

Robotic total knee arthroplasty (TKA)

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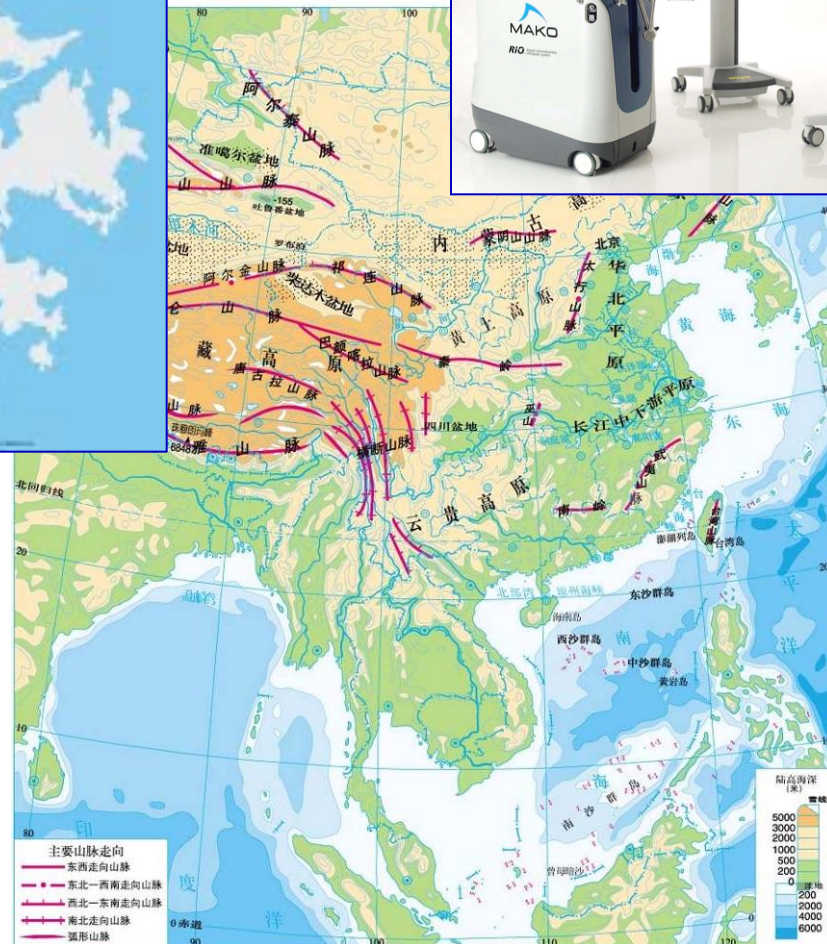
9.6.2026

1st Robotic (RIO) system for joint replacement

in Asia



Installed on 13 June 2012
in Hong Kong Sanatorium &
Hospital (HKSH)



影片



協助膝關節病人踏出新一步 | 守護生命的故事2 #9 | 吳啟華 | TVB 2014

YouTube · TVB Anywhere Life
2019年9月25日

<https://youtu.be/m9C8sMO7Fec?si=PvfALDAIM46oKaHO>



學如逆水行舟，不進則退。

Factors affecting the longevity of implants – after total knee arthroplasty (TKA)

- **Materials**
- **Design**
- **Surgical technique**



Surgeons were tired of inaccurate operations

Traditional method in performing TKR, using different guides

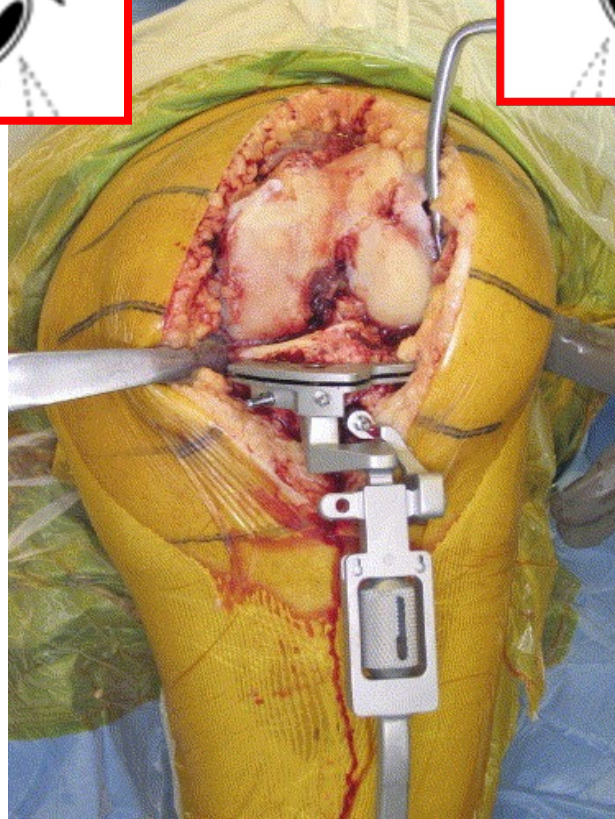
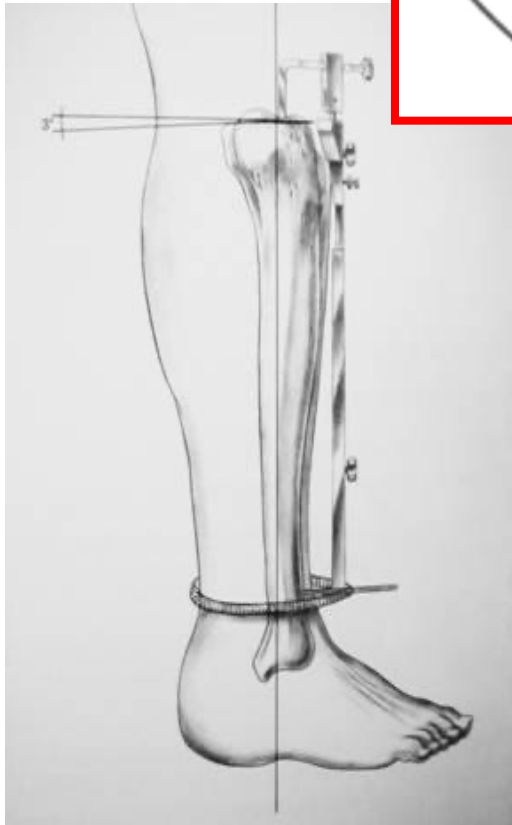
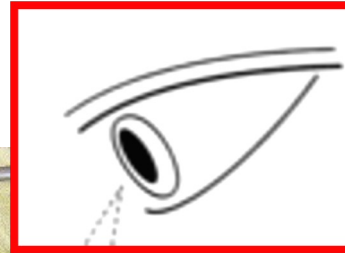
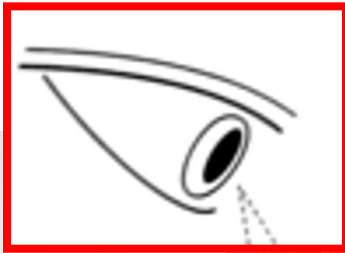
NOT a fool proof procedure

Even experienced surgeon can go wrong

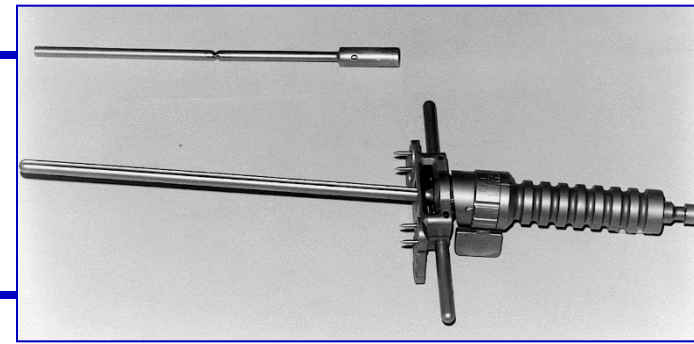


Extramedullary guide for bone cuts

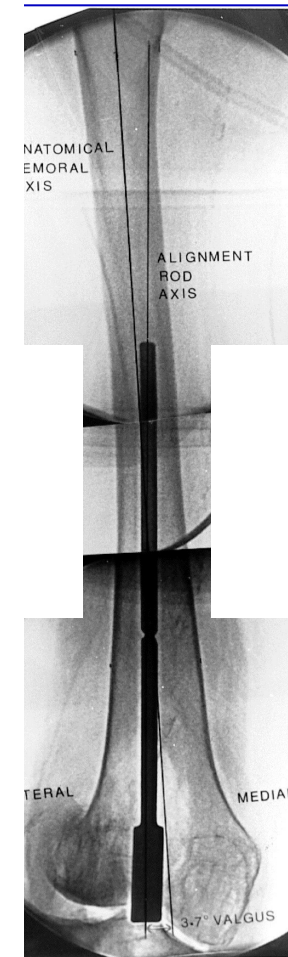
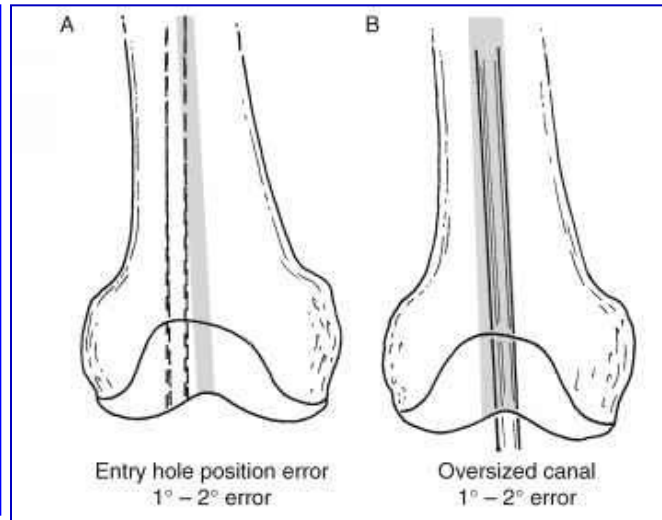
- Can be inaccurate



Intramedullary guide - for bone cuts



- Could be placed eccentrically



Functional outcomes



**Longevity of
implants**

Materials

Design

**Surgical technique
is good**

Implants

- More durable



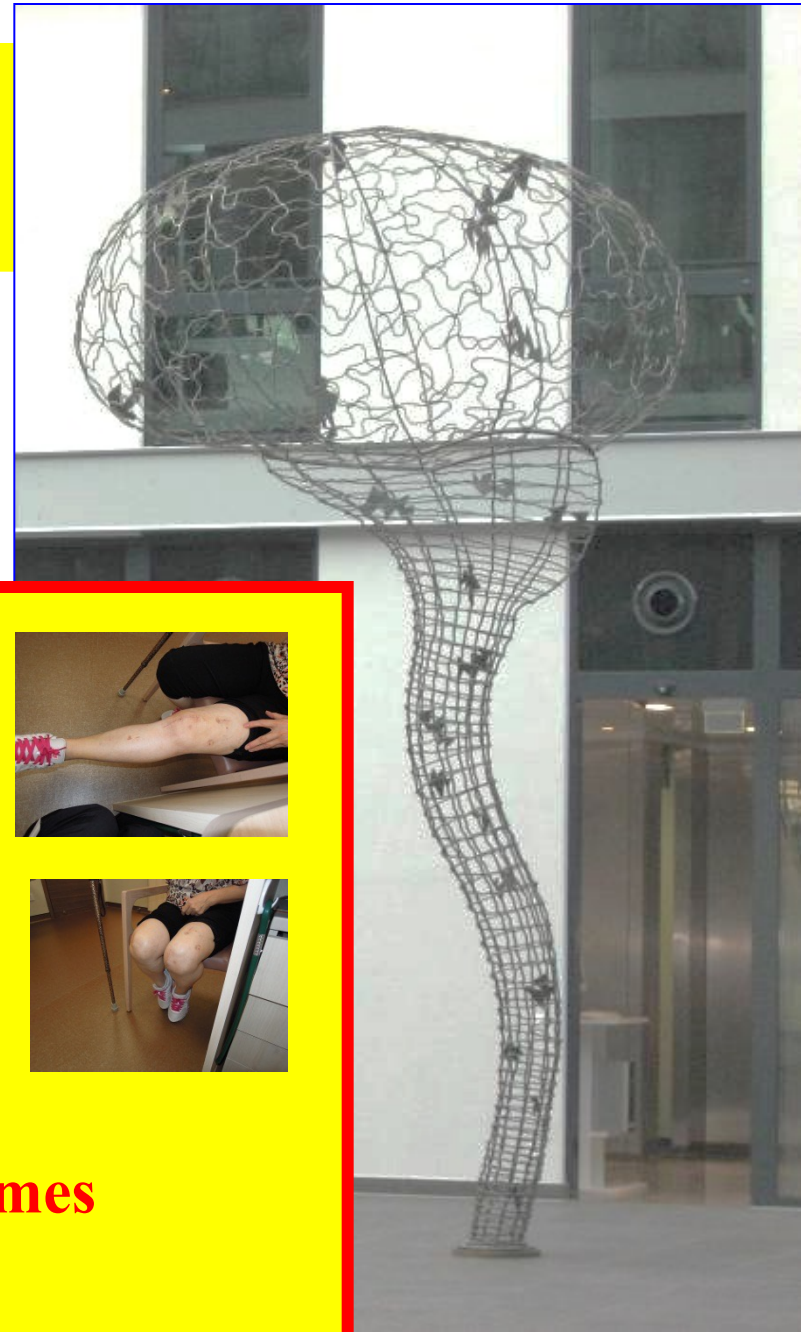
Recovery

- Less painful

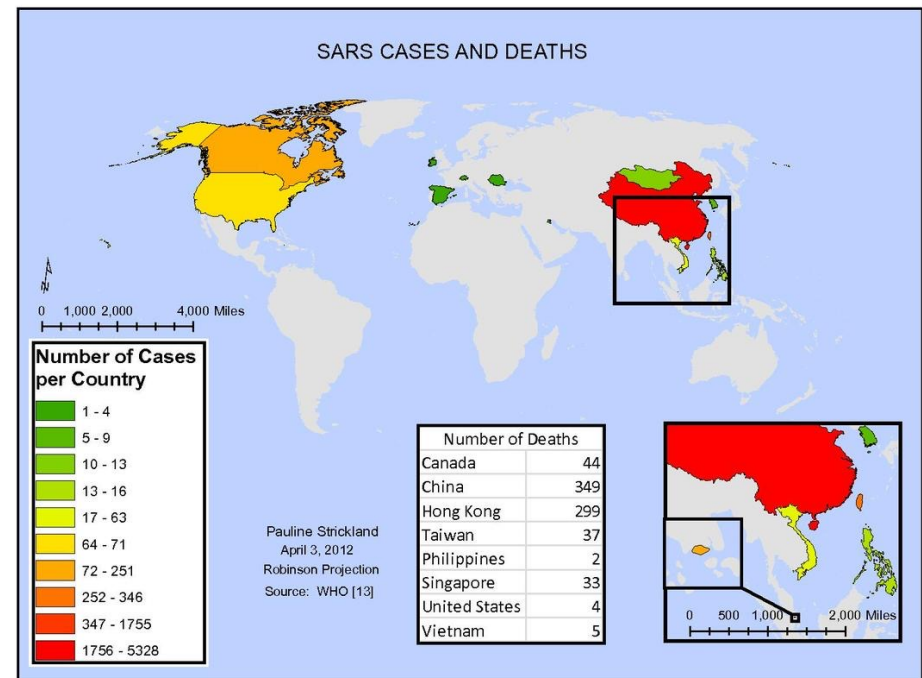


Functional outcomes

- Better



2003, SARS

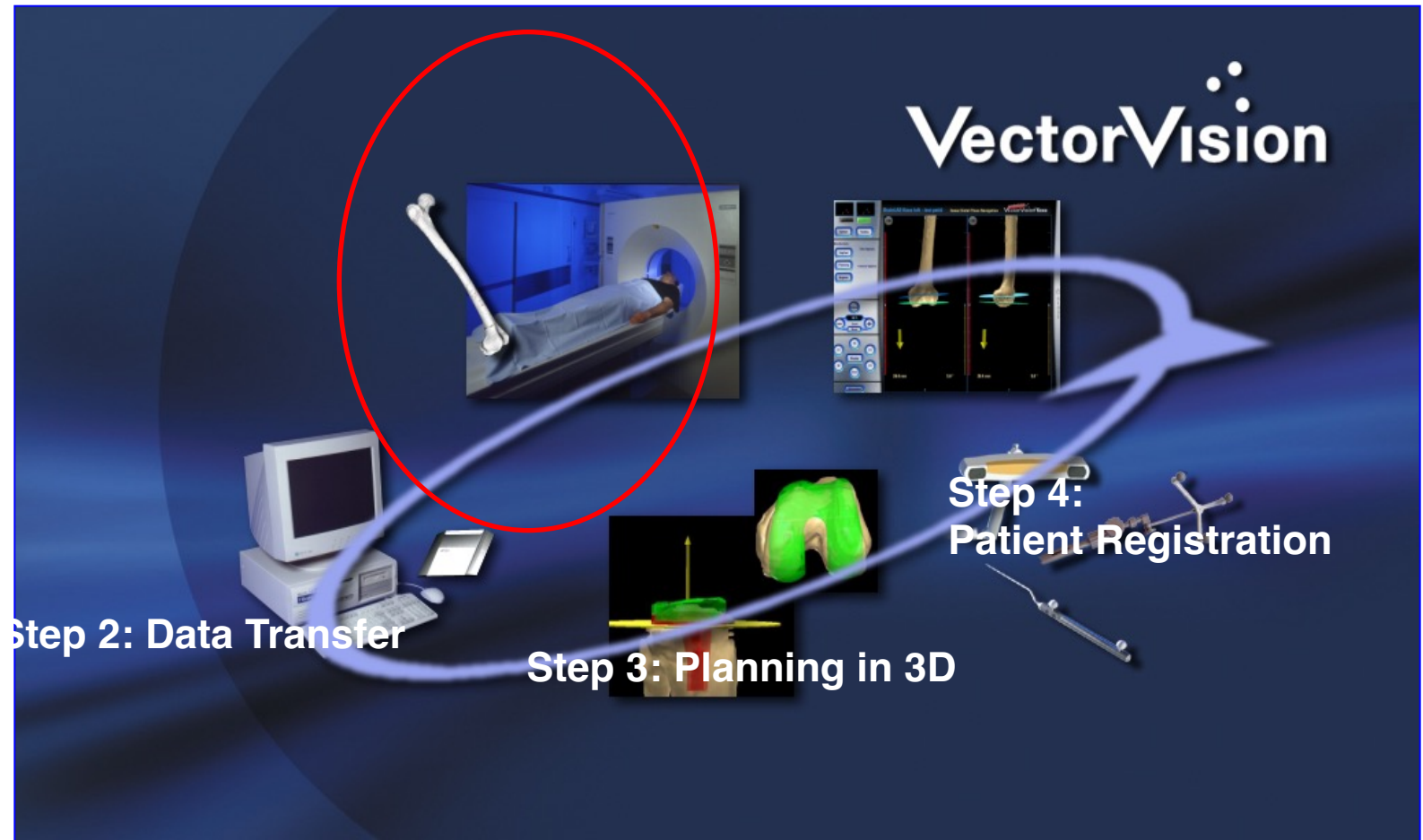


2003

Computer-assisted navigation system (CANS) in total joint replacements

CANS - Integration of different technology

- Started to be used



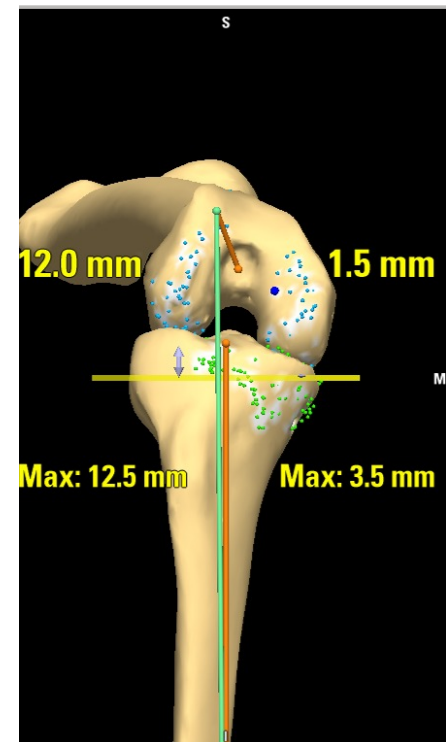
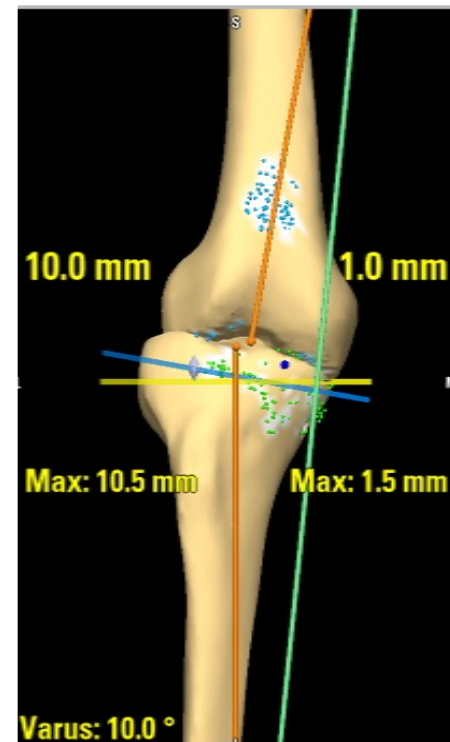
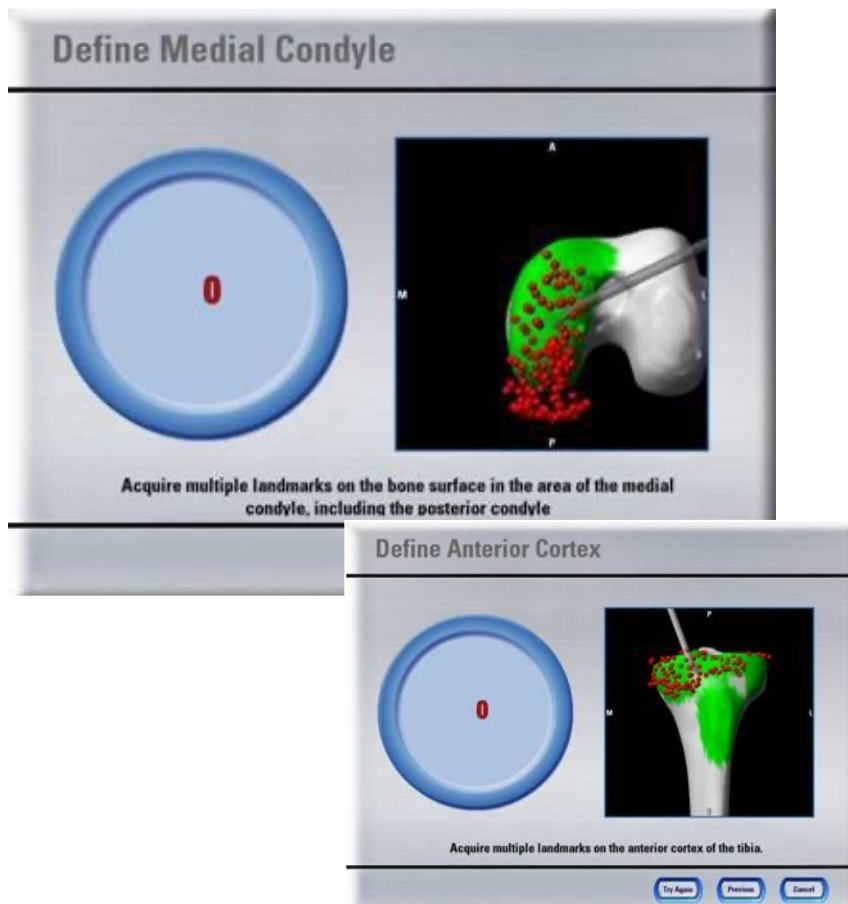
Computer-assisted Navigation system (CANS) in TKA

Paradigm shift

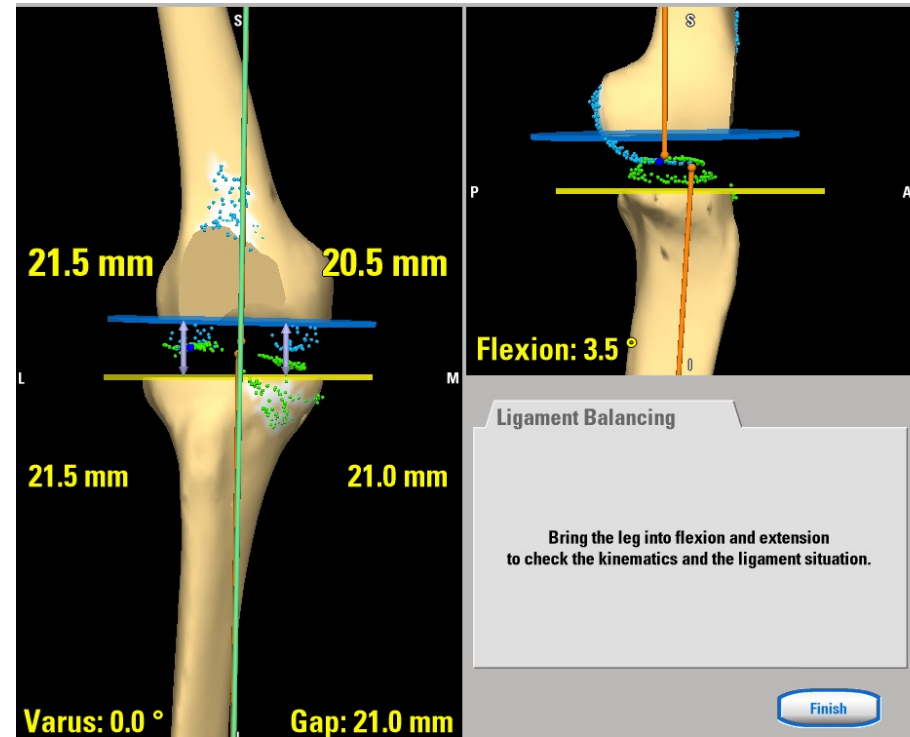
- in the method of surgery
- In use since 2004 in HKSH
- **Changed the way how TKA is performed**



Generate the **BONE & SOFT TISSUE** model of the knee in the computer

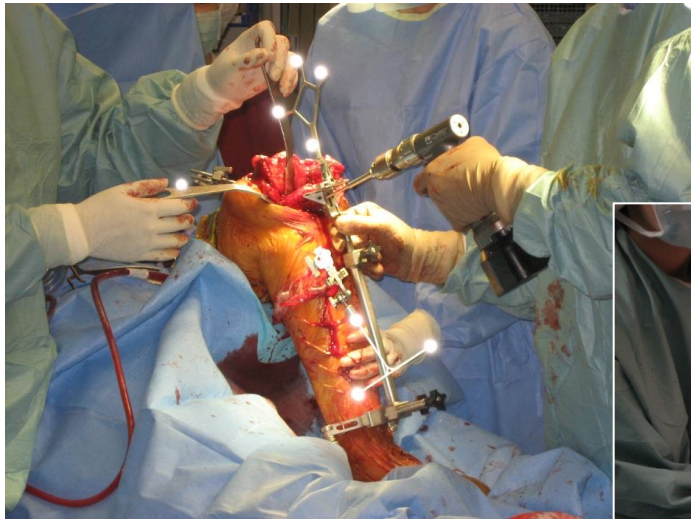


Can check accuracy of the **ligament balance** of the joint



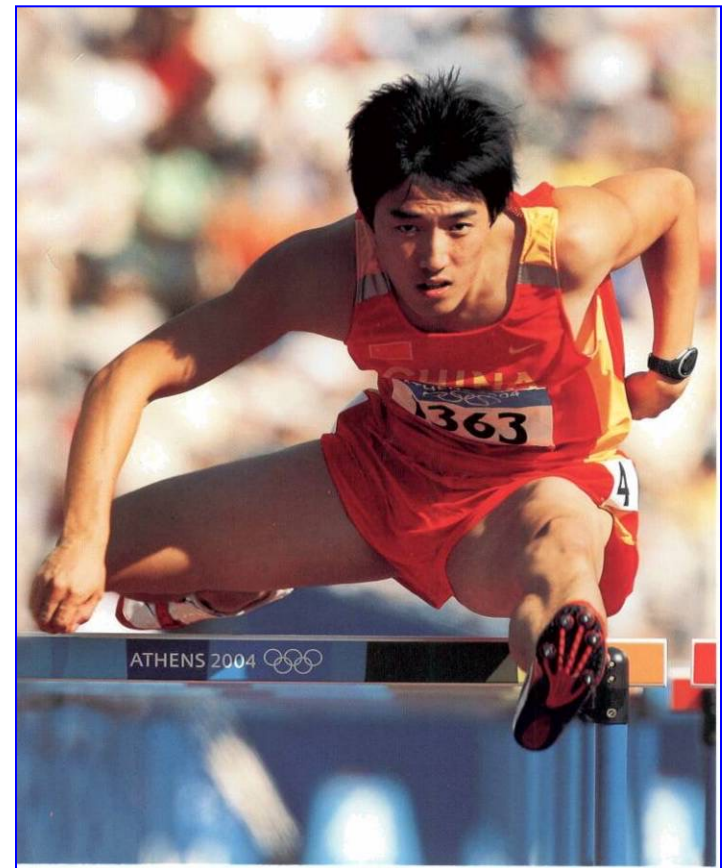
Navigation system

- to an accuracy of
better than 1 mm and 1 degree



Total knee replacement & the computer-assisted navigation system

- Many hurdles gone over



Era of Precision Surgery

Mako™

RIO 2.X to Mako 3.0 Upgrade



1st Asian Robotic Partial Knee Replacement Hong Kong, China 6/18/2012



2012

Mako Robotic Interactive Orthopaedic System



Makoplasty = Robot-assisted joint arthroplasty



Robotic Knee and Hip arthroplasties

stryker


MAKO
SURGICAL CORP.®



Robotic joint replacements using the **Stryker** system

- Come in different names
- Robotic UKA, BiKA, PKA, TKA, THA
- Mako UKA, BiKA, PKA, TKA, THA
- Makoplasty

Advantages of the robotic system

- Precision
- Safety
- Flexibility
- Excellent outcome

追求卓越，做到最好。

Robotic Total Knee Arthroplasty since 2018

- Bringing TKA to a higher level

Stryker TKA



2019



2020



22.10.2020 The 100th Robotic TKA



Robotic TKA 200



Robotic TKA 300



The Mako robotic system (智能機械臂 系統)

機械手臂
(The hands)

導航系統
(The eyes)

電腦及特制軟件
(The brain)



Before the operation, CT planning of the patient's knee

Build up the **3D model** of the knee

stryker Case Planning Case Completion Dr. Wu

Varus 0.0°

External 3.0° **Internal** 2.4°

PCA TEA

Flexion 2.5°

9.0 **9.0**

M 9.5 16.0 L

0.5 **7.0**

12.0 **9.5**

M 12.5 16.5 L

0.5 **7.0**

Bone Resection

0.0°

Varus

0.0°

External

3.0°

P. Slope

Triathlon® PS Cruciform

Femur Ant. 1

Tibia 1

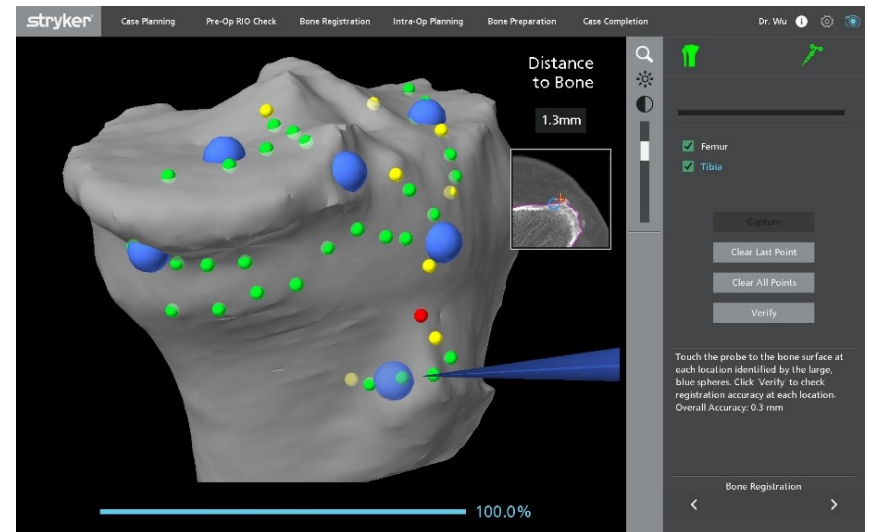
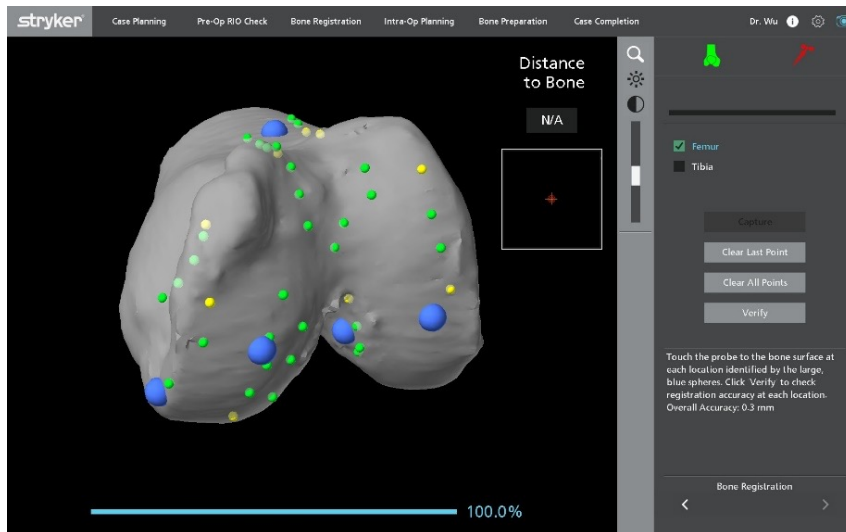
Poly 9

Capture points

Femur Capture Delete

Implant Planning

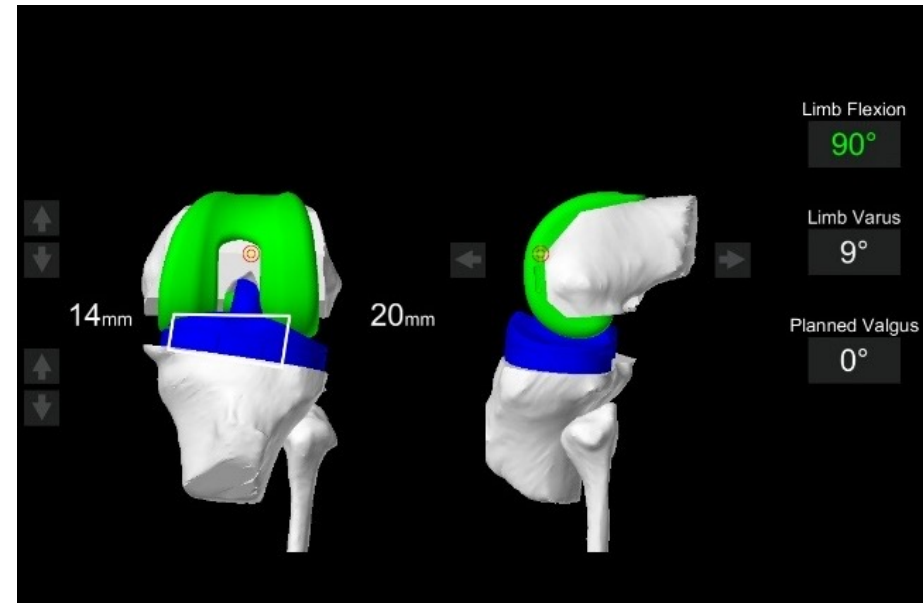
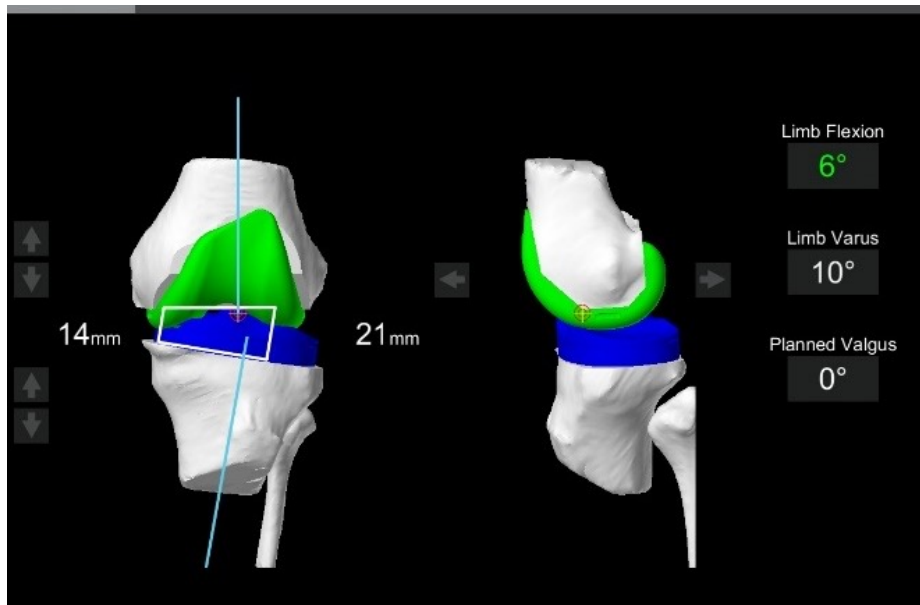
During the operation,
the Technology allows
synchronization of
preop. CT data with
patient's anatomical
landmarks intraop.





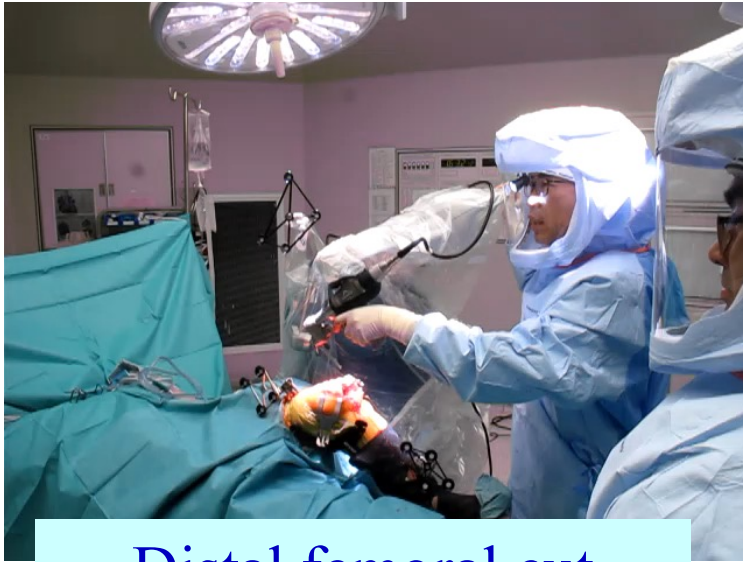
Ligament balance assessment

- **Soft tissue tension assessment** throughout the whole procedure



Bone cuts system

- Cut by the robot
- Under surgeon's control
- guided by the navigation system



Distal femoral cut

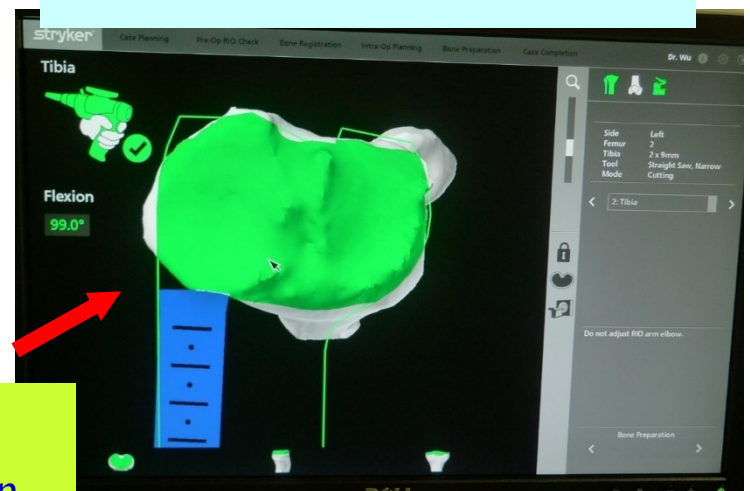


Proximal tibial cut



Cut within the boundary

- Improved safety of the operation



Case example 1

LM

M/83

Bilateral OA knees
could not walk
wheelchair bound

Flexion contracture
- serious

Surgeries on
29.11.2019 and 3.6.2020



X-rays before the operations



2.10.2021

Walking again without aids



X-rays after the operations



Case example 2

Ms. L

F/66

Consultation on 13.6.2022

- Persistent **right** knee pain despite various non-operative treatment
- Still with pain on walking
- Affected her activities of daily living
- Could not walk for more than 30 minutes

13.6.2022

- X-rays of knees
- Marked degenerative changes





5.1.2026

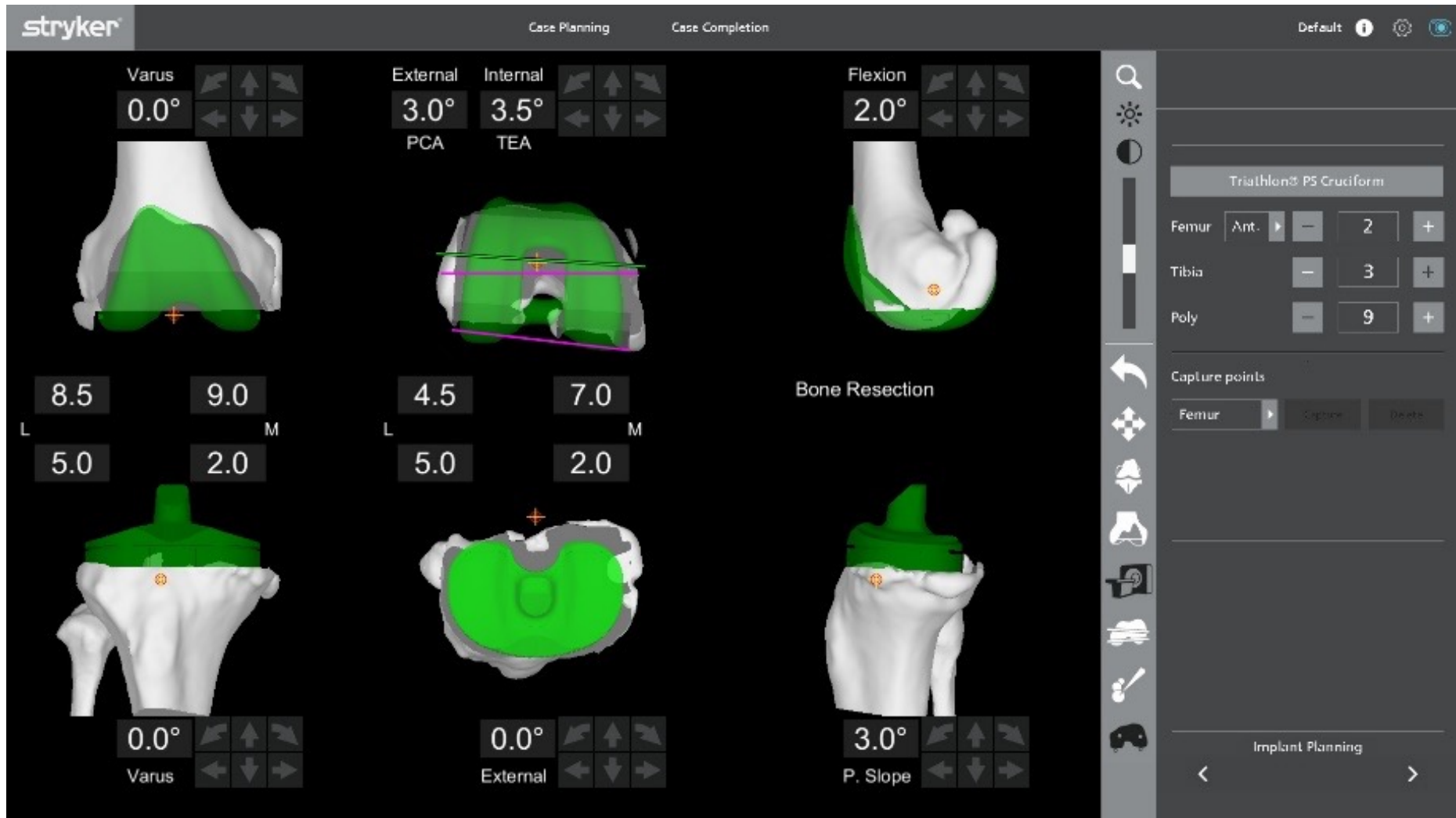
- Very painful right knee
- Decided to go for total knee arthroplasty (TKA)



Robotic Total knee Arthroplasty (TKA)



Pre-operative CT planning of right knee



The robot is under control of the surgeon



21.1.2026

Right knee robotic TKA surgery done

- Video
- The condition at the recovery room after the right knee robotic total knee arthroplasty



22.1.2026

- Video
- The condition one day after the operation.



26.1.2026

X-ray right knee after the operation



27.1.2026

- Video
- Day 6 after the operation



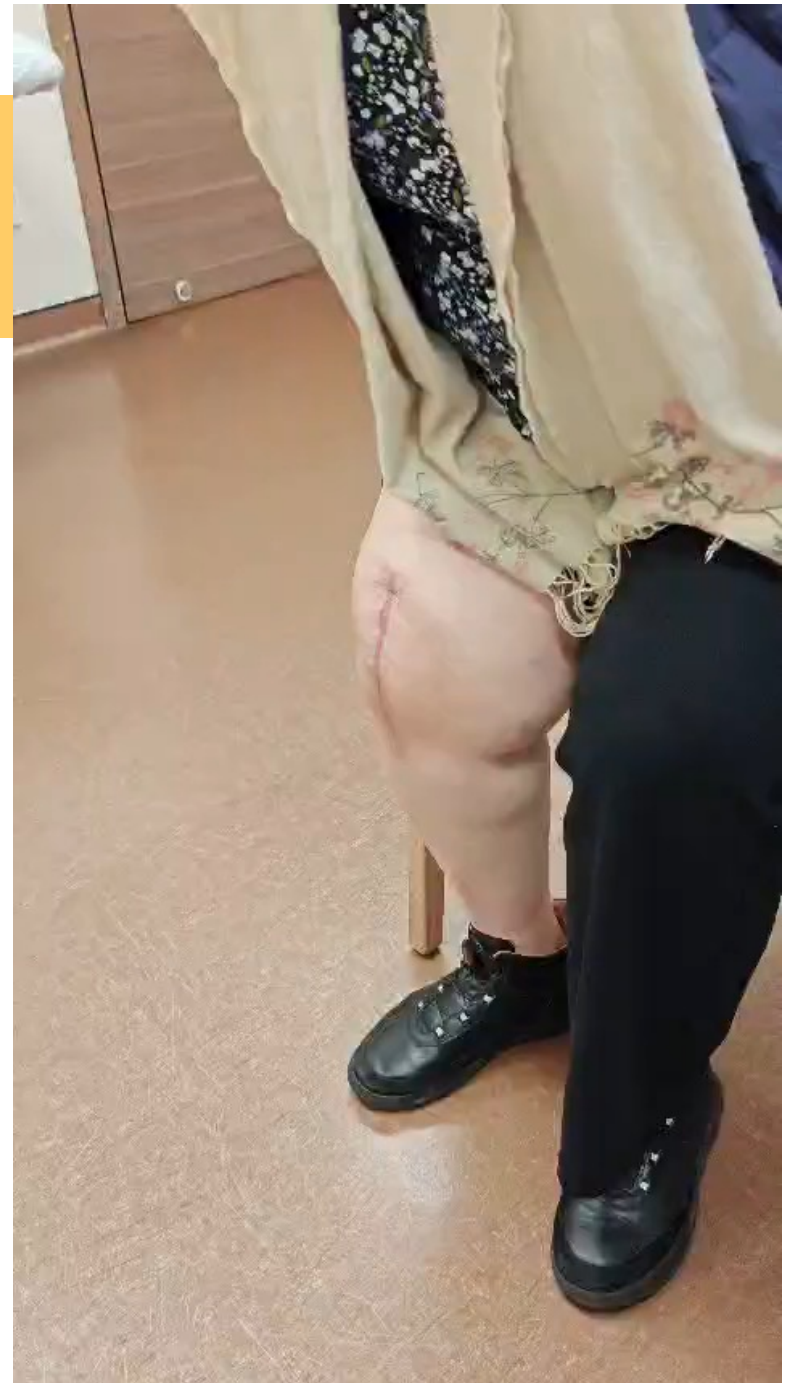
3.2.2026

- Video
- Day 13 after the operation.



13.3.2026

- Video
- Day 51 after the operation.



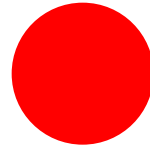
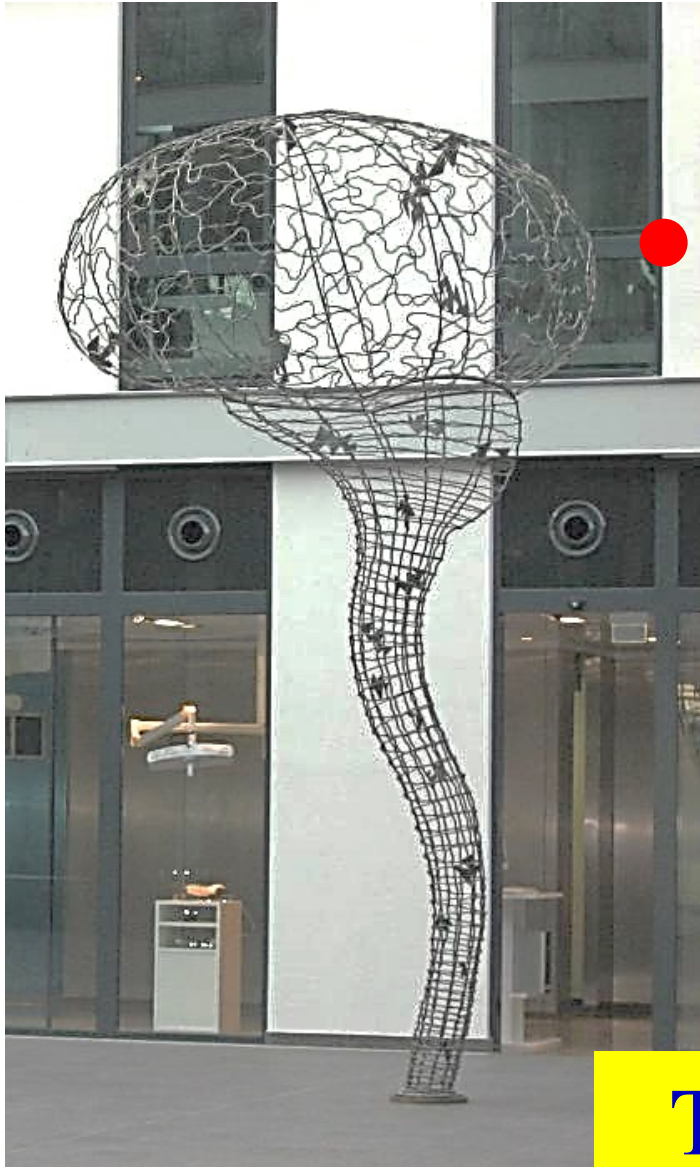
17.4.2026

- Video
- 3 months after the operation



3 months after the operation





Think different. Thank you