

# Total Knee Arthroplasty with Robotic Surgical Assistance Results in Less Physician Stress and Strain Than Conventional Method<sup>1</sup>

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The ROSA<sup>®</sup> Knee System resulted in less “surgeon physiologic stress, energy expenditure per minute, and postural strain” in surgeons performing robotic total knee arthroplasty (rTKA) compared to conventional TKA (cTKA).

- These benefits were noted “despite longer operative times”.

## Methods

Sensor equipped “smart garments” and other wearable sensors were worn by the author (JHL) to monitor surgeon stress metrics while performing consecutive cases of either rTKA (n=20) or cTKA (n=20) using the Persona<sup>®</sup> Knee System:

- Cardiorespiratory
- Postural
- Kinematic

The robotic cases were performed with the ROSA<sup>®</sup> Knee System and represent the first 20 ROSA Knee cases performed by the surgeon.

## Results

Operative times were longer in rTKA ( $p < 0.001$ )

- rTKA:  $48.2 \pm 9$  minutes
- cTKA:  $31.8 \pm 7$  minutes

Average operative time were lower in the second ten rTKA cases compared to the first ( $p = 0.15$ )

- 1-10:  $53.2 \pm 10$  minutes
- 11-20:  $43.2 \pm 5$  minutes

The average heart rate was lower in rTKA than cTKA ( $p < 0.001$ )

- rTKA:  $81.5 \pm 4$  beats per minute
- cTKA:  $90.1 \pm 5$  beats per minute

Energy expenditure per minute was lower in rTKA cases ( $p < 0.001$ )

- rTKA:  $2.53 \pm 0.4$  calories/minute
- cTKA:  $3.50 \pm 0.7$  calories/minute

Lumbar flexion was lower in rTKA ( $p < 0.001$ )

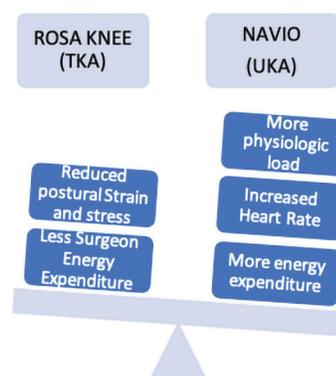
- rTKA:  $-13.1^\circ \pm 6^\circ$
- cTKA:  $-22.3^\circ \pm 5^\circ$

The time spent in lumbar flexion was also less ( $p < 0.001$ )

- rTKA: 23%
- cTKA: 55%

## Discussion

In addition to comparing this system with conventional for TKA, Haffar et al.<sup>2</sup> recently compared NAVIO to conventional UKA using these same parameters and reported different outcomes.



## Conclusion

The authors noted that, “...robotic technology may benefit the surgeon by reducing ergonomic strain and physiologic cardiorespiratory stress.”

## Significance

Unlike other robotic systems for joint arthroplasty<sup>2</sup>, and compared to conventional instrumentation, the ROSA Knee System improves intra-operative surgical ergonomics for the surgeons themselves by reducing the stress and strains of this physically demanding procedure.

## References

1. Haffar A, Krueger CA, Goh GS, Lonner JH. Total Knee Arthroplasty With Robotic Surgical Assistance Results in Less Physician Stress and Strain Than Conventional Methods. *The Journal of Arthroplasty* 2022. 2. Haffar A, Krueger C, Goh GS, Lonner JH. UKA with a Handheld Robotic Device Results in Less Neck Flexion but Greater Energy Expenditure. *American Association of Hip and Knee Surgeons Annual Meeting*. Dallas, TX; 2021.

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