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

Aims

The objective of this study was to compare early postoperative functional outcomes and time to hospital discharge between conventional jig-based total knee arthroplasty (TKA) and robotic-arm assisted TKA.

Patients and Methods

This prospective cohort study included 40 consecutive patients undergoing conventional jig-based TKA followed by 40 consecutive patients receiving robotic-arm assisted TKA. All surgical procedures were performed by a single surgeon using the medial parapatellar approach with identical implant designs and standardized postoperative inpatient rehabilitation. Inpatient functional outcomes and time to hospital discharge were collected in all study patients.

Results

There were no systematic differences in baseline characteristics between the conventional jig-based TKA and robotic-arm assisted TKA treatment groups with respect to age (p = 0.32), gender (p = 0.50), body mass index (p = 0.17), American Society of Anesthesiologists score (p = 0.88), and preoperative haemoglobin level (p = 0.82). Robotic-arm assisted TKA was associated with reduced postoperative pain (p < 0.001), decreased analgesia requirements (p < 0.001), decreased reduction in postoperative haemoglobin levels (p < 0.001), shorter time to straight leg raise (p < 0.001), decreased number of physiotherapy sessions (p < 0.001) and improved maximum knee flexion at discharge (p < 0.001) compared with conventional jig-based TKA. Median time to hospital discharge in robotic-arm assisted TKA was 77 hours (interquartile range (IQR) 74 to 81) compared with 105 hours (IQR 98 to 126) in conventional jig-based TKA (p < 0.001).

Conclusion

Robotic-arm assisted TKA was associated with decreased pain, improved early functional recovery and reduced time to hospital discharge compared with conventional jig-based TKA.

Cite this article: Bone Joint J 2018;100-B:930–7.
Robotic-arm assisted TKA uses preoperative imaging to
create a 3D reconstruction of the patient’s native knee anatomy. This
patient-specific model is then used to calculate a haptic
window for bone resection, and select optimal implant sizing
and positioning for the desired postoperative bone coverage and
limb alignment.4-6 An interactive robotic-arm with visual, audio
tablet feedback then guides intraoperative bone resection
within this predefined haptic window. Saw blade action
outside of this stereotactic window is limited, which conceptually
helps to preserve native bone stock and minimize periarthritic
soft-tissue injury.7 Dynamic referencing is used to assess intra-
operative flexion and extension gaps, joint stability, range of
movement and limb alignment, enabling the surgeon to perform
on-table modifications to bone resection, soft-tissue releases and
implant positioning. Studies have shown that robotic-arm
assisted TKA is associated with improved accuracy of implant
positioning and reduced outliers compared with conventional
jig-based TKA4-6 but to our knowledge, there are no existing
studies exploring how this translates into differences in early
postoperative recovery and hospital discharge.

The objective of this prospective cohort study was to deter-
mine differences in early postoperative recovery and time to
hospital discharge between patients undergoing conventional
jig-based TKA versus robotic-arm assisted TKA. The primary
outcome measure in this study was pain score on the numerical
rating scale at 24 hours following surgery. The hypothesis was
that no difference exists between the two groups relating to pain
scores at 24 hours as all operative procedures were performed
through the same surgical approach with a standardized rehabil-
itation programme.

Patients and Methods
Patient selection. This study included 80 patients with symp-
omatic knee osteoarthritis undergoing primary TKA at the
same treatment centre between January 2016 and September
2017. This included 40 consecutive robotic-arm assisted TKAs
and the preceding 40 consecutive conventional jig-based TKAs.
All operative procedures were performed by the senior author
(FSH) who was experienced in performing conventional jig-
based and computer-navigated TKA, and had undergone cadaveric
training on robotic-arm assisted TKA. The robotic group was
the first cohort of patients undergoing robotic-arm assisted TKA
under the operating surgeon. Inclusion criteria for this study
included the following: patients with knee osteoarthritis under-
going primary TKA; patient between 18 and 80 years of age;
surgery using the conventional jig-based or robotic-arm assisted
technique; surgery performed by the senior author (FSH).
Exclusion criteria included the following: conversion of uni-
compartmental to TKA; prior infection of knee joint; arthro-
plasty for fracture or previous osteotomy; underlying neurological
dysfunction compromising mobility; and/or the use of other sur-
urgical techniques such as computer navigation for TKA. The
study was assessed by the hospital review board who advised
that further institutional review board assessment for ethical
approval was not required. Patients were allocated to their treatment
group based on the date of their surgery relative to installation of
the robotic device into our institution (Princess Grace Hospital,
London, United Kingdom) in September 2016. Conventional jig-
based techniques were used prior to installation of the robotic
device, and robotic-arm assisted surgery performed after installation.

Surgical technique. All patients received general anaesthesia
with a standardized regimen of fentanyl, morphine, clonidine,
paracetamol and diolfenac at induction by the same consultant
anesthetist. In conventional jig-based TKA, the patient was
positioned supine on the operating table with a lateral thigh
support and foot bolster to enable flexion and extension of the
knee joint. In robotic-guided TKA, the patient was positioned
supine with the proximal tibia and foot of the operated limb in the
mobile leg holder boot. As per the surgeon’s routine practice, a
pneumatic tourniquet was applied but not inflated unless there
was intraoperative difficulty in achieving haemostasis or
compromise to the bone-cement interface. All study patients
received one gram of intravenous tranexamic acid on induction
and diathermy was used to help control intraoperative bleeding in
all operative procedures. A conventional medial parapatellar
approach was used in all patients. In both treatment groups, the
objective was to achieve neutral mechanical alignment.

In conventional jig-based TKA, extramedullary referencing
was used to perform tibial bone resection perpendicular to the
mechanical axis of the tibia in the coronal plane with the aim of
matching anatomical anteroposterior slope in the sagittal plane.
The femur was prepared using an intramedullary alignment jig
with the distal cutting block positioned so that the distal femoral
cut was at 5° to 7° valgus angle depending on the pre-existing
deformity. The distal femoral cutting block was positioned in 3°
or greater of external rotation using the transepicondylar axis.
Appropriate soft tissue releases were performed to ensure
symmetrical and balanced flexion and extension gaps. In robotic-
arm assisted TKA, the patient-specific computer aided design
model of the patient’s knee joint was used to create a virtual plan
for optimal bone resection and implant positioning. The RIO
robotic interactive orthopaedic arm system (Mako Surgical
Corporation, Kalamazoo, Michigan) was then used to execute
this plan intraoperatively and achieve the planned bone cover-
age and limb alignment. Femoral registration pins were placed
through the midline incision whilst tibial registration pins were
placed through a separate 3 cm longitudinal incision over the
proximal anteromedial tibia. Intraoperative dynamic tracking
markers were used to assess alignment, flexion and extension
gaps, and range of movement, enabling on-table modifications
to bone resection and implant positioning. Tibial and femoral
osteotomies in the coronal plane were performed perpendicular
to the tibial and femoral mechanical axes respectively to achieve
neutral overall alignment. In the sagittal plane, 0° to 5° of fem-
oral component flexion were used to optimize implant sizing
whilst preventing notching. The tibial slope was initially set to
0° and then adjusted as required based on intraoperative assess-
ment of the flexion gap and range of movement.

The cemented Triathlon Posterior Stabilized (PS) implant
(Stryker, Mahwah, New Jersey), knee system with an asymmetrical
patellar resurfacing button was used in both treatment groups.
Polyethylene thickness was selected to maximize range of
operative haemoglobin concentration (g/l). Findings were following: age at time of surgery (years); gender (male/female); surgeons (JRTP and SK). Baseline measurements included the scale following TKA of 4.19 (standard deviation (SD) 1.37),15 on a published mean postoperative score on the numerical rating scale for patients. The assumption of a 10% drop-out rate within the 30 days follow-up period resulted in a net sample size of 80 patients (10%) in the conventional jig-based TKA group. Attainment of physiotherapy targets including time to straight leg raise in the supine position (hours); number of inpatient physiotherapy sessions; use of crutches and independent ascent and descent of stairs.

Outcomes. All demographic data and patient outcomes were prospectively collected by two independent fellowship trained surgeons (JRTP and SK). Baseline measurements included the following: age at time of surgery (years); gender (male/female); body mass index (kg/m²); American Society of Anesthesiologists (ASA) grade (I to IV);10 side of intervention (right/left); and pre-operative haemoglobin concentration (g/l). Findings were compared to establish any baseline differences between the two treatment groups. The following postoperative outcomes were also prospectively collected in all study patients: operating time (minutes); assessment of the intraoperative blood loss based on the difference in pre- and postoperative haemoglobin concentration (g/l); postoperative pain score on the numerical rating scale (0 to 10) at days 0 to 3; opiate analgesia (mg) requirements at days 0 to 3; range of movement at discharge (°); time from completion of operation to independent straight leg raise in the supine position (hours); number of inpatient physiotherapy sessions; use of inpatient continuous passive motion machine; time to hospital discharge (hours); and complications for 30 days following surgery. Study outcomes were selected based on previous studies showing that these early functional parameters influence time to hospital discharge and mid- to long-term clinical outcomes following TKA.11-14

Statistical analysis. A sample size calculation was made based on a published mean postoperative score on the numerical rating scale following TKA of 4.19 (standard deviation (SD) 1.37),15 and a minimum clinically important difference in the numerical rating scale of one point. To achieve a minimum power of 80% in detecting this difference using a two-sample t-test at the level of 5% significance, the study needed to recruit a minimum of 72 patients. The assumption of a 10% drop-out rate within the 30 days follow-up period resulted in a net sample size of 80 patients (40 patients in each group). When comparing baseline and outcome measures between the two treatment groups, continuous variables with normal distributions were compared using the unpaired t-test, whilst the Mann–Whitney U test was used to compare continuous variables that were not normally distributed. One categorical outcome (use of continuous passive motion machine) was analysed using Fisher’s exact test, due to the small number of occurrences of this outcome. Continuous variables found to be normally distributed were displayed with the mean and range, whilst the median and interquartile range (IQR) were presented for factors not found to follow a normal distribution. Categorical variables were shown by the number and percentage of patients where the outcome occurred. Statistical significance was set at a p-value < 0.05 for all analyses and all statistical analysis was performed using SPSS software version 12 (SPSS Inc., Chicago, Illinois).

Results

There was no statistical difference in relation to baseline characteristics recorded between conventional jig-based TKA and robotic-arm assisted TKA (Table I). Interclass correlation coefficient was above 0.8 (0.88 to 0.92) for all postoperative outcomes recorded suggesting good interobserver agreement between the two independent observers. Study outcomes are displayed in Table II.

Patients undergoing robotic-arm assisted surgery had reduced pain scores at each of the four time intervals following surgery compared with conventional jig-based surgery (p < 0.001, unpaired t-test). In both groups, pain scores were greatest at day one, which reflected the day that the PCA was converted to oral analgesia (Fig. 1). Opiate analgesia requirements were also reduced in the robotic-group compared with the conventional group and this was found to be statistically significant at all four time points (p < 0.001, Mann–Whitney U test) (Fig. 2). There was no significant difference in preoperative haemoglobin concentration between the two treatment groups but patients undergoing conventional TKA had a greater reduction postoperatively compared with those undergoing robotic-arm assisted TKA (p < 0.001, unpaired t-test). The pneumatic tourniquet was not inflated in any study patient. Two patients in the robotic-arm assisted TKA group each received two units of red blood cells compared with four patients (10%) in the conventional jig-based TKA group. Attainment of physiotherapy targets including time to straight leg raise (p < 0.001, Mann–Whitney U test) and maximum knee flexion at discharge (p < 0.001, unpaired t-test) followed the same trend with improved outcomes in the robotic-arm assisted TKA group compared with the conventional jig-based TKA group (Figs 3 to 6). Each boxplot graphically displays the respective study outcome with the transverse line showing the median value and the box part representing the interquartile range. The whiskers extend to the minimum and maximum value, except for values more than 1.5 × interquartile range width from the lower or upper quartiles, which are plotted separately. There was a tendency towards to increased operating time in robotic-arm assisted TKA but overall hospital discharge was reduced in the robotic group (p < 0.001).

There were two inpatient complications in this study, which included one patient from each treatment group. In the conventional jig-based TKA, one patient had minor wound dehiscence from the distal part of the midline incision, which was treated...
with prophylactic antibiotics and adhesive skin strips to approximate the wound edges. In the robotic-arm assisted TKA group, one patient had minor wound dehiscence over the incision for the proximal tibial registration pins. This was treated with regular dressings and prophylactic oral antibiotics. Both patients made a satisfactory recovery with no further complications.

Discussion
In this prospective cohort study, there were no systematic differences in baseline characteristics between the two treatment groups, surgery was undertaken by a single surgeon using the same approach with identical implant designs, and inpatient rehabilitation performed using a standardized programme with the same rehabilitation team. Robotic-arm assisted TKA was associated with reduced postoperative pain, decreased analgesia requirements, smaller drop in haemoglobin concentration, shorter time to be able to perform a straight leg raise, improved maximum knee flexion at discharge and decreased length of stay compared with conventional jig-based TKA. Our findings suggest that implementation of robotic-arm assisted surgery may help to further improve early functional recovery and reduce time to hospital discharge in patients undergoing TKA.

Analysis of data from the National Joint Registry of England and Wales showed that persistent pain following TKA is the strongest predictor of patient dissatisfaction and reduced functional outcomes including the Oxford Hip Score.\(^\text{16}\) Regression analysis has also shown that postoperative pain is the most important prognostic indicator for long-term dissatisfaction following TKA.\(^\text{11}\) Our study showed reduced pain and opiate analgesia requirements at each of the four time points in patients undergoing

### Table I. Demographic and baseline measurements for study patients undergoing conventional jig-based total knee arthroplasty (TKA) and robotic-arm assisted TKA

| Characteristic       | Category | Conventional (n = 40) | Robotic (n = 40) | p-value |
|----------------------|----------|-----------------------|-----------------|---------|
| Mean age (yrs)       | -        | 71.4 (54.2 to 87.1)   | 69.7 (53.1 to 85.3) | 0.32†   |
| Gender (%)           | Female   | 25 (62)               | 22 (55)         | 0.50†   |
|                      | Male     | 15 (38)               | 18 (45)         |         |
| Mean BMI (kg/m\(^2\))| -        | 26.7 (20.3 to 36.0)   | 27.9 (21.8 to 37.1) | 0.17†   |
| ASA score (%)        | I        | 7 (18)                | 8 (20)          | 0.88†   |
|                      | II       | 29 (72)               | 27 (67)         |         |
|                      | III      | 4 (10)                | 5 (13)          |         |
| Side intervention (%)| Left     | 20 (50)               | 18 (45)         | 0.65†   |
|                      | Right    | 20 (50)               | 22 (55)         |         |
| Mean preoperative Hb (g/L) | -       | 132.7 (95.1 to 164.3) | 133.3 (113.2 to 154.6) | 0.82†   |

\(^\text{†Chi-squared test}\)

BMI, body mass index; ASA, American Society of Anesthesiologists; Hb, Haemoglobin

### Table II. Study outcomes for patients undergoing conventional jig-based total knee arthroplasty (TKA) and robotic-arm assisted TKA

| Outcome                                      | Conventional (n = 40) | Robotic (n = 40) | p-value |
|----------------------------------------------|-----------------------|-----------------|---------|
| Mean operating time (mins)                   | 61.2 (54.6 to 83.1)   | 70.4 (59.2 to 91.7) | 0.34*   |
| Mean fall in Hb (g/L)                        | 26.1 (5.1 to 49.6)    | 18.7 (8.0 to 37.2) | < 0.001* |
| Mean postoperative Hb (g/L)                  | 106.7 (77.3 to 138.4) | 114.7 (86.4 to 139.1) | 0.01*   |
| Mean pain score (NRS) – Day 0                | 5.4 (3.0 to 7.0)      | 3.1 (2.0 to 5.0)  | < 0.001* |
| Mean pain score (NRS) – Day 1                | 6.3 (4.0 to 8.0)      | 3.6 (2.0 to 6.0)  | < 0.001* |
| Mean pain score (NRS) – Day 2                | 6.1 (3.0 to 8.0)      | 3.3 (1.0 to 5.0)  | < 0.001* |
| Mean pain score (NRS) – Day 3                | 4.5 (2.0 to 7.0)      | 2.6 (1.0 to 5.0)  | < 0.001* |
| Median analgesia (mg) – Day 0                | 36.0 (IQR 29.0 to 51.3) | 20.0 (IQR 16.0 to 28.5) | < 0.001* |
| Median analgesia (mg) – Day 1                | 10.0 (IQR 10.0 to 20.0) | 10.0 (IQR 0.0 to 10.0) | < 0.001* |
| Median analgesia (mg) – Day 2                | 10.0 (IQR 10.0 to 20.0) | 10.0 (IQR 0.0 to 10.0) | < 0.001* |
| Median analgesia (mg) – Day 3                | 10.0 (IQR 0.0 to 10.0) | 0.0 (IQR 0.0 to 5.0) | < 0.001* |
| Median time to SLR (hrs)                     | 31.0 (IQR 24.0 to 44.0) | 20.0 (IQR 18.0 to 21.0) | < 0.001* |
| Median knee extension (°)                   | 0.0 (IQR 0.0 to 0.0)  | 0.0 (IQR 0.0 to 0.0) | 0.08†   |
| Median physiotherapy sessions (n)            | 93.3 (90.0 to 110.0)  | 104.1 (90.0 to 120.0) | < 0.001* |
| CPM sessions, n (%)                          | 11.0 (IQR 9.0 to 11.0) | 5.0 (IQR 5.0 to 6.0) | < 0.001† |
| Median time to discharge (hrs)               | 105.0 (IQR 98.0 to 126.0) | 77.0 (IQR 74.0 to 81.0) | < 0.001† |

\(^\text{*Unpaired t-test}\)
\(^\text{†Mann-Whitney U test}\)
\(^\text{‡Fisher’s exact test}\)

NRS, numerical rating scale; Hb, haemoglobin concentration; IQR, interquartile range; SLR, straight leg raise; CPM, continuous passive motion machine
robotic-arm assisted surgery compared with conventional jig-based TKA, which we hope would lead to improved long-term patient satisfaction and functional outcomes in the robotic TKA group. Marchand et al.\(^7\) compared outcomes in 28 robotic-arm assisted TKAs matched with 20 conventional jig-based TKAs and showed that pain, physical function scores and patient satisfaction measured using Western Ontario and McMaster Universities Arthritis Index\(^8\) were better in the robotic group compared with the conventional group at six months after surgery. Our data shows important differences in pain and analgesia requirements in the early postoperative period but the long-term clinical significance of these remains unknown. The present data will be subsequently correlated to validated long-term clinical and functional outcome measures.

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**Fig. 1**
Boxplot showing pain score as measured using the numerical rating scale in conventional jig-based total knee arthroplasty (TKA) versus robotic-arm assisted TKA.

**Fig. 2**
Boxplot showing opiate analgesia requirements in conventional jig-based total knee arthroplasty (TKA) versus robotic-arm assisted TKA.
Robotic-arm assisted TKA uses dynamic referencing to assess intraoperative knee stability, alignment and range of movement, enabling on-table adjustments to bone resection and implant positioning to be performed. The surgeon is able to manipulate bone cuts to achieve the desired flexion and extension gaps without having to perform extensive soft-tissue releases. No additional soft-tissue releases for knee balancing were performed in the robotic-arm assisted group in this study. Reduced soft-tissue dissection and muscle trauma may have helped to reduce the local inflammatory response and time to attainment of physiotherapy targets such as straight leg raise in the robotic-group compared with patients undergoing conventional jig-based TKA.

Siebert et al. conducted a retrospective study on 70 patients undergoing robotic-arm assisted TKA versus a matched historic cohort of 50 conventional TKAs, and observed reduced postoperative soft-tissue swelling in the robotic-group but the size or difference in the effect was not quantified. There are no existing studies comparing the local or systemic inflammatory response and time to attainment of physiotherapy targets such as straight leg raise in the robotic-group compared with patients undergoing conventional jig-based TKA. Siebert et al. conducted a retrospective study on 70 patients undergoing robotic-arm assisted TKA versus a matched historic cohort of 50 conventional TKAs, and observed reduced postoperative soft-tissue swelling in the robotic-group but the size or difference in the effect was not quantified. There are no existing studies comparing the local or systemic inflammatory response and time to attainment of physiotherapy targets such as straight leg raise in the robotic-group compared with patients undergoing conventional jig-based TKA.

The technical objectives of TKA are to restore mechanical alignment, preserve the joint line, balance flexion and extension gaps and maintain the normal Q angle for correct patella tracking. In order to achieve these objectives, preservation of the surrounding soft-tissue envelope is essential. Compromise to the periarticular soft-tissue structures such as the collateral ligaments, posterior cruciate ligament or extensor mechanism, may compromise postoperative clinical and functional recovery, reduce stability and decrease implant survivorship. Manual based techniques may lead to inadvertent disruption of the periarticular soft-tissue structures, and in many cases these ligamentous and soft-tissue injuries are underreported. Robotic-arm assisted TKA limits saw blade action to within the fixed stereotactic field, which conceptually helps to reduce iatrogenic bone and soft-tissue injury. In this study, no intraoperative macroscopic soft-tissue complications were identified but previous cadaveric reports have shown that robotic-arm assisted technology can reduce more discrete periarticular soft-tissue injuries. Khlopas et al. conducted a prospective non-randomized study comparing soft-tissue injury in six cadaveric knees undergoing robotic-
arm assisted TKA versus seven conventional jig-based TKA. The authors found mild posterior cruciate ligament injury in two of the seven conventional jig-based TKAs compared with none of the six robotic-arm assisted TKAs, with more extensive soft-tissue disruption in the conventional group on careful visual evaluation and palpation. In the current study, improved preservation of the periarticular soft-tissue envelope and reduced iatrogenic trauma in the robotic-arm assisted group may have helped to limit pain and enhance early functional recovery.

In this study, there was a trend towards increased operating time in the robotic group but this was not statistically significant. Our findings are consistent with a previous study by Song et al., who conducted a prospective study on 30 patients undergoing sequential TKA, which included conventional jig-based TKA on one side followed by robotic-arm assisted TKA on the contralateral side. The authors reported no difference in operating time between the two treatment groups, with mean operating time in the robotic-arm assisted of 95 minutes (SD 18). Park and Lee reported on the learning curve of robotic-arm assisted TKA and showed that six of their 32 robotic-arm assisted TKAs had short-term complications, including superficial infection, patellar ligament rupture, patellar dislocation, supracondylar fracture, patellar fracture and common peroneal injury during the learning phase. The reduced operating time and absence of intraoperative complications in our cohort of patients compared with these previous studies may be due to the operating surgeon in this study having extensive training in robotic-arm assisted TKA in cadaver-workshops and prior experience in performing computer navigated arthroplasty. As such progression along the learning curve for some aspects of robotic-assisted surgery may have already been achieved.

There is growing literature showing that robotic-arm assisted knee arthroplasty is associated with improved accuracy of implant positioning, better short- to mid-term functional scores and reduced revision rates compared with conventional jig-based TKA. Although a financial analysis has not been undertaken, our findings do show important differences in inpatient rehabilitation and hospital stay, which will aid healthcare policy makers in the allocation of medical resources and cost planning for the implementation of this technology into clinical practice. There are several limitations of this study that need to be considered when interpreting the findings. First, all patients received general anaesthetic, which is not keeping in with current trends in enhanced recovery programmes and this may have reduced the overall rehabilitation time in both treatment groups. Second, the reported early functional outcome measures were not correlated to long-term clinical outcomes or implant survivorship. Third, patients and observers recording outcomes of interest could not be blinded as patients in the robotic group had an additional incision over the proximal tibia for the insertion of the registration pins. Fourth, the use of historical controls may have introduced bias into the study due to increasing drive for faster rehabilitation and reduced length of stay. Improved outcomes in the robotic group may therefore not be exclusively due to surgical technique. Fifth, preoperative grading of the arthritides and radiological outcomes were not analysed in this study. Despite these limitations, this prospective single surgeon study used the same surgical approach, implant design and rehabilitation programme in two systemically matched treatment groups, and showed improved early functional recovery and time to hospital discharge with no additional risk of complications in robotic-arm assisted TKA compared with conventional jig-based TKA.

Robotic-arm assisted TKA was associated with reduced postoperative pain, decreased analgesia requirements, less reduction in postoperative haemoglobin levels, shorter time to perform a straight leg raise, decreased length of stay, and improved maximum knee flexion at discharge compared with conventional jig-based TKA. There was no additional risk of inpatient complications in patients undergoing robotic-arm assisted TKA compared with conventional jig-based TKA.

Take home message:
- Robotic-arm assisted TKA is associated with reduced postoperative pain and analgesia requirements compared with conventional jig-based TKA.
- Robotic-arm assisted TKA is associated with improved early functional recovery compared with conventional jig-based TKA.
- Robotic-arm assisted TKA is associated with reduced time to hospital discharge compared with conventional jig-based TKA.

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Funding statement:
The author or one or more of the authors have received or will receive benefits for personal or professional use from a commercial party related directly or indirectly to the subject of this article. In addition, benefits have been or will be directed to a research fund, foundation, educational institution, or other non-profit organization with which one or more of the authors are associated.

This research/study/project was supported by the National Institute for Health Research University College London Hospitals Biomedical Research Centre.

Acknowledgements:
The authors would like to thank Dr Craig Goldsack – Consultant Anaesthetist, University College Hospital and Princess Grace Hospital, London, United Kingdom.

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This article was primary edited by G. Scott.