

No Difference in 90-Day Dislocation Rates Between Manual and Robotic-Assisted Total Hip Arthroplasty Utilizing the Posterolateral Approach

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Background

- Dislocation following total hip arthroplasty (THA) is a common complication, with long term dislocation rates averaging approximately **2.25%** following primary Total Hip Arthroplasty (THA) (1,2)
- Risk for dislocating can be influenced by many factors including patient and surgical factors (3-5)
 - Patient factors-** age, sex, and previous surgeries
 - Surgical factors** - approach, soft tissue tension, choice of implant, and surgeon experience
- The **posterolateral (PL) approach** is the most commonly used approach to expose the hip; however, the disruption of posterior soft-tissue is a major concern for implant stability (6)
- In the setting of THA, the introduction of the MAKO Robotic Arm Interactive Orthopaedic System (Stryker Corporation; Kalamazoo, MI, USA) has proven to be an option for optimizing implant placement during THA (7,8)
- While there is a plethora of literature evaluating surgical parameters surrounding the use of the MAKO system in THA. There is a paucity of literature evaluating the difference in dislocation rates between manual and robotic-assisted THA while utilizing the posterolateral approach

Study Aim: retrospectively assess the 90-day dislocation rate between robotic assisted and manual primary THA through the posterolateral approach.

Due to implant optimization with the use of the MAKO system, we hypothesized there would be reduced dislocation rates in the robotic-assisted THA (rTHA) group compared to the manual THA group (mTHA).

Methods

- Prospectively collected data was retrospectively reviewed from 2014-2023
- Data from three senior surgeons at our institute who conduct THA via a posterolateral approach was collected
- Variables collected included patient demographic information, surgeon, use of robotic assistance, operative times, and 90-day total complications.
- Functional Outcomes:** Hip Disability and Osteoarthritis Outcome Score (HOOS) was recorded for patients at 12 weeks, 6 months, and 1-year.
- Inclusion criteria**
 - All patients undergoing either manual or robotic-assisted primary THA with a PL approach
 - patients aged 18-89
 - primary diagnosis of osteoarthritis
- Exclusion criteria**
 - Revision THA
 - Approach other than PL
 - Non-elective surgeries
 - Bilateral procedures
 - Conversion surgeons
 - Patients younger than 18 or older than 89

Results

Patient Demographic	Manual THA (n=1772)	Robotic THA (n=899)
Age	66	68
Gender		
Male	840	431
Female	932	468
BMI	28.6	28.5
Laterality		
Left	815	401
Right	957	498

Table 1: Patient demographic data for both manual and robotic-assisted THA

	Manual THA	Robotic THA	*p-value (0.05)
Total number of surgeries (n)	1772	899	
Operative time (min)	74	88	<0.001
Complications	91	34	0.117
Acute MI	2	2	
Cardiac Arrest	2	0	
Cardiac Arrythmia	7	2	
Cerebrovascular Accident (CVA)	1	0	
Transient Ischemic Attack (TIA)	0	0	
Wound Dehiscence	3	1	
Dislocation	7	4	0.85
Closed reduction	2	1	
Revision THA	2	0	
Unknown	3	3	
Periprosthetic Fracture	12	7	
Hematoma	4	1	
GI Hemorrhage	3	0	
Acute Kidney Injury (AKI)	0	0	
Venous Thromboembolism (VTE)	8	4	
Falls	15	6	
Mechanical Fail	0	0	
Nerve Injury	0	0	
Prosthetic Joint Infection (PJI)	13	4	0.375
Pneumonia (PNA)	8	1	
Surgical Site Infection (SSI)	2	1	
Vascular	0	0	
In House Mortality	4	1	

Table 2: Total 90-day complications between all three senior attendings

Average Score	Manual THA	Robotic THA	*p-value (0.05)
Preoperative	50.9	53.8	<0.001
12 Weeks Postoperative	82.2	80.9	0.104
6 Months Postoperative	84.6	85.8	0.836
1 Year Postoperative	88.1	92.0	0.731

Table 3: Hip Disability and Osteoarthritis Outcome Score (HOOS)

Discussion

- No difference in 90-day dislocation rates between manual versus robotic-assisted THA
 - mTHA 7/1772 (**0.4%**) vs rTHA 4/899 (**0.4%**) (p=0.85)
- Significant difference in operative times between THA and mTHA
 - mTHA 74 minutes vs rTHA 88 minutes (p<0.001)
- No difference in 90-day PJI between groups even with increased operative times
 - mTHA 13/1772 (**0.7%**) vs rTHA 4/899 (**0.4%**)
- The use of the MAKO can lead to an increased cost burden to the patient and the hospital
 - Patient** - higher cost for operation due to use of MAKO system
 - Hospital** - higher cost due to increased operative times which results in more personnel and supply use during cases and decreases ability to turn operating rooms over for additional procedures
- Limitations|
 - Retrospective study in nature
 - Limited to three primary surgeons
 - Only one approach was analyzed

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