# Robotic-Assisted Total Knee Arthroplasty is Associated with Improved Surgical and Post-Operative Outcomes: A Large Single-Centre Matched-Pair Study

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# Faculty Disclosure Information

- Nothing to disclose

# Modern technology for improved surgical accuracy

| | Robotic | Navigation |
|---|---|---|
| **Preoperative planning** | • May require preoperative imaging<br>• Allows for preoperative planning with 3D model | • No need for preoperative imaging<br>• Does not allow for preoperative planning |
| **Intraoperative guidance** | • Real-time positioning of cutting blocks<br>• Live intraoperative feedback in accordance with surgical plans | • Real-time positioning of cutting blocs<br>• Manual sawblade |

# Study methods

- Single centre, multi-surgeon, retrospective study of prospectively collected outcomes
- TKA cases performed using Mako robot (Stryker) or OrthoMap® navigation (Stryker)
- Study period: November 2019 to October 2023
- Patients were matched 1:1 by age, gender, ASA ethnicity, BMI and follow-up time

Inclusions
- Primary TKA
- Unilateral
- At least 1 year follow-up

Exclusions:
- 12 cases conventional (jig-based)
- 16 cases CORI (Smith + Nephew)
- CS/TS implants

- **Key outcomes: reoperations, complications, and patient-reported**



*ASA,* American Society of Anesthesiologists; *BMI,* body mass index; *CS,* cruciate-sacrificing; *TKA*, total knee arthroplasty, *TS,* total stabilised

# Study patients: 1,434 primary TKAs

| | Unmatched | | Matched | |
|---|---|---|---|---|
| | Robotic | Navigated | Robotic | Navigated |
| **Cases** | 388 | 1,046 | 381 | 381 |
| **Gender** | 52% male | 55% male | 51% male | 50% male |
| **Age (y)** | 68 ± 8 | 70 ± 9 | 68 ± 8 | 68 ± 9 |
| **Ethnicity** | 83% European | 74% European | 84% European | 85% European |
| **BMI** | 31 ± 5 | 31 ± 6 | 31 ± 5 | 31 ± 5 |
| **ASA** | 68% ASA 2 | 53% ASA 2 | 68% ASA 2 | 64% ASA 2 |
| **Follow-up time (mo)** | 33 ± 11 | 36 ± 13 | 33 ± 11 | 34 ± 13 |

*ASA,* American Society of Anesthesiologists; *BMI,* body mass index; *mo,* months

# Study findings: Clinical outcomes

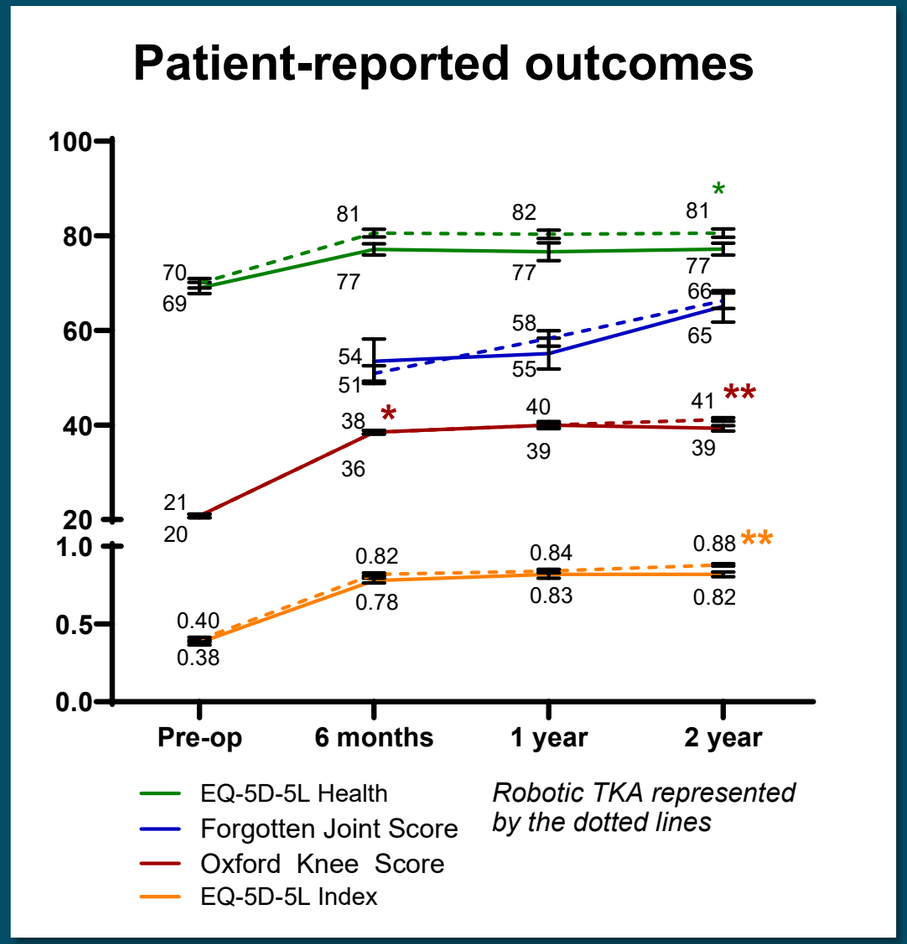
- In a matched cohort, robotic-assisted TKA patients had shorter surgical time, shorter length of stay and fewer MUA events

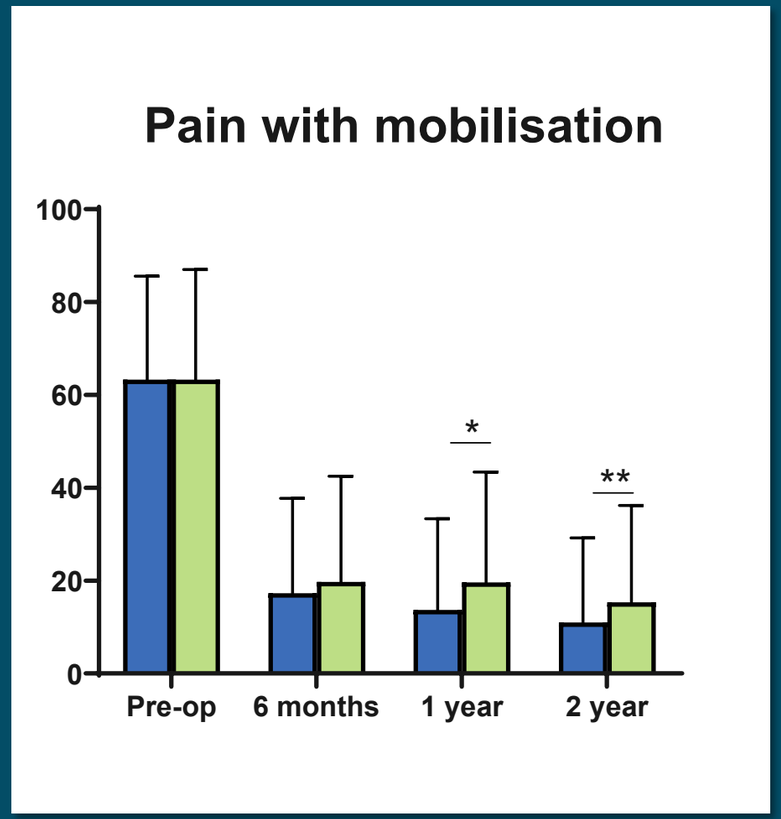
| | Robotic (n=381) | Navigated (n=381) | p-value |
|---|---|---|---|
| **Revisions** | 1% | 0.5% | 0.45 |
| **Operation time (mins)** | 87 ± 19 ⬇ | 93 ± 24 | <0.001* |
| **Length of stay (days)** | 3.1 ± 1.4 ⬇ | 3.4 ± 1.6 | <0.001* |
| **Inpatient complications** | 4% | 6% | 0.31 |
| **ED presentations** | 8% | 11% | 0.32 |
| **MUA events** | 4% ⬇ | 11% | 0.04* |

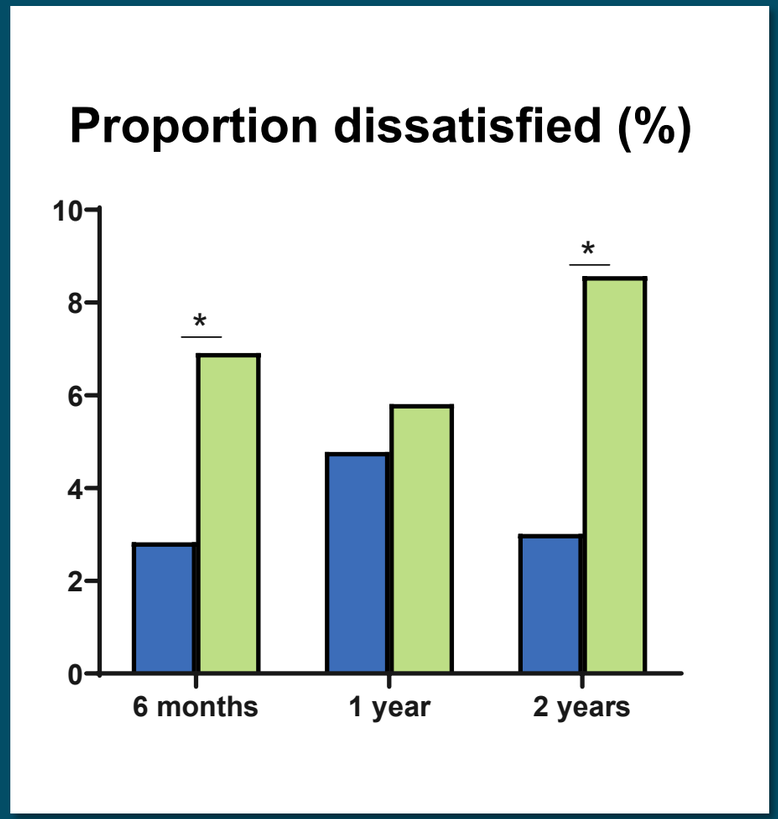
*ED,* Emergency Department; *MUA,* manipulation under anaesthesia; *TKA,* total knee arthroplasty

# Study findings: Patient-reported outcomes

- In a matched cohort, robotic-assisted TKA patients reported higher patient-reported outcome measures (PROMs), pain and satisfaction.




Robotic TKA  Navigated TKA

*EQ-5D,* EuroQol-5 Dimensions; *TKA,* total knee arthroplasty

# Cost-analysis

**Shorter hospital stays:** $390,000 per year

- $790 per patient
- 500 TKAs per year

**Fewer MUAs:** $80,000 per year

- $2,600 per MUA
- 30 MUAs fewer per year

**Robot cost:** $270,000 per year

- Operation costs: $170,000 per year
- CT scans: $200 per patient

*CT,* computed tomography; *MUA,* manipulation under anaesthesia; *TKA,* total knee arthroplasty

# Conclusions

- Robotic-assisted TKA shows improved surgical and clinical outcomes in the medium term
- Robotic-assisted TKA has potential to improve patient satisfaction
- There may be some associated cost savings for similar high-volume centres, however the high initial cost of robotic systems also need to be considered

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