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Is it worth changing from computer navigation to robotic knee replacement?

A prospective study comparing patient outcomes following robotic-assisted and computer navigated TKA

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Faculty Disclosure Information

Declaration of Interest	Dr Myles Coolican	Dr David Parker
Held shares in:	-	Personalised Surgery, Ganymed Robotics
Received royalties from:	S&N	S&N
Done consulting work for:	S&N	S&N
Given paid presentations for:	S&N, J&J DePuy, Medacta	S&N, Arthrex
Received institutional support from:	S&N, Corin, ZB	S&N, Corin, ZB, Arthrex
Editorial board of:	-	AJSM, JISAKOS, AP-SMART Journal, OJSM

*S&N – Smith & Nephew, J&J – Johnson & Johnson, ZB – Zimmer Biomet
**Nothing to declare for other included authors

Background

- The use of computer-assisted surgery in TKA has expanded greatly
- Computer-navigated TKA (CN-TKA) studies have shown significant benefit over conventional TKA short-term and long-term outcomes.
- Early robotic-assisted TKA (RA-TKA) studies have shown some modest benefit compared to conventional TKA
- Very limited data exists comparing CN-TKA to RA-TKA, and comparing different RA-TKA modalities

Aims

- Compare short term (12-month) PROMs following CN-TKA versus RA-TKA
- Compare short term PROMs following ROSA TKA (Zimmer Biomet) versus CORI TKA (Smith & Nephew)

Methods:

- Two Hospitals in Sydney, Australia
- Two high volume TKA surgeons, experienced with CN-TKA
- Retrospective analysis of prospectively collected data of 399 patients
- No Randomization
- Time period: December 2021 – April 2023

Data Collection:

Demographics: Age, Gender, BMI

Knee ROM: Pre-op, Intra-op, Post-op

PROMS: Oxford Knee Score, Forgotten Joint Score, Patient Satisfaction, Pain and VR-12

Data time points: Pre-op, 3 months, 12 months

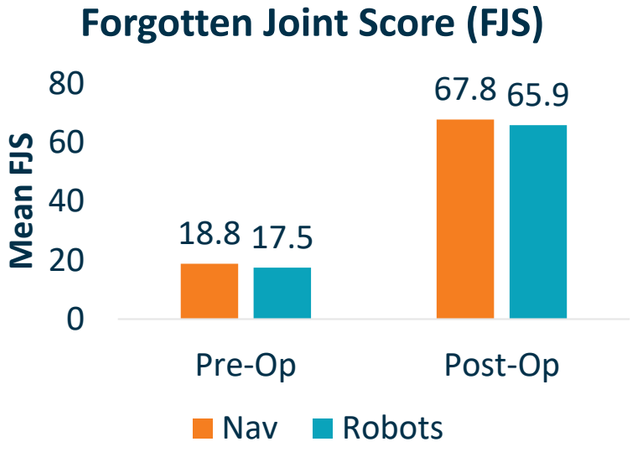
Study Retention: 80.6% (19.4% attrition)

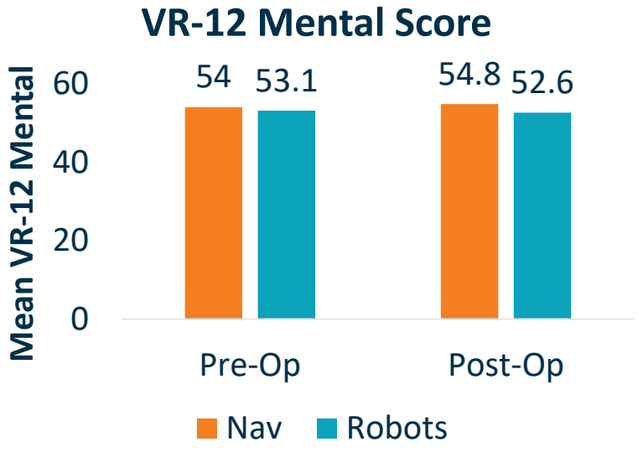
Patient Data: Computer Navigation vs Robots

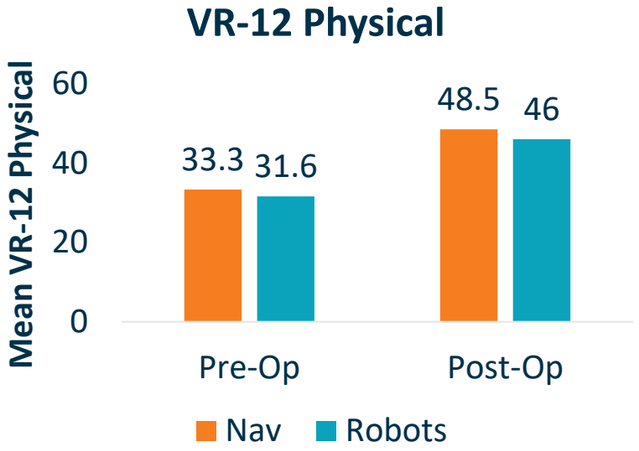
Patient Characteristics	Navigation (n= 187)	Robots (n=212)	P values
Age	70.7 (8.8)	71.1 (8.0)	0.60
Female Gender	50.7%	49.4%	0.48
BMI	29.9 (5.3)	30.3 (5.8)	0.45
Pre-op Extension	5.67 (5.65)	6.53 (9.37)	0.30
Pre-op Flexion	114.8 (18.0)	113.3 (15.3)	0.42

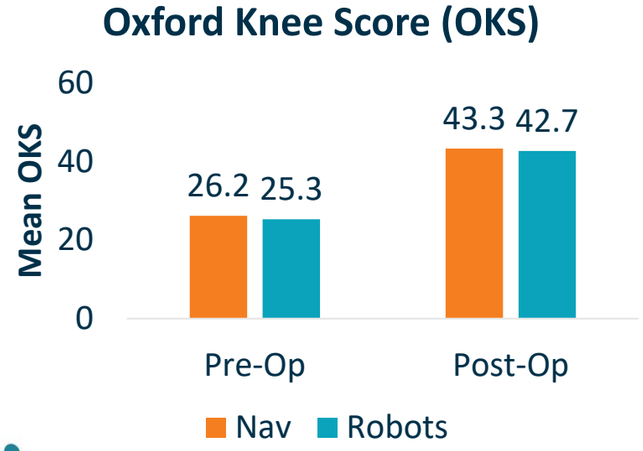
Data presented as means and standard deviations (SD)
Differences in groups was calculated using t-test

Patient Reported Outcomes: Nav vs Robots









Delta Scores

	Nav	Robots	P Value
Δ FJS	49.9 (29.4)	48.8 (28.1)	0.74
Δ OKS	17.2 (8.5)	17.1 (8.9)	0.95
Δ VR-12 M	0.5 (10.6)	-0.6 (11.3)	0.39
Δ VR-12 P	13.6 (10.1)	13.7 (10.5)	0.91

No clinically meaningful difference observed

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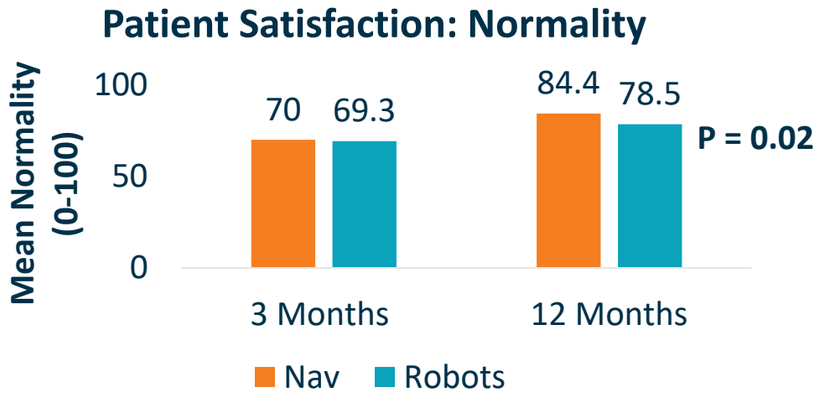
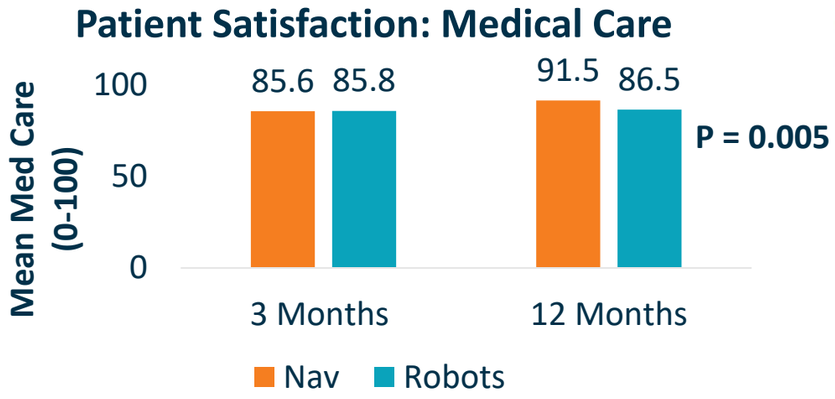
Patient Satisfaction: Nav vs Robots





Pain: VAS (0-100)

	3 months	12months
NAV	25.2	12.6
ROBOTS	25.5	17.7
P-values	0.89	**0.03**

Delta Scores

	Nav	Robots	P Value
Δ Norm	9.6 (24.8)	8.8 (24.6)	0.80
Δ Care	3.3 (16.9)	0.5 (17.4)	0.23
Δ Pain	-9.0 (23.7)	-6.3 (26.1)	0.43

Small significant difference observed at 12 months post-op

No significant difference observed between the delta scores

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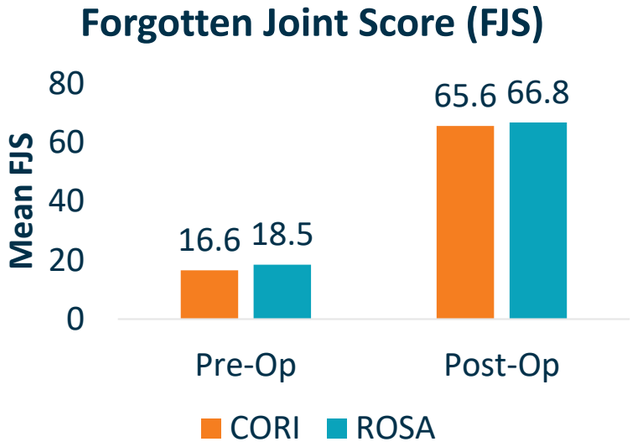
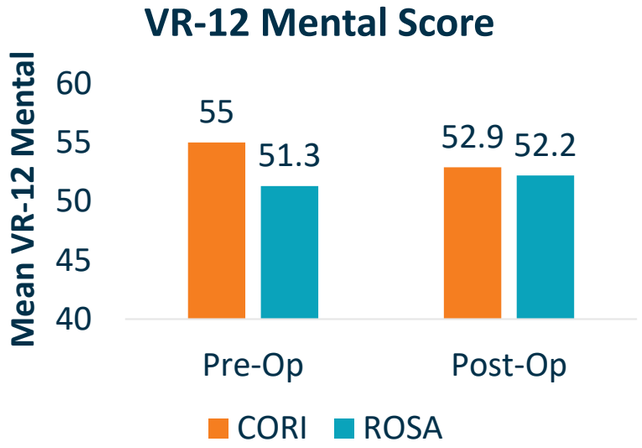
Patient Data: CORI vs ROSA

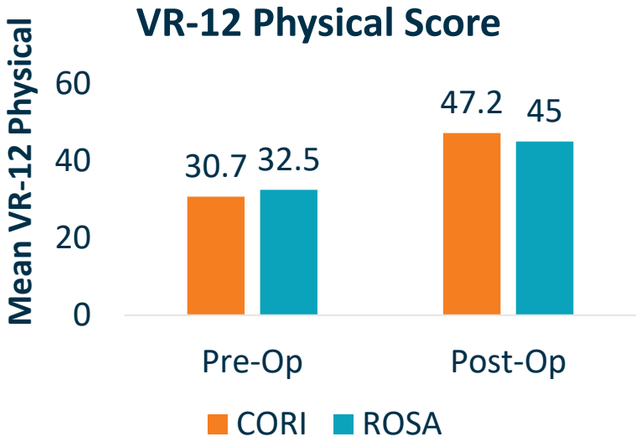
Patient Characteristics	CORI (n= 104)	ROSA (n=108)	P values
Age	71.4 (7.7)	70.9 (8.3)	0.71
Female Gender	50.4%	48.4%	0.38
BMI	30.5 (6.1)	30.1 (5.5)	0.53
Pre-op Extension	5.73 (5.65)	7.39 (12.1)	0.23
Pre-op Flexion	114.8 (14.4)	111.8 (16.2)	0.18

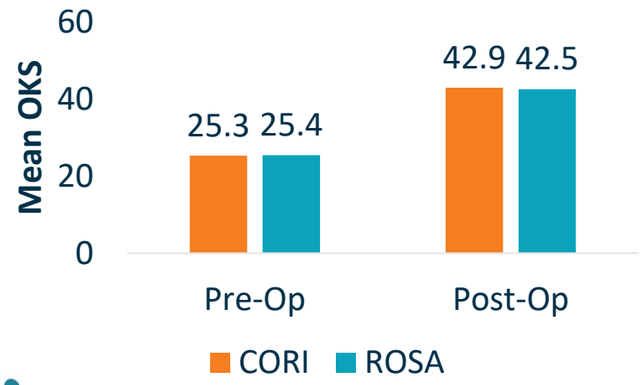
Data presented as means and standard deviations (SD)
Differences in groups was calculated using t-test

Patient Reported Outcomes: CORI vs ROSA









Delta Scores

	CORI	ROSA	P Value
Δ FJS	49.2 (29.6)	48.4 (26.6)	0.85
Δ OKS	17.4 (8.8)	16.8 (9.1)	0.69
Δ VR-12 M	-1.4 (11.4)	0.2 (11.2)	0.34
Δ VR-12 P	15.1 (11.0)	12.4 (9.93)	0.18

No significant difference observed

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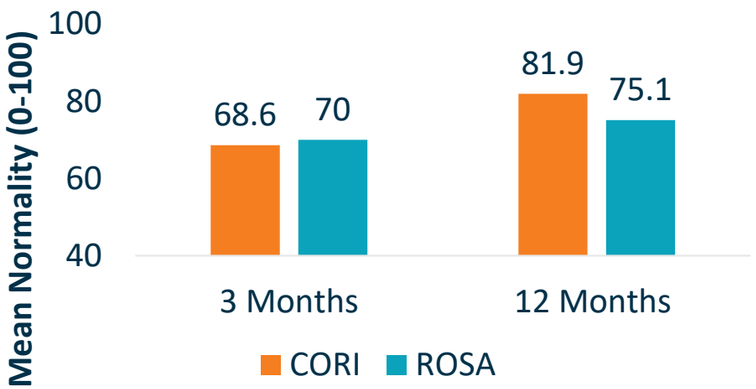
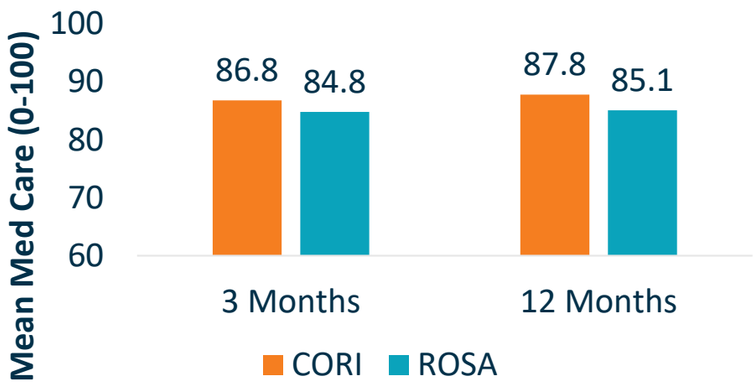
Patient Satisfaction: CORI vs ROSA





Pain: VAS (0-100)

	3 months	12months
NAV	26.1	15.6
ROBOTS	24.9	19.8
P-values	0.75	0.22

Delta Scores

	CORI	ROSA	P Value
Δ Norm	11.5 (22.5)	5.9 (26.6)	0.20
Δ Care	-0.2 (19.2)	1.3 (15.2)	0.62
Δ Pain	-7.8 (24.4)	-4.7 (28.0)	0.49

No significant difference observed

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Results Summary

- CN-TKA had slightly less pain and felt more normal than RA-TKA at 12-months; 12.6 vs 17.7 (p=0.03) and 84.4 vs 78.5, (p=0.02) respectively.
- No difference in PROMs (Oxford Knee Score and Forgotten Joint Score) were seen at 12-months between CN-TKA and RA-TKA.
- No significant difference was observed between the two RA-TKA techniques (CORI and ROSA) in any outcome.
- No significant difference was demonstrated between the delta scores of any comparison in the study.

Conclusion

- The uptake of robotic technology is rapidly increasing however there is no published evidence supporting its superiority over computer navigation, as shown by this study.

- For well-established navigation surgeons there is no clear benefit to change to robotic techniques based on patient outcomes.

- Longer term follow-up will help further clarify this conclusion.

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