Robotic Assisted Knee Replacement Surgery – Rationale & Benefits

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THIS IS MODERN MEDICINE

Learning Outcomes

- Rationale and process of Mako robotic assisted knee replacement
- Evidence



Rationale for Robotic Assisted Total Knee Replacement



Rationale for Robotic Assisted Total Knee Replacement



Partial or Total Knee Replacement











CT of Knee Including Hip Ankle Alignment





Preoperative Planning Implant Size, Position, Alignment



b



а

Intraoperative: Registration of Knee





Intraoperative: Registration Of Knee – Bone Surface Mapping







Dynamic Assessment: Stress the Knee... How Loose or Tight?



Graph Balancing

- Each Vertical Bar is a "Pose" Captured and taken at a specific range of motion
- A Blue Bar Up is Loose
- An Orange bar Down is Tight
- Left: Early flexion
- Middle: Mid Range flexion
- · Right: Deep flexion
- Each horizontal line is a 1 mm change in tension up or down





Robotic Arm Assisted Bone Cuts According To Operative Planning







Case From Beacon Hospital





WB

Post-Operative X-Ray







KNEE An assessment of early functional rehabilitation and hospital discharge in conventional versus vehatic arm assists

conventional versus robotic-arm assisted unicompartmental knee arthroplasty

A PROSPECTIVE COHORT STUDY

B. Kayani,

S. Konan,

J. Tahmassebi,

F. E. Rowan,

F. S. Haddad

From University College London Hospital and Princess Grace Hospital

Aims

The objectives of this study were to compare postoperative pain, analgesia requirements, inpatient functional rehabilitation, time to hospital discharge, and complications in patients undergoing conventional jig-based unicompartmental knee arthroplasty (UKA) *versus* robotic-arm assisted UKA.

Patients and Methods

This prospective cohort study included 146 patients with symptomatic medial compartment knee osteoarthritis undergoing primary UKA performed by a single surgeon. This included 73 consecutive patients undergoing conventional jig-based mobile bearing UKA, followed by 73 consecutive patients receiving robotic-arm assisted fixed bearing UKA. All surgical procedures were performed using the standard medial parapatellar approach for UKA, and all patients underwent the same postoperative rehabilitation programme. Postoperative pain scores on the numerical rating scale and opiate analgesia consumption were recorded until discharge. Time to attainment of predefined functional robabilitation outcomes, hospital discharge, and postoperative complications were

Decreased Opioid Analgesia Required In Robotic Group



Boxplot showing pain opiate analgesia consumption in patients undergoing conventional jig-based unicondylar arthroplasty (UKA) versus robotic-arm assisted UKA.



Quicker Time To Straight Leg Raise

AN ASSESSMENT OF EARLY FUNCTIONAL REHABILITATION AND HOSPITAL DISCHARGE



Boxplot showing time to straight leg raise in patients undergoing conventional jig-based unicondylar knee arthroplasty (UKA) *versus* robotic-arm assisted UKA.



Quicker Discharge From Hospital



Fig. 6

Boxplot showing time to hospital discharge in patients undergoing conventional jig-based unicondylar knee arthroplasty (UKA) versus robotic-arm assisted UKA.



Evidence For Mako Robotic Total Knee Replacement



THE KNEE SOCIETY Robotic-assisted total knee arthroplasty improves accuracy and precision compared to conventional techniques

From Mayo Clinic Hospital, Phoenix, Arizona, USA

Bone Joint J 2021;103-B(6 Supple A):74-80.

• 103 conventional TKA versus 96 robotic TKA



Robotic TKA Is More Precise In Planning Component Position

Variable	M-TKA	RA-TKA	p-value*
Mean difference in femoral positioning, ° (SD)	1.7 (1.1)	0.9 (1.2)	< 0.001
Mean difference in tibial positioning, ° (SD)	1.3 (1.0)	0.3 (0.9)	< 0.001
Mean difference in posterior tibial slope, ° (SD)	1.7 (1.1)	-0.3 (1.3)	< 0.001
Mean difference in mechanical axis limb alignment, ° (SD)	2.7 (1.9)	1.0 (1.7)	< 0.001
Postoperative outliers, n (%)†	39.0 (37.9)	21.0 (21.8)	0.020

Table II. Comparison of preoperative plan to postoperative final component positioning.

*Independent-samples t-test.

*Defined as < -3° or > 3° on final mechanical axis limb alignment.

M-TKA, manual total knee arthroplasty; RA-TKA, robotic-assisted total knee arthroplasty; SD, standard deviation.





- Robotic assisted knee replacement aims to increase precision in implant position, limb alignment and soft tissue balance with less operative trauma to soft tissues
- Evidence earlier supporting improved alignment, earlier return to function
- ¿Long term effect on survivorship, particularly in younger patients...



Thank you

