

# Mako Total Knee key clinical studies

	Title	Journal	Year	Author(s)	Institution(s)	Conclusion
Accuracy	Robotic-arm assisted total knee arthroplasty more accurately restored the posterior condylar offset ratio and the Insall-Salvati Index compared to the manual technique; a cohort-matched study	Surgical Technology International	2019	Sultan AA, Khlopas A, Sodhi N, Bhowmik-Stoker M, Chen A, Orozco F, Kolisek F, Mahoney O, Smith LS, Malkani A, Molloy RM, Mont MA	Cleveland Clinic, Cleveland, Ohio; Rothman Institute, Philadelphia, Pennsylvania; OrthoIndy, Indianapolis, Indiana; Athens Orthopaedic Clinic, Athens, Georgia; Shea Orthopedic Group, Louisville, Kentucky; Lenox Hill Hospital, New York City, New York	“Patients who underwent TKA using robotic-arm assisted technology had smaller mean differences in PCOR which had been previously shown to correlate with better joint ROM at 1-year following surgery. In addition, these patients were less likely to have values outside of normal Insall-Salvati Index, which meant they may be less likely to develop patella baja, a condition in which the patella would impinge onto the patellar component, potentially leading to restricted flexion and overall ROM.”
Accuracy	Robotic assisted total knee arthroplasty demonstrates greater component placement accuracy compared to manual instrumentation: results of a prospective multi-center evaluation	Presented at International Society for Technology in Arthroplasty (Toronto, Canada)	2019	Mont MA, Kinsey T, Zhang J, Bhowmik-Stoker M, Chen A, Orozco F, Hozack W, Mahoney O		This study showed improved accuracy to plan for RA-TKA compared to manual TKA. “Compared to manual TKA, RA-TKA cases were typically 47% more accurate for tibial component alignment, 59% more accurate for tibial slope, and 36% more accurate for femoral component rotation (percent differences of median absolute deviations from plan). As optimal component position in TKA affects joint kinematics and may positively influence implant longevity, it is important for surgeons to maximize the opportunity to direct component positioning.”
Accuracy	Robotic-arm assisted total knee arthroplasty demonstrated greater accuracy and precision to plan compared with manual techniques	J Knee Surg	2018	Hampp EL, Chughtai M, Scholl LY, Sodhi N, Bhowmik-Stoker M, Jacofsky DJ, Mont MA	Cleveland Clinic; Lenox Hill Hospital; CORE Institute	In a cadaveric study that compared RA-TKA to manual TKA (M-TKA), “RA-TKA bone cuts were as or more accurate to plan based on nominal median values in 11 out of 12 measurements. RA-TKA bone cuts were more precise to plan in 8 out of 12 measurements. RA-TKA final component positions were as or more accurate to plan based on median values in five out of five measurements. RA-TKA final component positions were more precise to plan in four out of five measurements... When compared with M-TKA, RA-TKA demonstrated more accurate and precise bone cuts and implant positioning to plan.” “There was reduced bone and periarticular soft tissue injury”
Soft tissue	Iatrogenic bone and soft tissue trauma in robotic-arm assisted total knee arthroplasty compared with conventional jig-based total knee arthroplasty: a prospective cohort study and validation of a new classification system	Journal of Arthroplasty	2018	Kayani B, Konan S, Pietrzak JRT, Haddad FS	University College Hospital, London, UK; Princess Grace Hospital, London, UK	in patients undergoing RA-TKA compared to conventional TKA.

# Mako Total Knee key clinical studies (continued)

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Outcomes	Do total knee arthroplasty surgical instruments influence clinical outcomes? A prospective parallel study of 150 patients	Presented at ORS	2019	Bhowmik-Stoker M, Faizan A, Nevelos J, Tippett B, Clark G	St. John of God, Perth, Australia	Compared to computer navigated TKA, patients who received RA-TKA had significantly improved post-op pain, reduced total morphine consumption, and a reduced length of stay.
Outcomes	Robotic-arm assisted total knee arthroplasty is associated with improved early functional recovery and reduced time to hospital discharge compared with conventional jig-based total knee arthroplasty: a prospective cohort study	Bone and Joint Journal	2018	Kayani B, Konan S, Tahmassebi J, Pietrzak JRT, Haddad FS	University College Hospital, London, United Kingdom; Princess Grace Hospital, London, United Kingdom	When comparing robotic-arm assisted TKA (RA-TKA) to conventional instrumented TKA, RA-TKA was associated with: less postoperative pain, reduced postoperative hemoglobin levels, less time to straight leg raise, less inpatient PT sessions, less time to hospital discharge, and improved maximum knee flexion at discharge.
Outcomes	Multicenter analysis of outcomes after robotic-arm assisted total knee arthroplasty	Presented at the Knee Society Meeting	2018	Hozack W, Chen A, Khlopas A, Mahoney O, Mont M, Murray T, Orozco F, Higuera Rueda C, Stearns K	Rothman Institute; Brigham and Women's Orthopaedic Center; Cleveland Clinic; Athens Orthopaedic Clinic; Lenox Hill Hospital	The data indicated RA-TKA patients had greater improvement in their functional activity walking and standing scores at both 4-6 weeks and 6 months follow-up (p=0.019 and p=0.017, respectively) when compared to conventional TKA patients. Additionally, RA-TKA patients had higher overall functional activity improvements at 1-year follow-up (p=0.020).
Outcomes	Does robotic-arm assisted surgery improve early outcomes in total knee arthroplasty?	Presented at ORS	2018	Bhimani S, Bhimani R, Feher A, Malkani A	University of Louisville, Louisville, KY; Jewish Hospital, KentuckyOne Health, Louisville, KY	The RA-TKA group had significantly lower VAS pain scores at rest and with activity compared to the manual instrument TKA group at 6-week follow-up.
Outcomes	Patient satisfaction outcomes after robotic-arm assisted total knee arthroplasty: a short-term evaluation	J Knee Surg	2017	Marchand RC, Sodhi N, Khlopas A, Sultan AA, Harwin SF, Malkani AL, Mont MM	Ortho Rhode Island, Wakefield, RI; Cleveland Clinic, Cleveland, OH; Mount Sinai West Hospital, New York; KentuckyOne Health, Louisville, KY	The RA-TKA cohort had a significantly lower mean pain score and greater patient satisfaction than the manual TKA cohort. The results from this study showed that patients who underwent RA-TKA demonstrated better overall patient satisfaction and functional outcome scores.
Cost	Health care utilization and payer cost analysis of robotic arm assisted total knee arthroplasty at 30, 60, and 90 days	J Knee Surg	2019	Mont MA, Cool C, Gregory D, Coppolecchia A, Sodhi N, Jacofsky D	Lenox Hill Hospital; Baker Tilly; The CORE Institute	RA-TKA patients had overall lower average 90-day EOC cost to payer (Medicare) compared to conventional TKA. Cost savings were driven by: reduced index facility costs, lower LOS, discharge destinations, and decreased readmissions.