

# Effect of Robotics on Clinical Outcomes in Patients Following TKA: 1000 Consecutive Patient Cohort



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# Disclosures



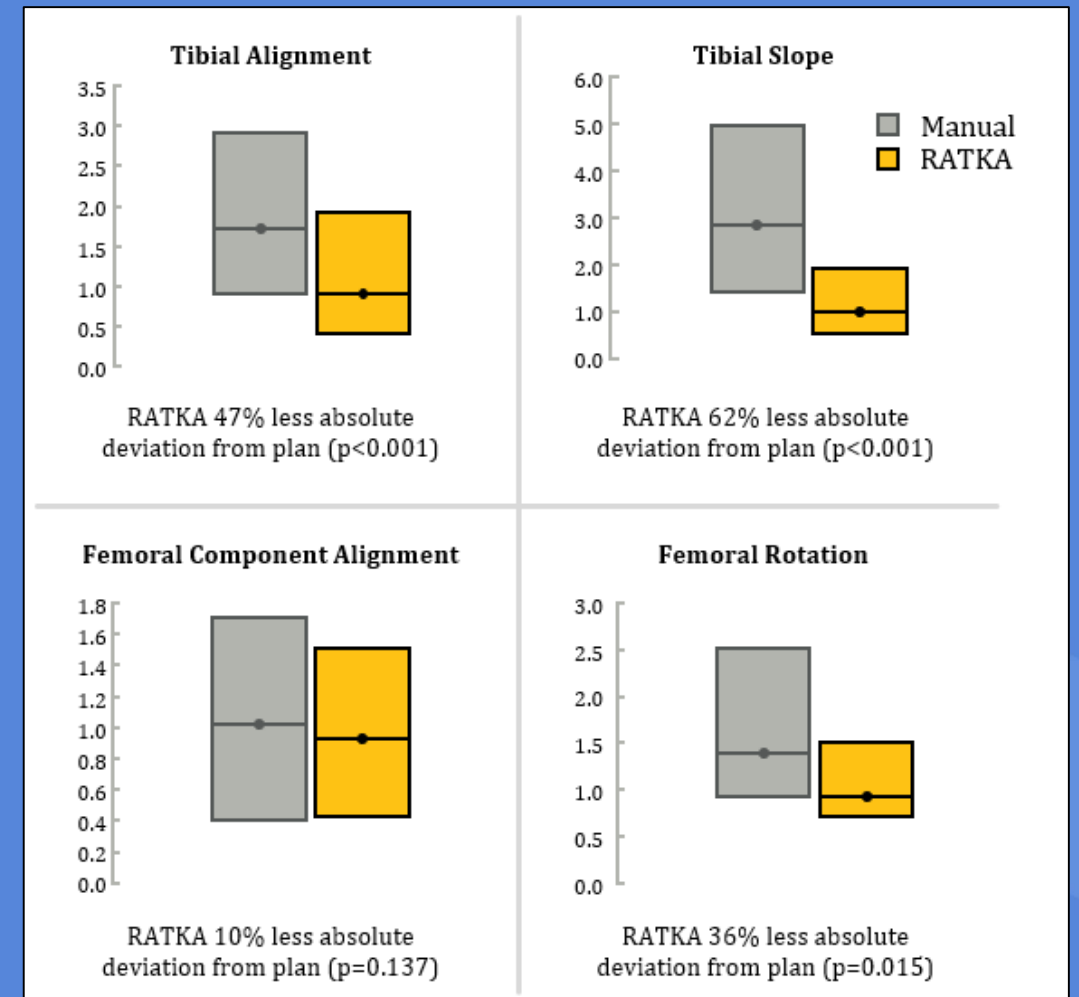
- Robert C. Marchand is a paid consultant for Stryker, Zipline, Onetray
- Laura Y. Scholl, Manoshi Bhowmik-Stoker, and Emily L. Hampp are employees of Stryker
- Research funding was received from Stryker for this study.

# Robotic-assisted TKA clinical outcomes

Robotic-assisted total knee arthroplasty (RATKA), in comparison to manual TKA (MTKA), has demonstrated:

- increased accuracy and precision of component placement to plan<sup>1</sup>
- reduced iatrogenic soft tissue damage<sup>2</sup>
- improved outcomes at 6-months, 1-year, and 2-year follow-up<sup>3-5</sup>

Existing RATKA clinical data includes patient cohorts <200 patients



\*Mont M, Kinsey T, Zhang J, et al. 2019 International Society for Technology in Arthroplasty annual meeting. Toronto, Canada. 2-5 October 2019.

**Table 1** Six-month manual versus robotic TKA WOMAC scores

Surgical technique	Manual TKA	Robotic arm-assisted TKA	p-Value
Mean 6-mo postoperative WOMAC—pain	5 ± 3 (range: 0–10)	3 ± 3 (range, 0–8)	<0.05
Mean 6-mo postoperative WOMAC—physical function	9 ± 5 (range: 0–17)	4 ± 5 (range, 0–14)	0.055
Mean 6-mo postoperative WOMAC—total score	14 (range: 0–27, SD: ±8)	7 (0–22; SD: ±8)	<0.05

Abbreviations: SD, standard deviation; TKA, total knee arthroplasty; WOMAC, Western Ontario and McMaster Universities Arthritis Index.

\*Marchand RC, et al. J Knee Surg. 2017;30(9): 849-853

Reference: 1. Mont MA, et al. ISTA; October 2-5, 2019. Toronto, Canada. 2. Kayani B, et al. J Arthroplasty. 2018;33(8):2496-2501. 3. Marchand RC, et al. J Knee Surg. 2017;30(9): 849-853. 4. Marchand RC, et al. J Knee Surg. 2019 Nov;32(11):1063-1068. 5. Marchand R, et al. ISTA. 2-5 Oct 2019. Toronto, Canada.

# Study objective

The purpose of this study was to assess the patient-focused effects of new technology adoption in a large case-controlled cohort study.

We specifically investigated adverse events (AEs) and patient-reported outcomes (PROs) in the first 6 months of a single surgeon's robotic adoption.



# Methods

## Patient Inclusion

- 1000 patients were enrolled in a retrospective single-surgeon longitudinal trial, including:
  - 150 MTKA cases prior to adopting RATKA
  - First 850 RATKA cases after transitioning
- All patients received the same implant design: Triathlon implant (Stryker, Mahwah, NJ)
- Consented patients with advanced OA who were a candidate for a primary TKA and could undergo a CT scan

## Data Collected

- Patient demographics were collected
  - Gender, age, BMI, and surgical side
- Adverse events and reduced WOMAC score collected through 6-month postoperative
- Statistical analysis was performed using a one-way ANOVA ( $\alpha = 0.05$ ).

# Patient demographics

	MTKA	RATKA
Cohort size (n)	150	850
Men   Women	57%   43%	44%   56%
Left   Right	46%   54%	50%   50%
Age, Years	63.7 ± 8.6	66.4 ± 8.1
BMI, kg/m <sup>2</sup>	32.0 ± 7.0	32.0 ± 6.5

- No statistically significant difference in demographics between the MTKA and RATKA groups.

# Patient-reported outcomes

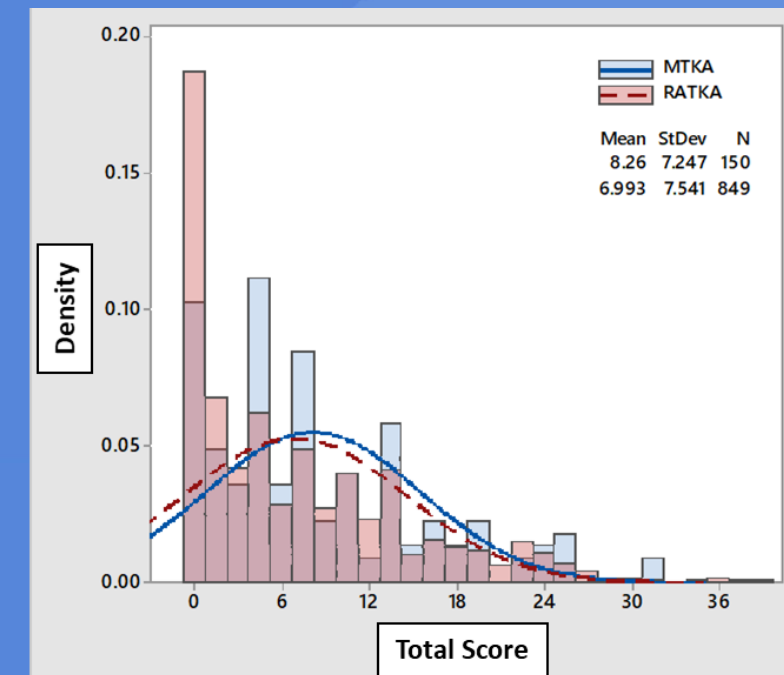
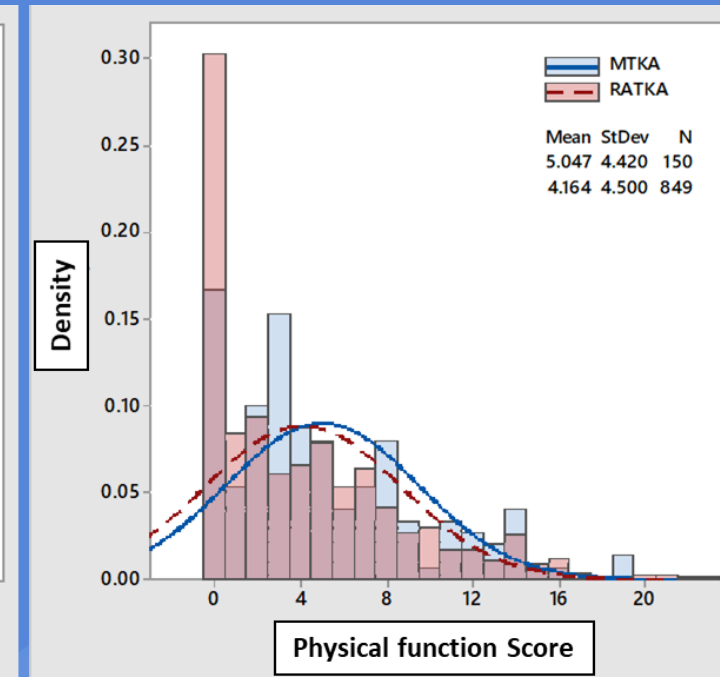
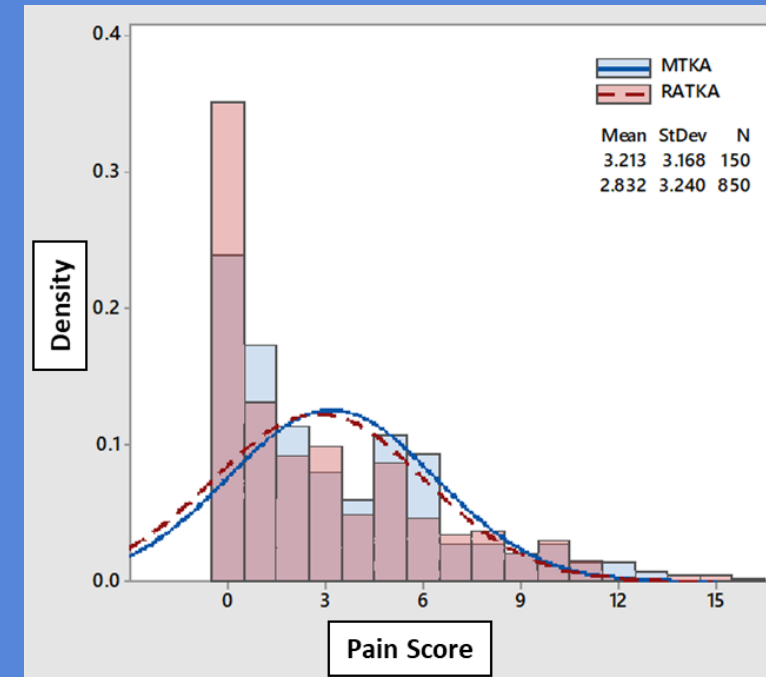
6-month postoperative reduced WOMAC	MTKA	RATKA	p-value
	Mean $\pm$ SD	Mean $\pm$ SD	
Total	8.3 $\pm$ 7.2	7.0 $\pm$ 7.5	0.05*
Physical function	5.0 $\pm$ 4.4	4.2 $\pm$ 4.5	0.03*
Pain	3.2 $\pm$ 3.2	3.8 $\pm$ 3.2	0.18

Note: \* Indicates significant values ( $p < 0.05$ ), SD represents standard deviation

- No statistically significant difference in preoperative reduced WOMAC between the MTKA and RATKA groups.
- Patients in both cohorts had statistically significant ( $p=0.000$ ) improvement in reduced WOMAC preoperative to 6-months postoperative.
- **RATKA patients has statistically significant improved total ( $p=0.05$ ) and physical function ( $p=0.03$ ) scores when compared to MTKA.**

# Patient-reported outcomes

- Distribution of RATKA (red curve) and MTKA (blue curve) demonstrated the RATKA cohort had a greater proportion of patients with lower pain, physical function, and total scores when compared to the MTKA cohort.
- More specifically, RATKA had a greater percentage of patients with:
  - Pain score  $\leq 3$ : RATKA - 67% vs. MTKA - 44%
  - Physical function score  $\leq 3$ : RATKA – 54% vs. MTKA – 33%
  - Total score  $\leq 6$ : RATKA – 58% vs. MTKA – 37%





# Reported adverse events

- At 6 months, there were:
  - No reported aseptic failures for the RATKA and MTKA groups
  - No reported SSI for the RATKA and MTKA groups
- No statistical difference in manipulation under anesthesia rate: MTKA – 2.0% vs RATKA – 2.4%
- For the RATKA:
  - Pin site fracture: 0%
  - No robotic to manual conversions

# Discussion

- This study demonstrated improved clinical outcomes, no revisions, and equivalent rate of MUA during the adoption phase of a new operative technology.
- Improvement in RATKA outcomes when compared to MTKA have been shown in literature from other centers.<sup>6-7</sup>
- Longitudinal follow-up is needed to support the initial impressions from this analysis.

Reference: 6. Kayani B, et al. Bone and Joint Journal: 2018;100-B:930–7. 7. Bhimani, et al. Bone Joint Open. 2020;1-2:8-12.

Thank you

