Robotics 2.0

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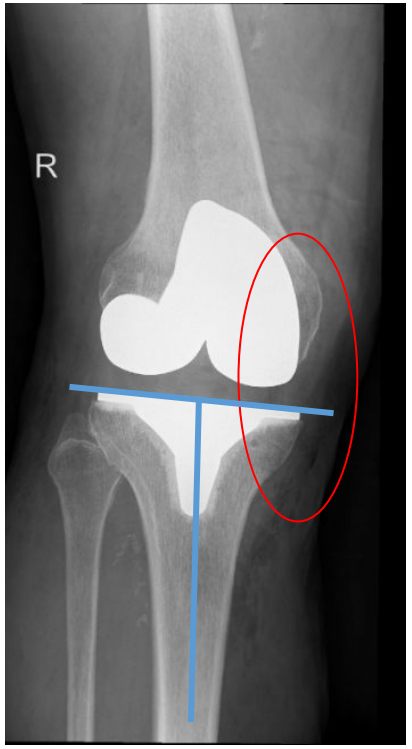
Knee Surgery & Sports Traumatology

Orthoclinic Brugge

Az Sint-Jan & AZ Sint-Lucas

Total Knee Arthroplasty

- Goal
  - Stable – Medial compartment (MCL)
  - Alignment (3D) – PSA
  - No relaeses (<----> Alignment strategies)
  - Stable medial compartment



=> Functional aligned STABLE joint => Satisfaction

(Manual TKA : 80-90 %)

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Keys to succes in TKA

Indication:

Clinical examination

Impact QoL / Proms

Radiology / Imaging

Information

Technique :

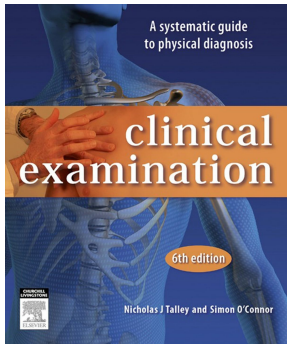
Restore: Anatomy

Stability !!

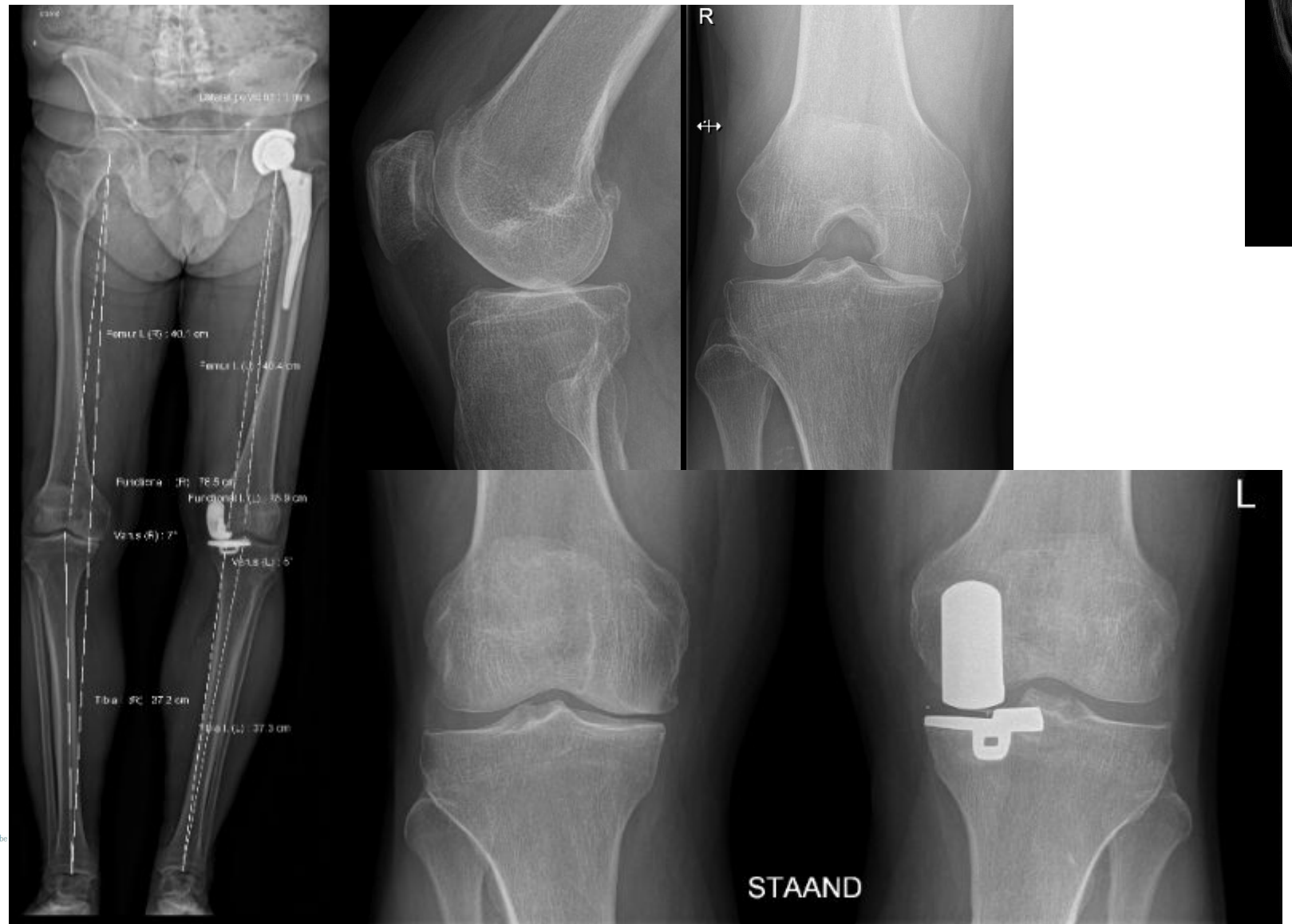
Alignment 3D

Mechanical vs kinemtac vs PSA

Variety: UKA (FB / MB) , TKA (CR, PS / MB, FB)

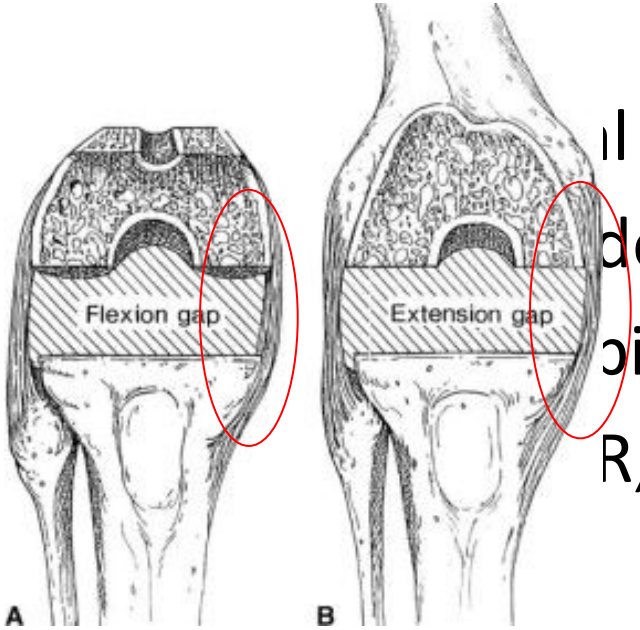


Patient specific

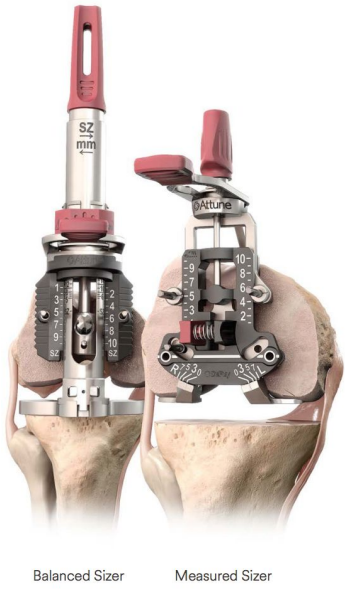


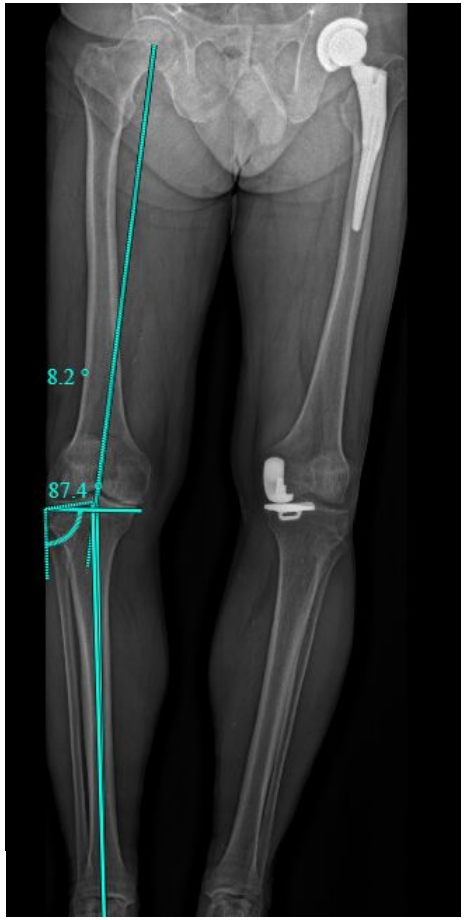
=> TKA

TKA: Balance the gaps



Manual:




8.2 °
87.4 °

8.2 °
87.4 °

95.2 °

R

R

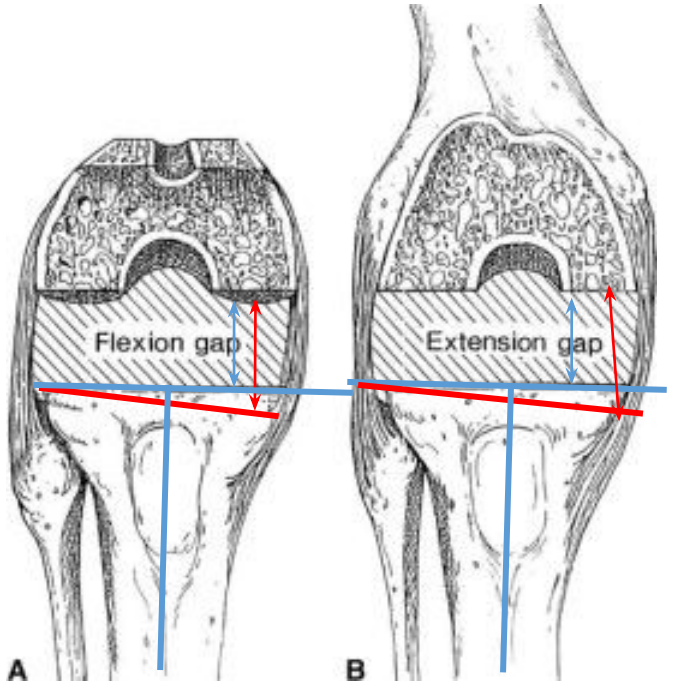
R

Results TKA

- High satisfaction rate
- 10-20% Dissatisfied
  - Multi-etiology

- Precision?
- What is our exact tibial cut?
- Impact of tibial cut on 3D femur?

=> 3D tool



3D Tool = Robotic-Assisted TKA

Predicable (adjustable)
Precise
Parameters
    Resection
    Balance
Personalised
Preservation

Quid?

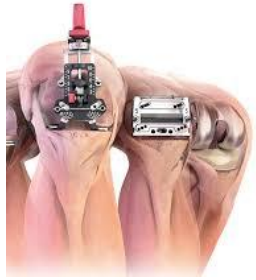
Short term

Long term

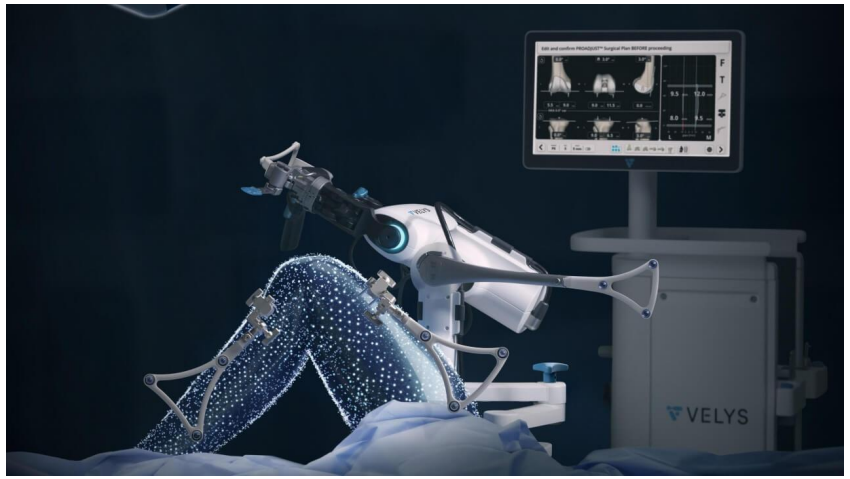
TKA Balancing is….

Medial **R**eferrence **P**redictive **G**ap **B**alancing (independent alignment)

- Manual: TRAM



- **Robotics:**



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First stage

- March 2018 First Robotic surgery
- June 2021 Rosa®
- Oct 2023 Velys® (1st in Europe)

Goal RA-TKA

- SAME Manual
- Stable medial compartment
- Dynamic Lateral

+

- Objective numbers
  - Resection
  - Balance
- Precise - Less relaeses
- PSA

- “What you see is what you get”

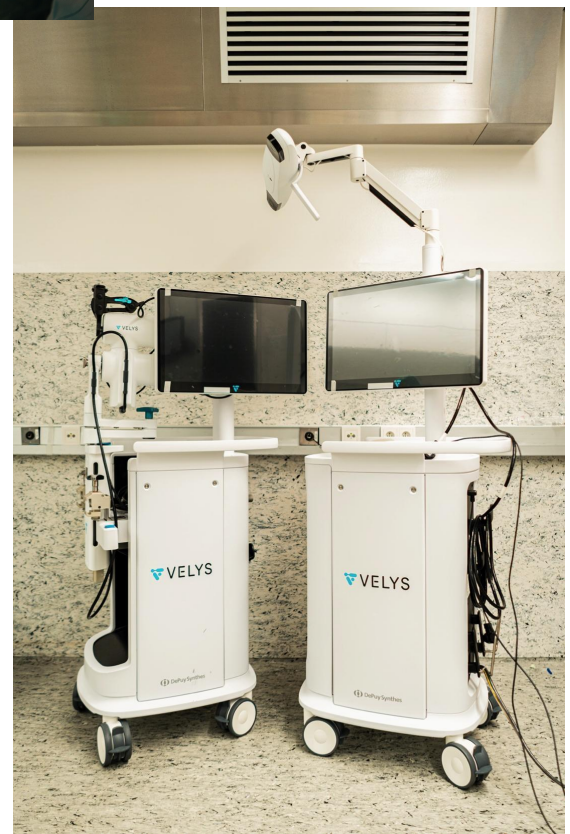
- Better result?

First Experience

- Start 10/10/23
- 53 cases

- *Advantages Robotics*

  - Compact – **High speed camera** – **Precise** (0,1 mm)
  - Reference points F en T !!
  - **Modern implant**
  - Fast
  - Relibale cut, **stable saw 2mm**!!
  - Easy Interface : assessments, balance graph, adjustments cuts, …..
  - **Balancer patella in place**
  - Accubalance within deficieny **(flexion contraction)**
  - **Reliable balance** / reliable result
  - Copy **your own technique**
  - ……



Learning curve

- **Teaching!!!!!!**

  Staff & Nurses (&Reps)

- Cases +++

- **Learning curve:**

  Time :

  - <u>17 cases</u>: 4 complex , 13 simple
    - Complex: *+ 22 mins*
    - Simple: *+ 12 mins*, 6 cases time neutral

  - <u>53 cases:</u> 10 mis

  Understanding / Pit falls / flow:

  30-35 cases (cfr literature)

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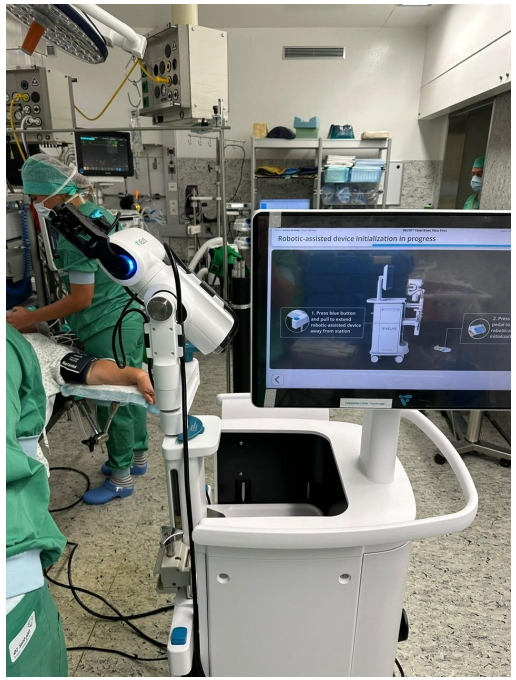
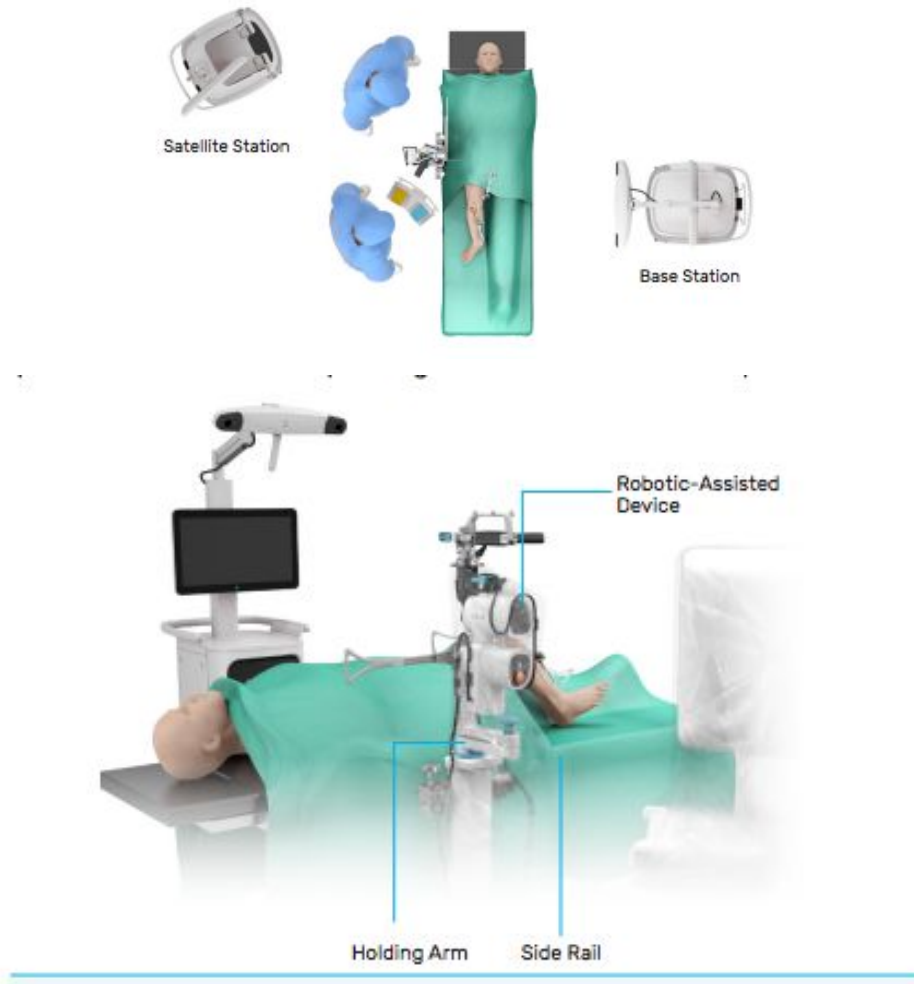
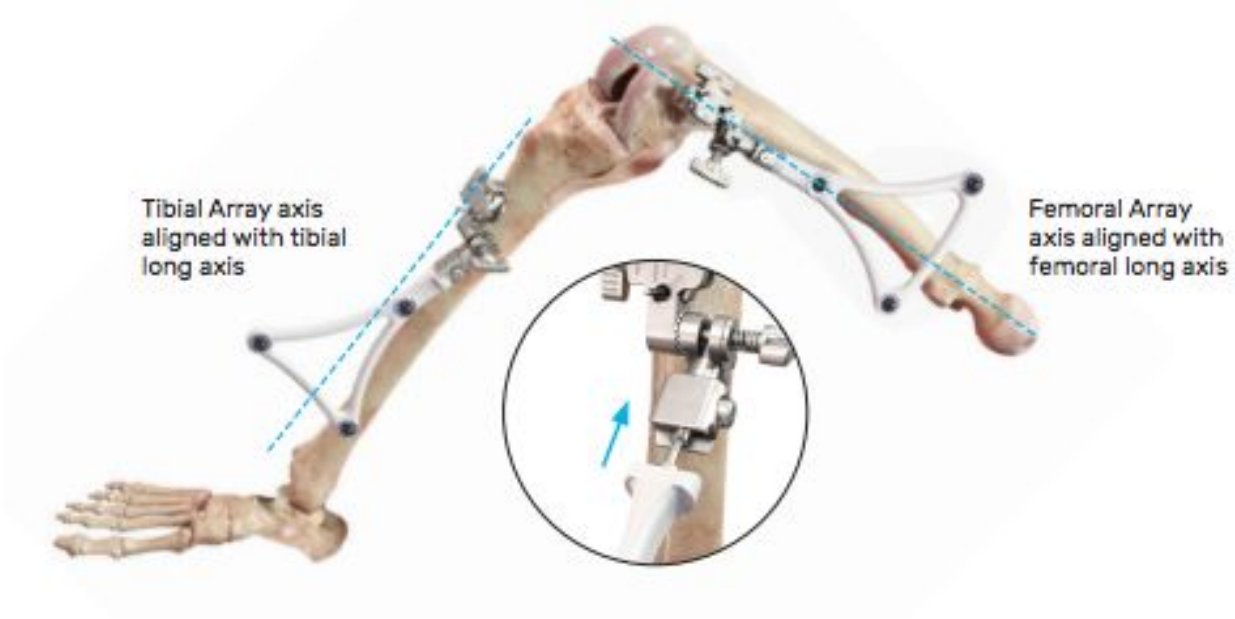
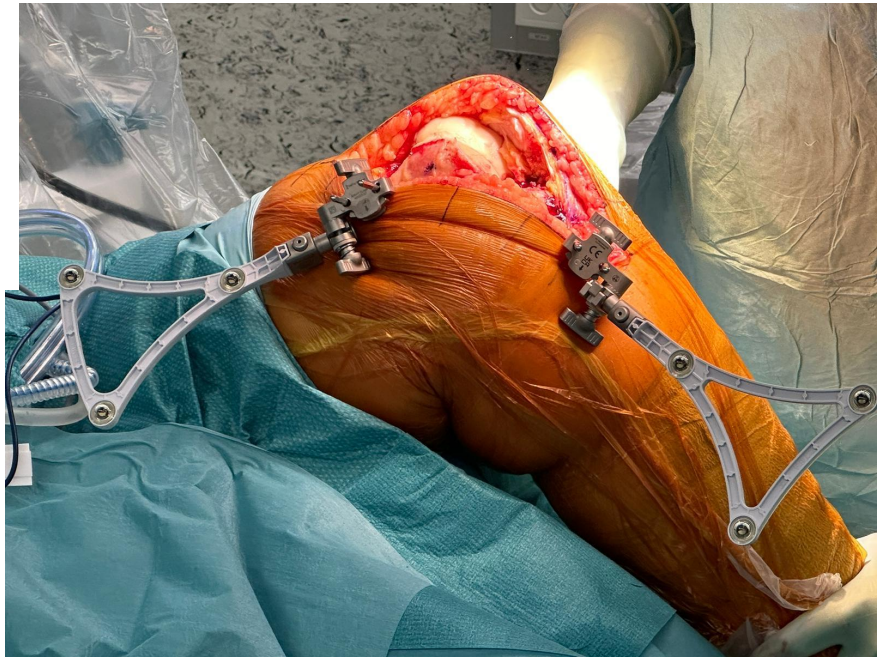
Workflow – Prep & Installation





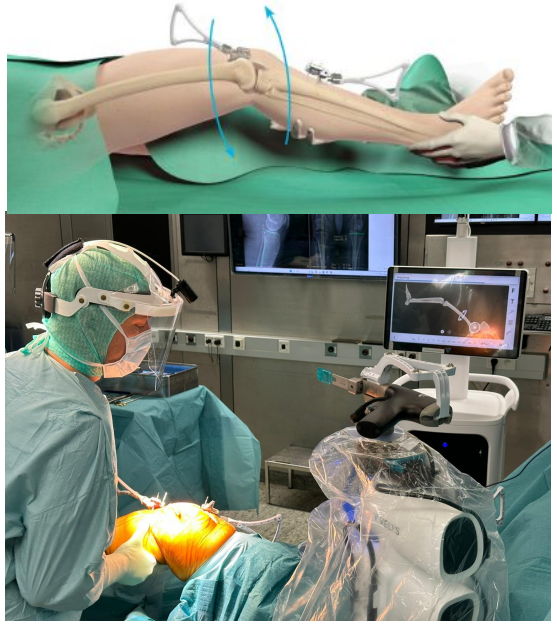
Robot prep & arrays

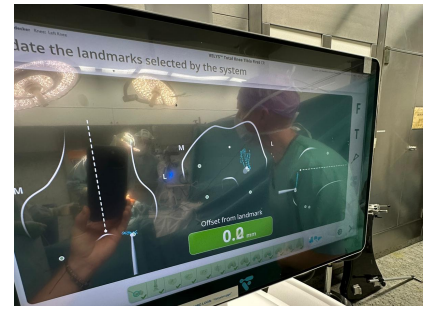




Work Flow : PSA - Orthoclinic

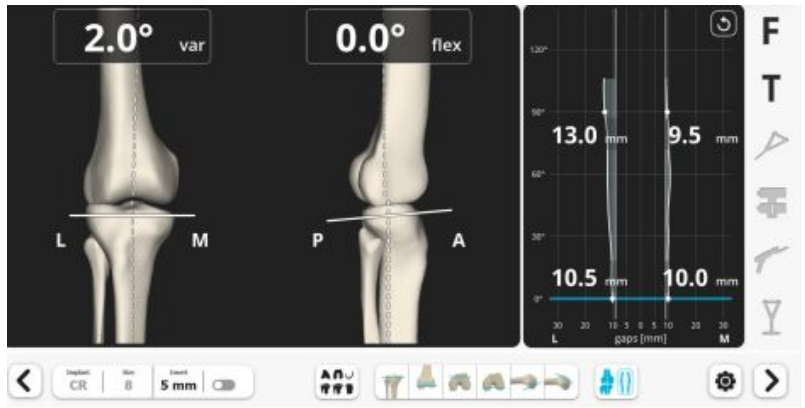
3D- Mapping knee (+ HKA)



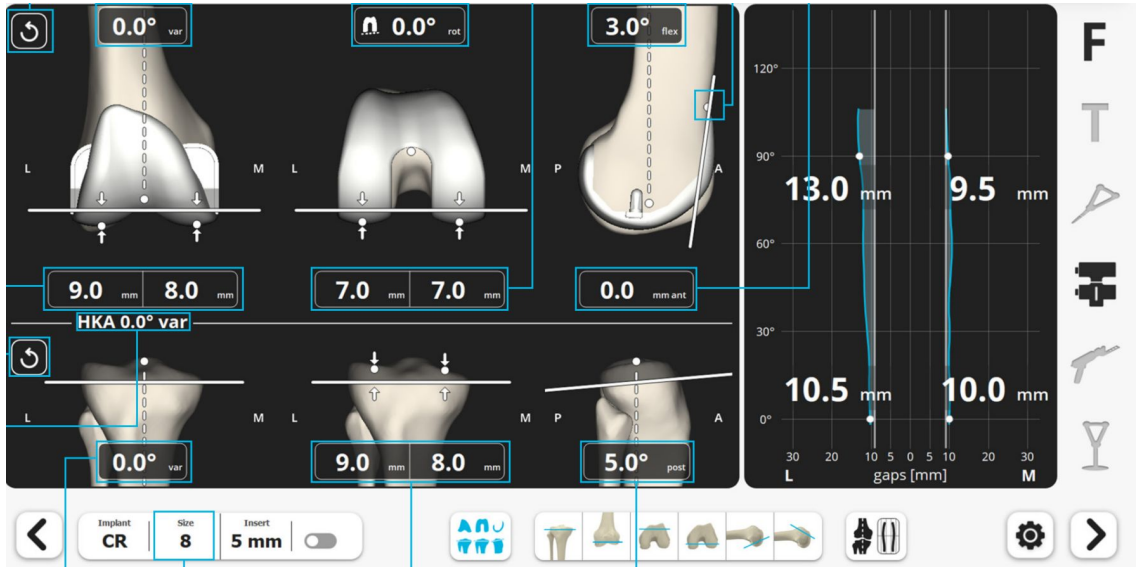


Workflow: PSA - Orthoclinic

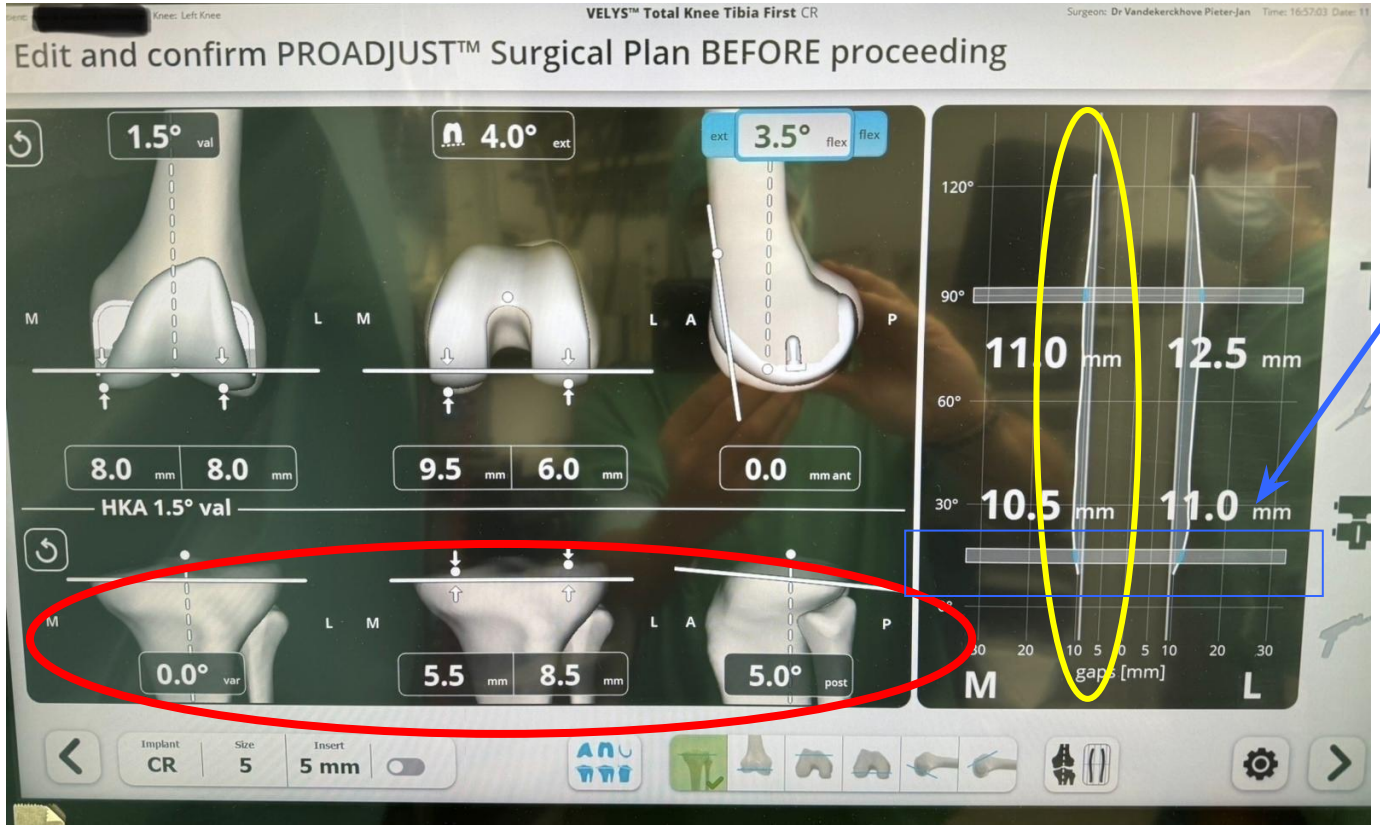
- 1st Ligament balance (manual)
  - Varus valgus stress



- Proadjust Surgical plan
  - Accubalance Graph
  - PSA (Tibia) (Preop alignment)



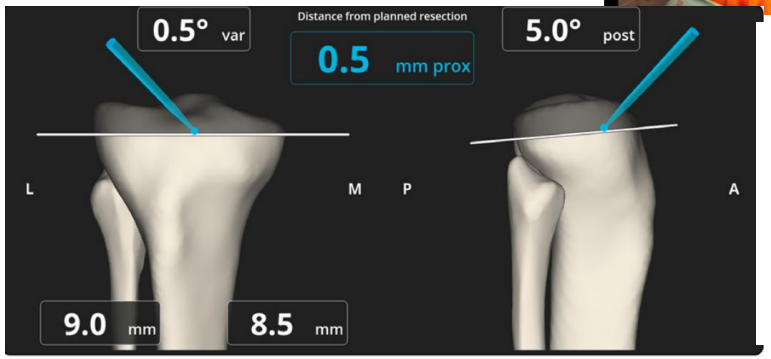
Accubalance: 1st balance – tibia preparation



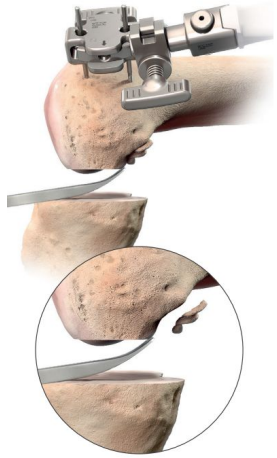
Flex	1	2.5
Ext	0.5	1
	M	**L**

- **Tibia cut**
  - Reference point!

  - Assess + **arrey**



- **Remove osteophytes**



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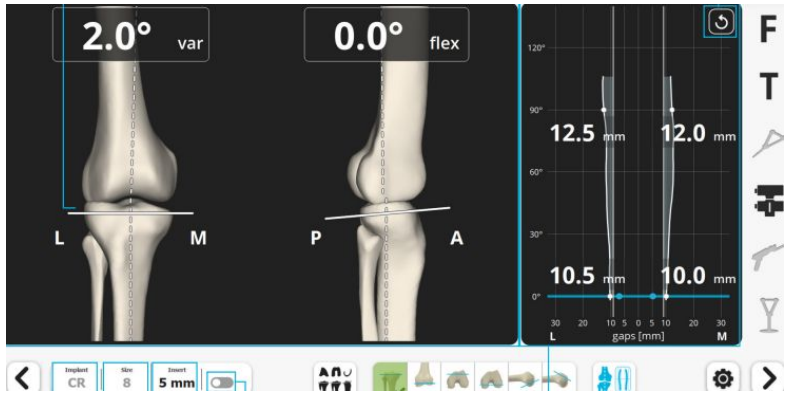
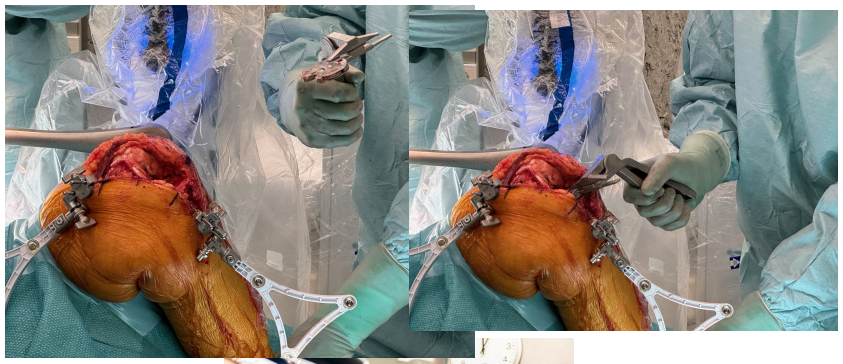
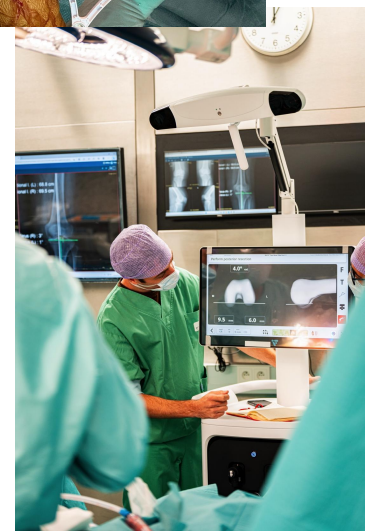
- **2nd Balancing** (patella in place balancer)

- **Readjust** planning
  - Medial referenced
  - Resection
  - Notching / sizing







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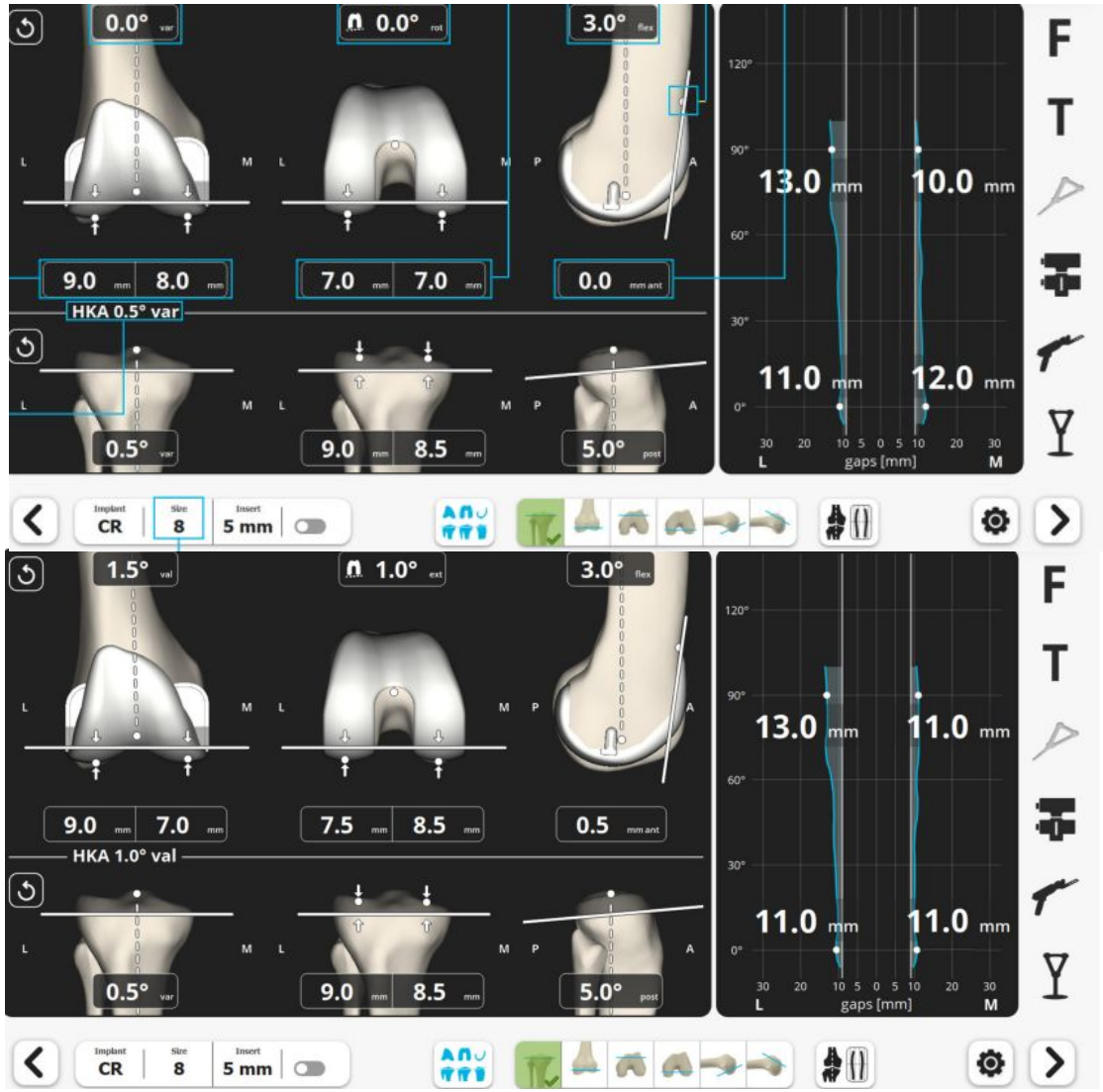
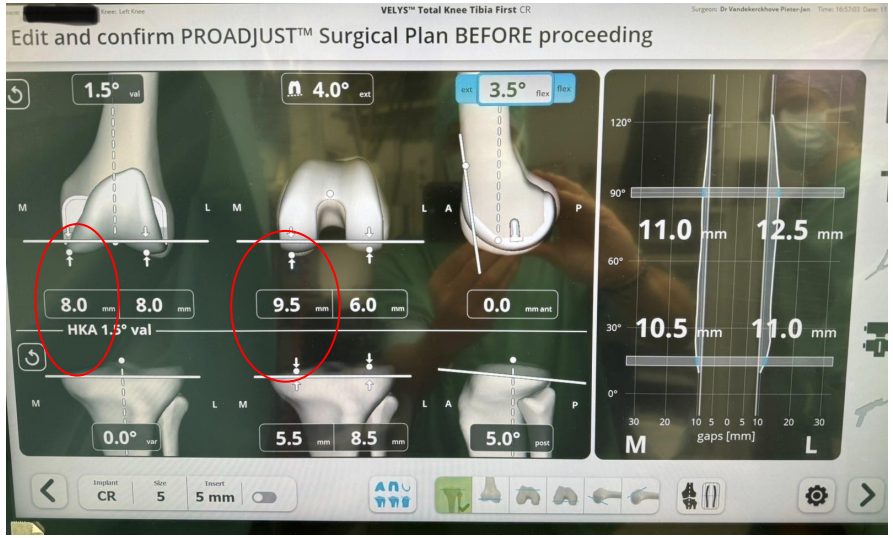
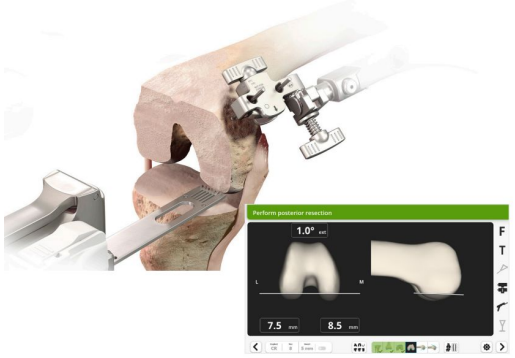
Accubalance – Medial referenced

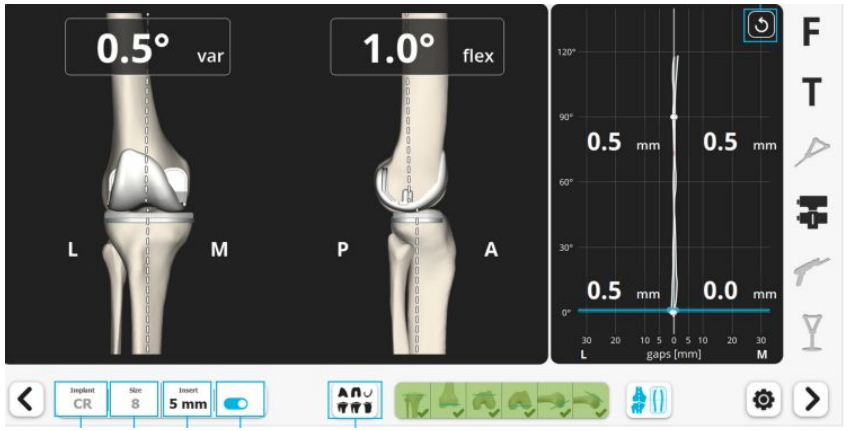




- 4 in 1 cuts (Cave sclerotic bone)
  - Femoral reference
  - Check cutting surface



- Trial:



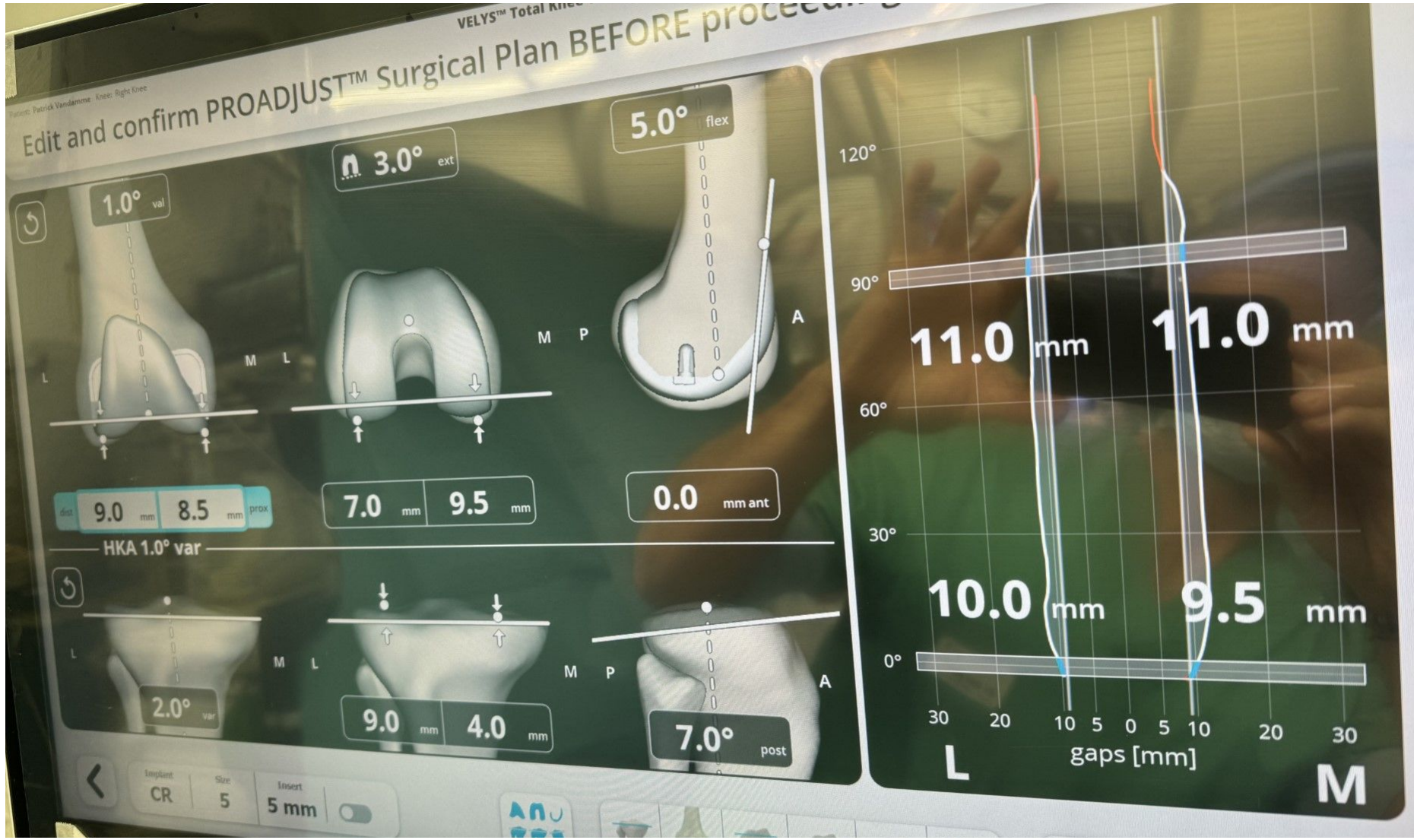
- Re-assess / recut?
  - Recut 3/53 cases

- Final implant

Case 1: 69, male, varus (9°) OA

Case 1: Varus 9°

Balance Tibia (and femur)



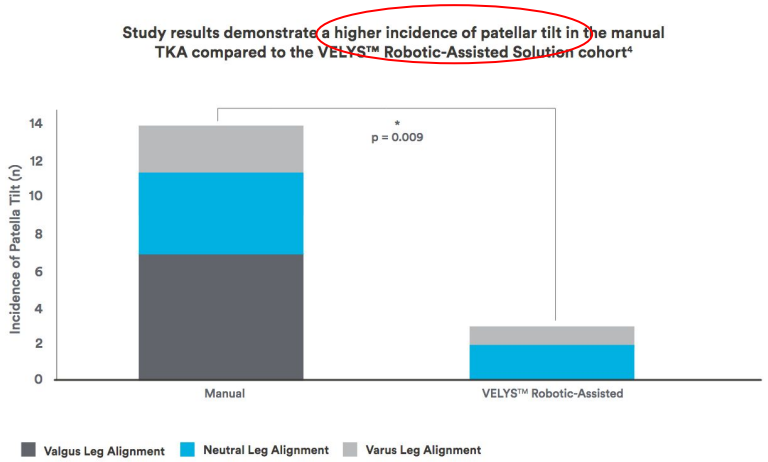
Balance with balancer

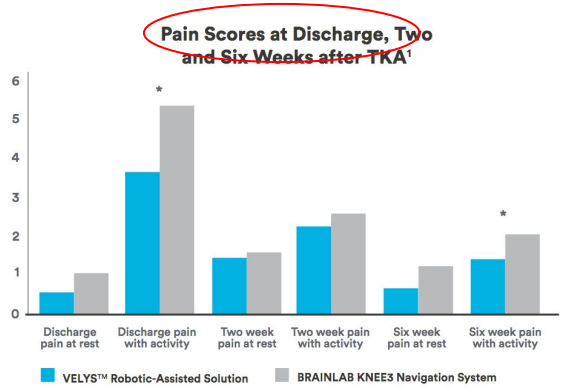
Final cuts / Results

Final balance

Results

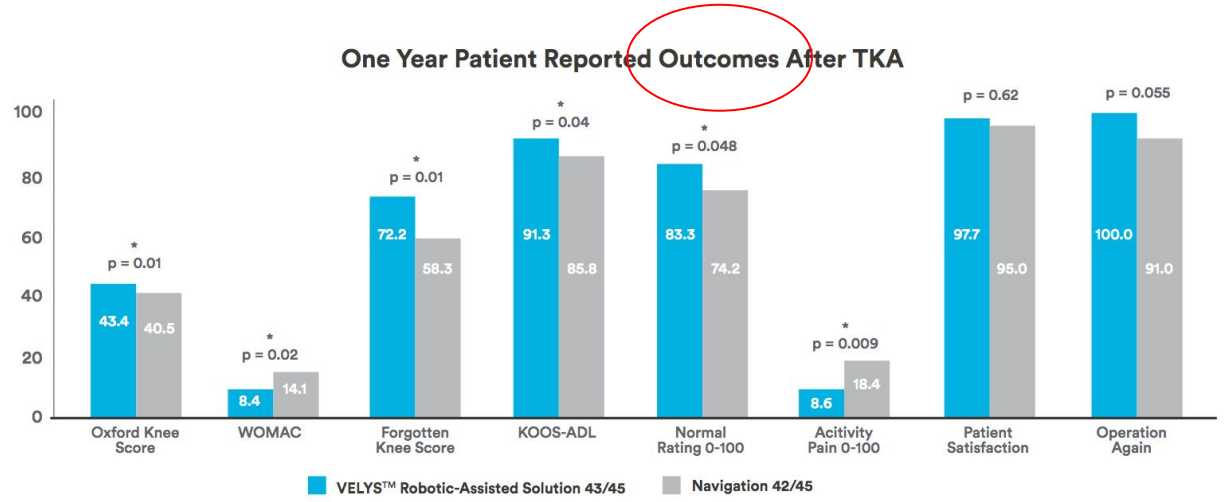
- Promising
  - Pain
  - Outcome
  - Revision ratio 1yr
  - LOS
- Short term
  - Studies vs
    - Manual
    - Navigation





	Manual TKA (N=121)	VELYS™ Robotic-Assisted Solution rTKA (N=104)
Mean LOS Days (SD)	1.3 (0.4)	1.1 (0.7)
Number of 30-day ED visits	8.3%	5.8%
Mean MME* (SD)	112.9 (96.3)	86.6 (94.6)
Mean Post-operative Pain Intensity (SD)	4.6 (2.0)	4.7 (2)
Mean Operative Minutes (SD)	67.0 (11.1)	84.4 (15.8)

*MME morphine milligram equivalents



*Indicates statistically significant difference, two sample t-test, p-value<0.05

Round Up: 53 cases – 7 weeks

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Precision V
Predictive V
Parameters V
Preservation V
Personalised V

No added cost patient
Real time changes – Quick interaction
Faster rehab
Less relaeses (<< PCL)
Less complex hardware / thinner poly's
Minimal adjustments

\-

Learning curve (teaching)
Cost (hospital – Society)
Tool & Fool - THINK (different)
Long term ? (vs manual MRGB) => *study Jan '24*

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Thank you