



Predicting And Preventing Overcorrection In Medial Unicompartmental Knee Arthroplasty: A Radiographic Study Based On Long-Leg Films And Valgus Stress Views.



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- Disclosure:

- **Gaggiotti Gabriel:** Consultant for Bioimpianti
- **Elvire Servien:** Consultant for Corin
- **Sebastien Lustig:** Consultant for Stryker, Smith Nephew, Heraeus, Depuy Synthes; institutional research support from Groupe Lepine, Amplitude; editorial board for Journal of Bone and Joint Surgery (Am)
- **Gaggiotti Stefano, Foissey Constant, Batailler Cecile and Gaggiotti Santino:** no competing interests.



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Introduction

➤ Unicompartmental Knee Arthroplasty (UKA)

- Could be used in nearly 50% of knee replacement cases
- Technique less reproducible than total knee arthroplasty (TKA)

- **Avoiding overcorrection**
- **Restoring primitive alignment**



GOLDEN RULE

- Preoperative valgus stress radiographs allow to
 - Assess varus deformity correction
 - Predict postoperative alignment

Introduction

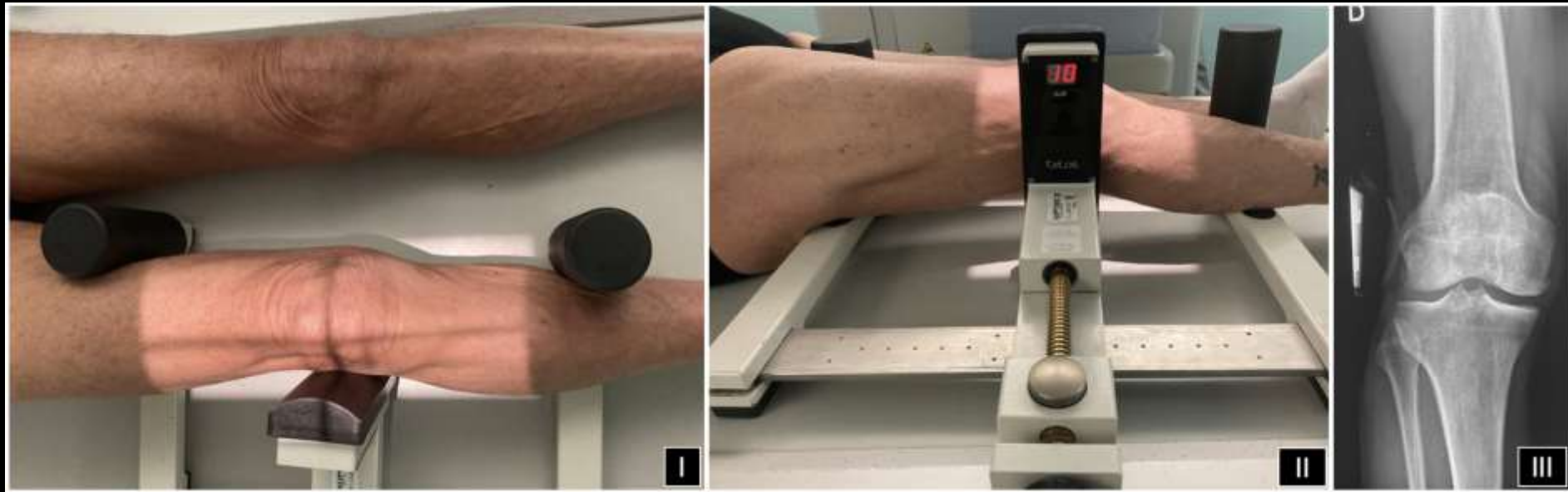


Image. Preoperative valgus stress view with Telos device.

Purpose:

- “To develop a strategy to detect the postoperative risk of overcorrection when implanting a medial UKA using preoperative radiographic data based on long leg films, valgus stress views and the joint line convergence angle (JLCA)”
- “To identify intraoperative protective factors that could help prevent overcorrection”

Methods

Medial UKA overcorrection risk prediction

- Retrospective radiographic study
- All imaged-based robotic medial UKA
- (February 2022 – February 2023)
- **NO medial RELEASE**
- Radiographic measurements based on
 - Long leg x-rays
 - Valgus stress radiographs
 - Pre and postoperative AP views

Overcorrection

=

postHKA $\geq 180^\circ$

>180° = valgus

<180° = varus

Measurements

Hip-knee-ankle angle (HKA)



Preoperatively

Lateral femoral-fibular angle (LFFA)



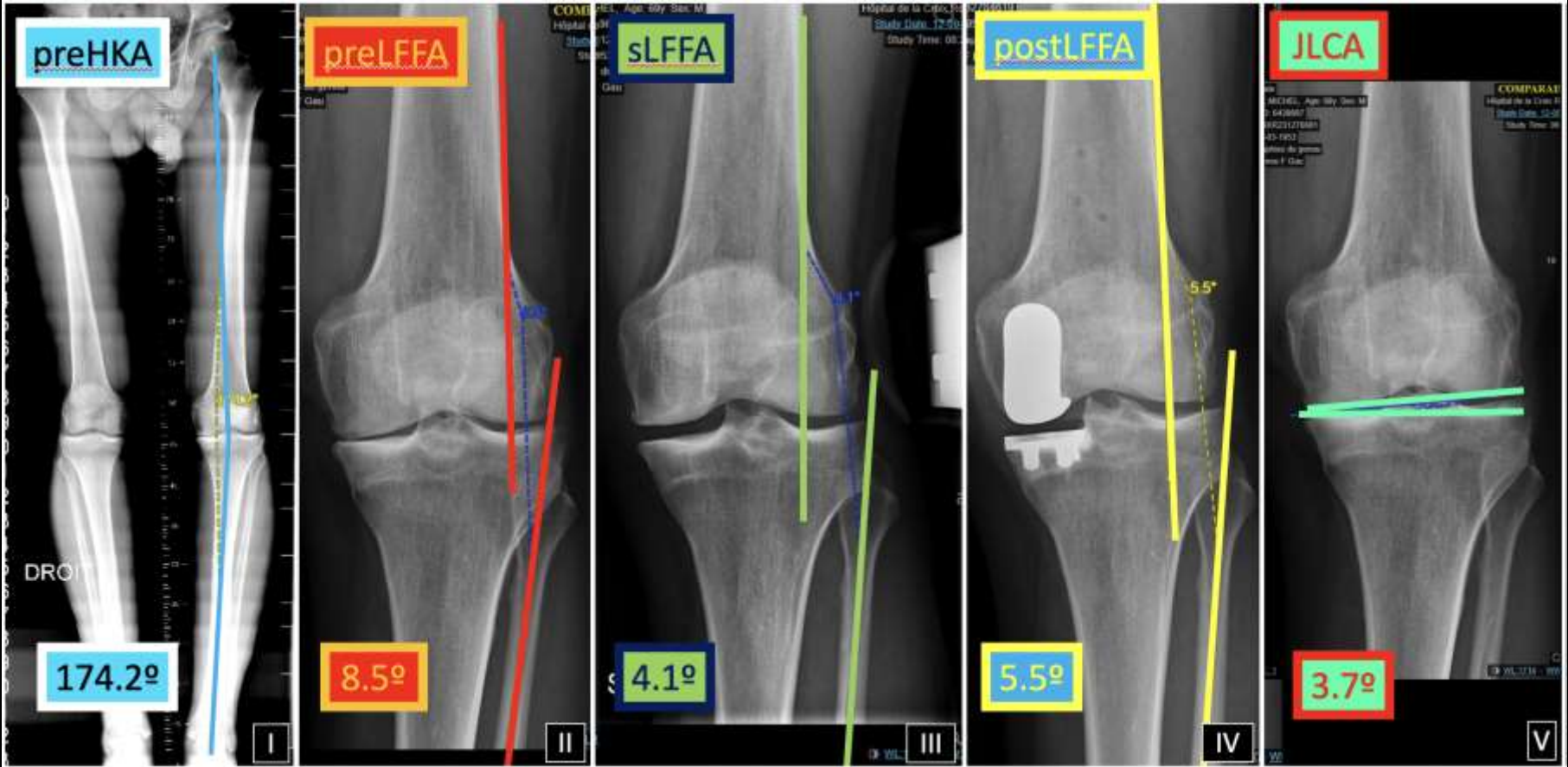
Preop, stress rx and Postop

Joint line convergence angle (JLCA)



Preoperatively

Methods



Methods

- Stress HKA (**sHKA**) = preHKA + (preLFFA – sLFFA)
- Postoperative HKA (**postHKA**) = preHKA + (preLFFA – postLFFA)
- Estimated HKA (**eHKA**) = preHKA + JLCA
- Medial safety laxity (**MLS**) = sHKA - postHKA

Example case (photos)

preHKA	=	174.2°	
sHKA	=	178.6°	{ 174.2° + (8.5° - 4.1°) }
postHKA	=	177.2°	{ 174.2° + (8.5° - 5.5°) }
eHKA	=	177.9°	{ 174.2° + 3.7° }
MLS	=	1.4°	{ 178.6° - 177.2° }

Methods

Analysis

- **Receiver Operating Characteristic (ROC) curves** were constructed to evaluate the predictive ability of: **preHKA, sHKA and eHKA**.
- **Area under the curve (AUC)** was calculated to determine the best parameter for **predicting the risk of overcorrection**.
- **Cut-off points**, along with their respective sensitivity (Se) and specificity (Sp), were determined using the Youden method.
- Subgroup analysis on patients at risk to determine if **any specific cut-off value** of **residual laxity (sHKA - postoperative HKA)** measured intraoperatively could be identified as a protective factor against overcorrection.



Results

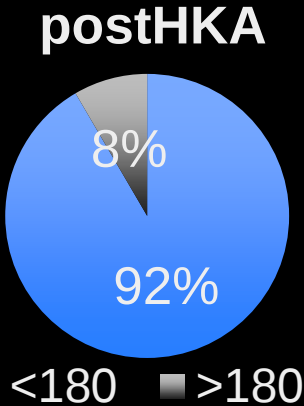
95 imaged-based robotic medial UKA

Age: 69 (45-89)
Gender: Female 45.3% (n43)
BMI: 28 (21.3-40.8)

Mean **postHKA** = 176.9°

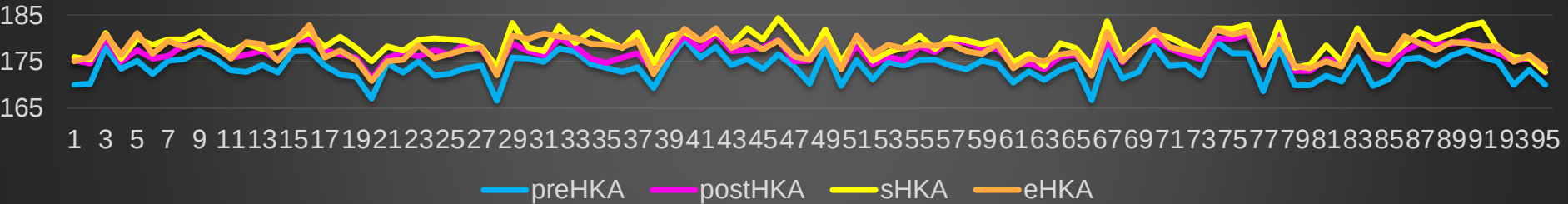
8 cases of overcorrection!

8.4%



preHKA	sHKA	eHKA	postHKA
173.8° (166.6-179.9)	178.7° (172.7-184.3)	177.6° (170.8-182.9)	176.9° (171.3-181.3)

Alignment



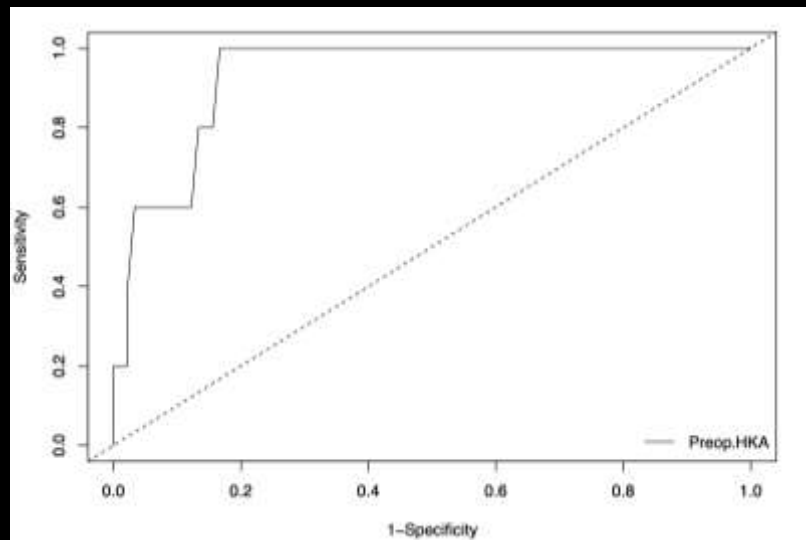
Results

Overcorrection predictors:

- preHKA AUC = 0.96

Cut-off value 176°

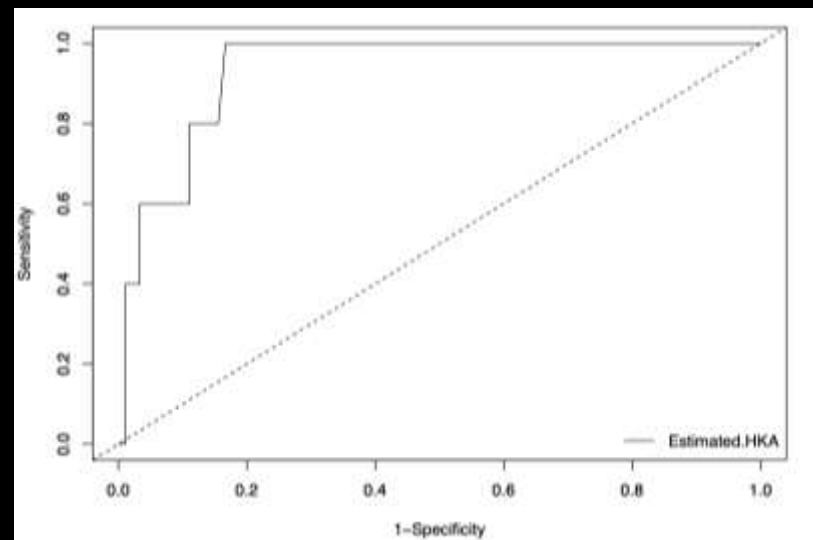
(Se 100%, Sp 86%)



- eHKA AUC = 0.94

Cut-off value: 179.7°

(Se 100%, Sp 86%)

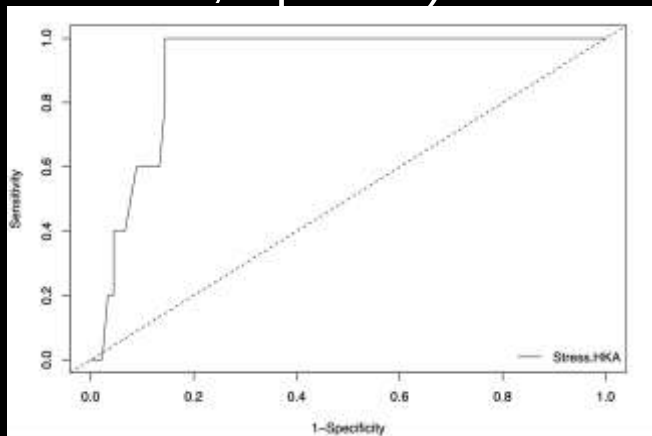


Results

- sHKA AUC = 0.91

Cut-off value: 181.3°

(Se 100%, Sp 85%)



No cases of overcorrection when:

- preHKA <176°

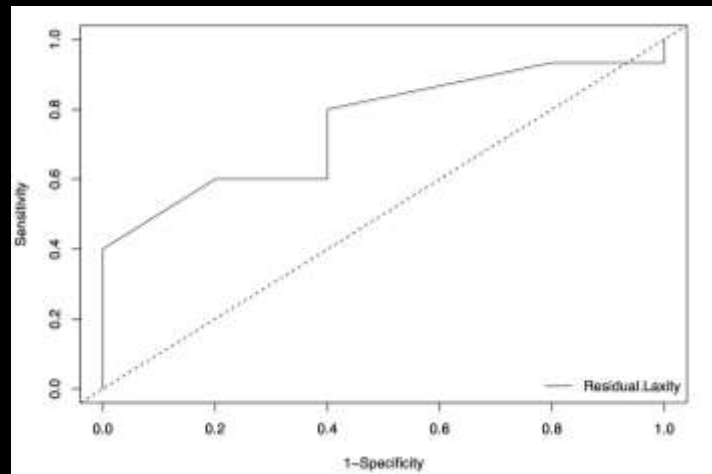
- sHKA <179.9°

- eHKA <179.9°

- Subanalysis in 20 UKAs with preHKA >176°

MSL PROTECTOR FACTOR

Cut-off value: >2.6° (p<0.04)



Conclusion

● Best overcorrection predictor  **preHKA >176°**

● In this population (preHKA >176°)

 **a MSL >2.6°** 

PROTECTOR FACTOR

Other overcorrection
predictors

- **eHKA >179.7°**
- **sHKA >181.3°**

preHKA >176°

Se 100%, Sp 86%

eHKA >179,7°

Se 100%, Sp 86%

sHKA >181,3°

Se 100%, Sp 85%

MSL > 2,6°

Protector factor in preHKA >176° (p<.04)

HKA PRE <176°

0% HKA POP >180°

HKA STRESS <180°

0% HKA POP >180°

E HKA < 180°

1,3% HKA POP >180°



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