.019***