

CONGRESSO NAZIONALE SOCIETÀ ITALIANA FISSAZIONE ESTERNA

Fissazione esterna nel trattamento
delle emergenze e traumi militari,
tecniche di ricostruzione degli arti e
trattamento degli esiti posttraumatici

ROMA

2025

16-17 MAGGIO 2025



I SISTEMI ESAPODALICI SONO REALMENTE AFFIDABILI? VALUTAZIONE DI ACCURATEZZA E RIPRODUCIBILITA' DI UN FISSATORE ESAPODALICO

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ASST Settelaghi – Varese
S.C. Ortopedia e Traumatologia
Direttore: Prof. F. D'Angelo



FISSATORI ESTERNI ESAPODALICI (I-fixation)



***Correzioni multiplanari
(6 assi)***

Versatilità

Enormi potenzialità

... E LA PRECISIONE?
(escludendo correzione postume)

Cosa dice la letteratura?



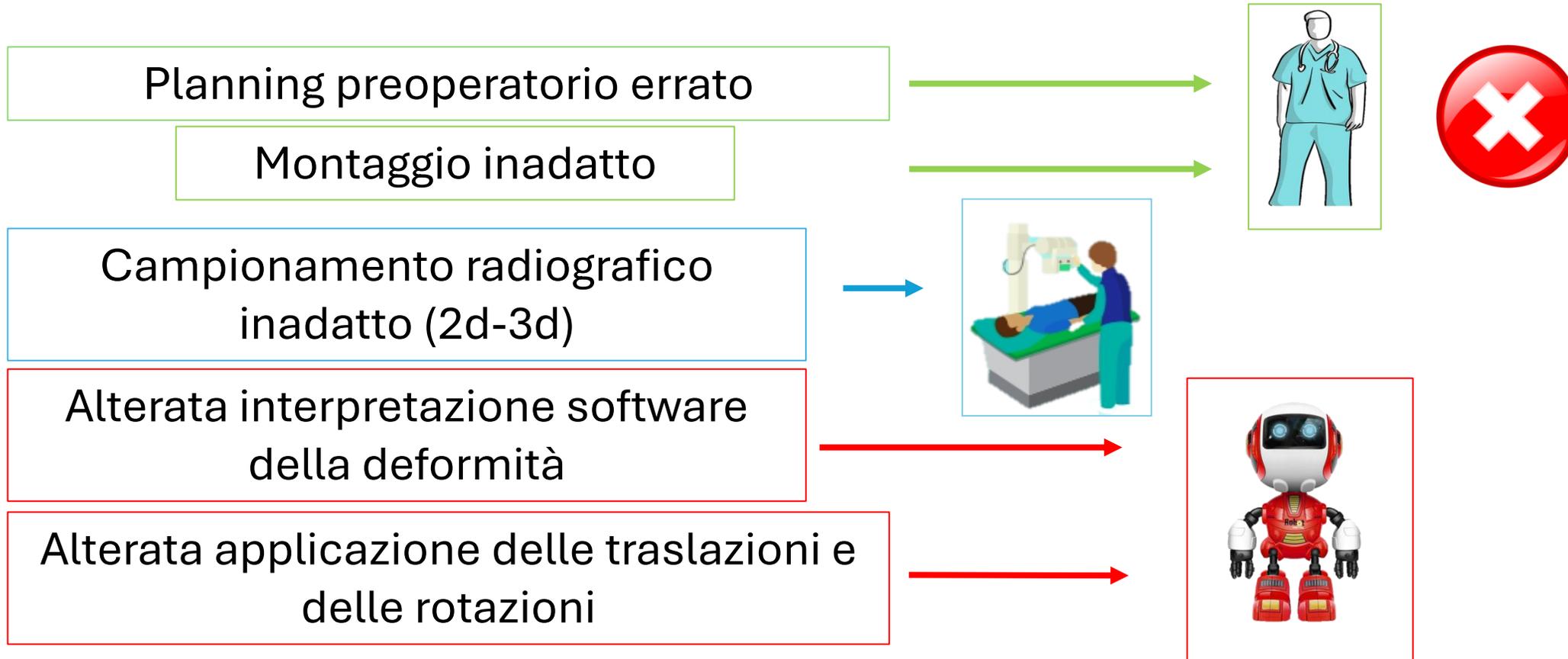
Molti studi retrospettivi ma pochissimi studi
di laboratorio

Basha et. Al, 2022



**NESSUN STUDIO CHE CORRELI ENTITÀ
ERRORE DI CORREZIONE ALLA PRECISIONE
DEL CAMPIONAMENTO**

Cause di errore



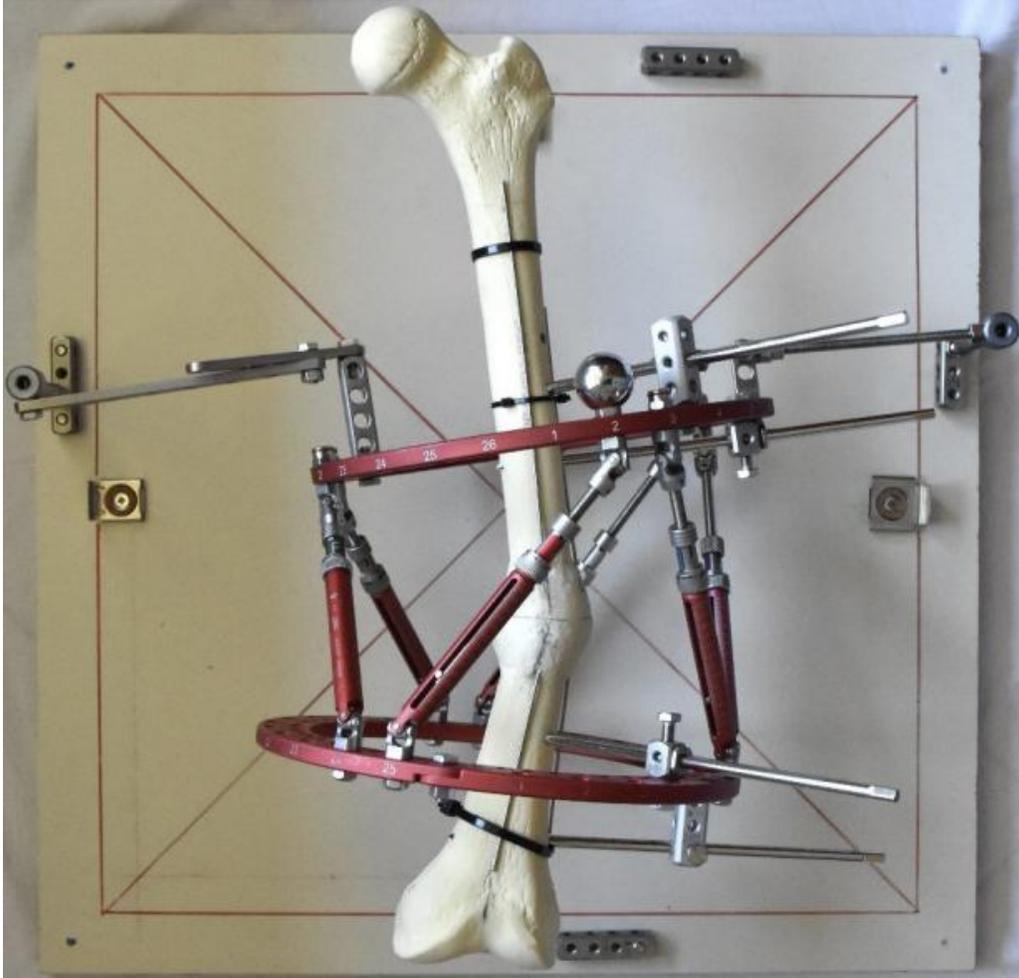
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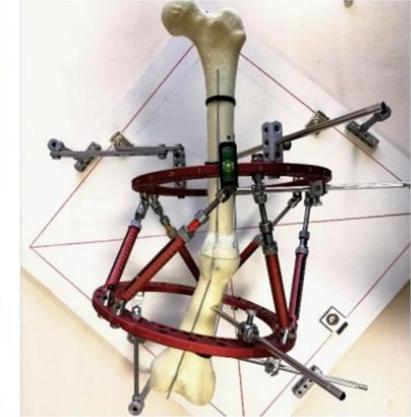
MONTAGGIO CORRETTO E STANDARDIZZATO

DIFETTO COSTANTE E NOTO

(18° VARO)

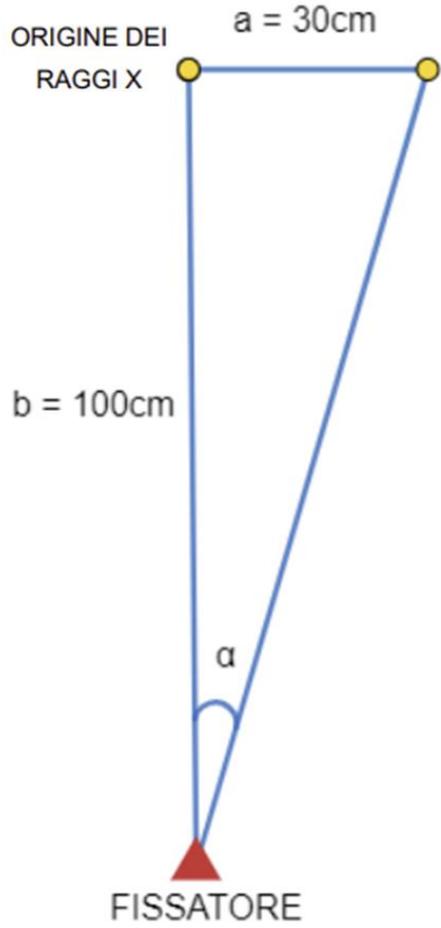
ASTE METALLICHE RADIOPACHE PER

STANDARDIZZARE TRACCIAMENTO VETTORI



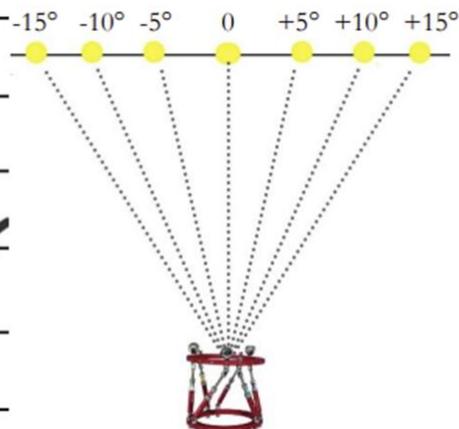
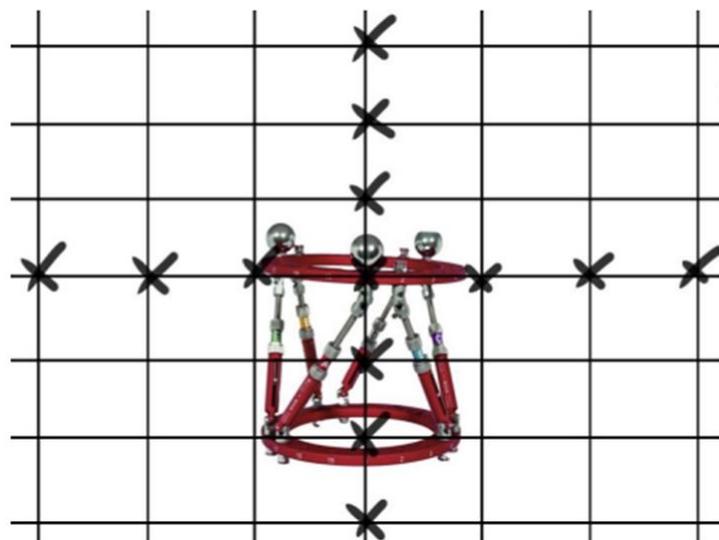


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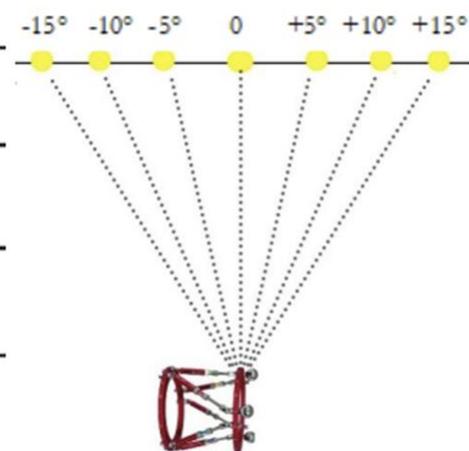
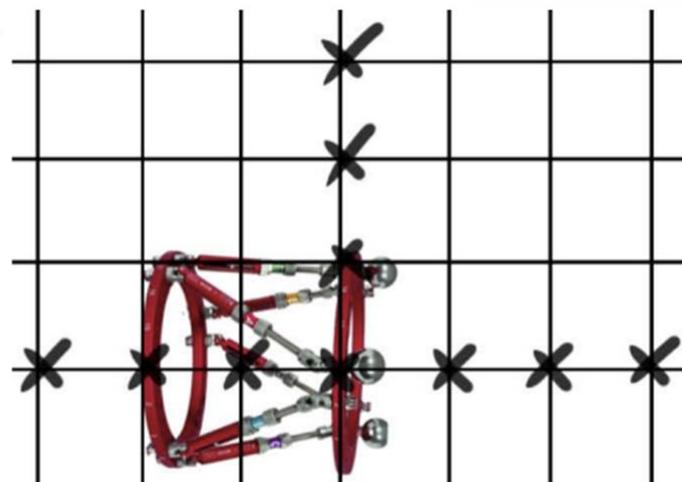




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130 Combinazioni



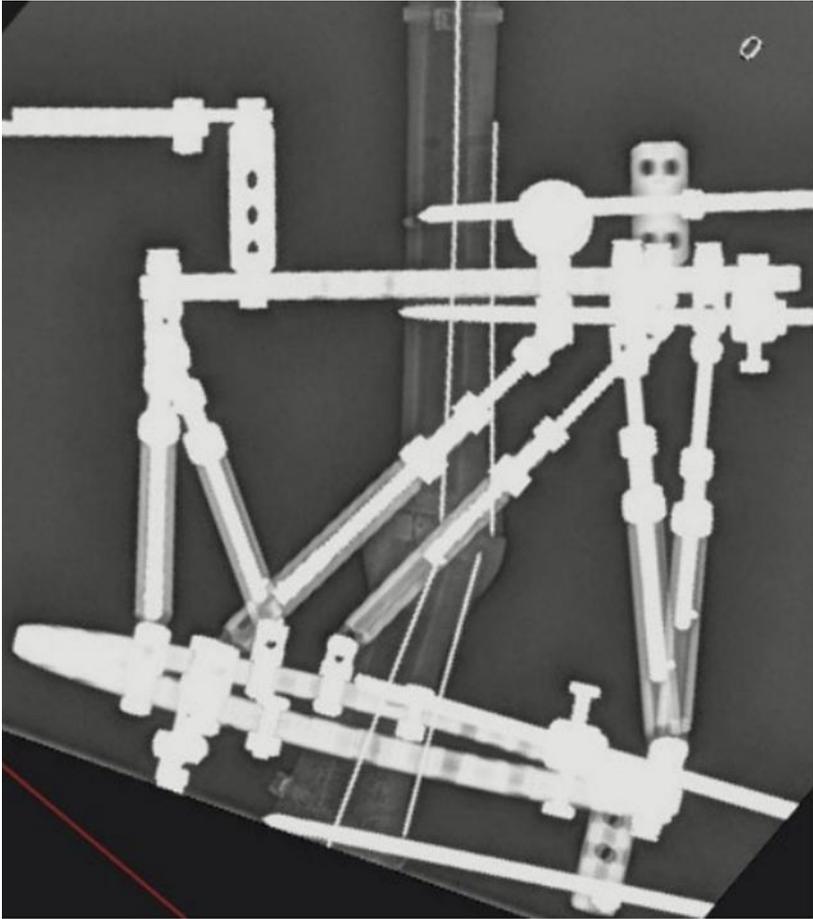
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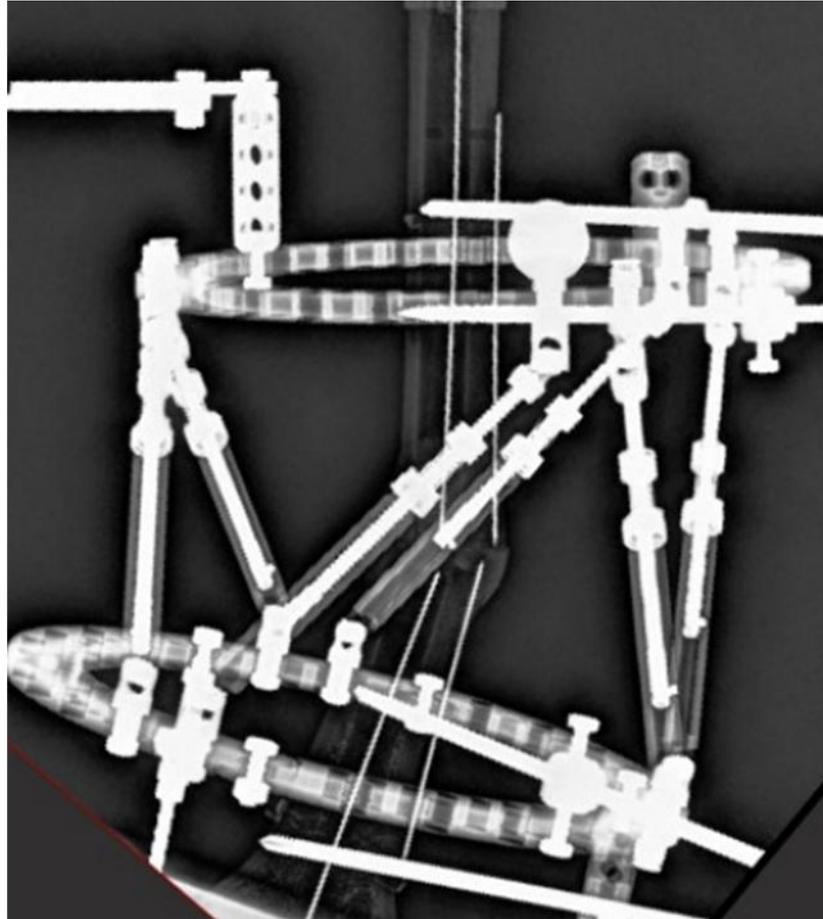
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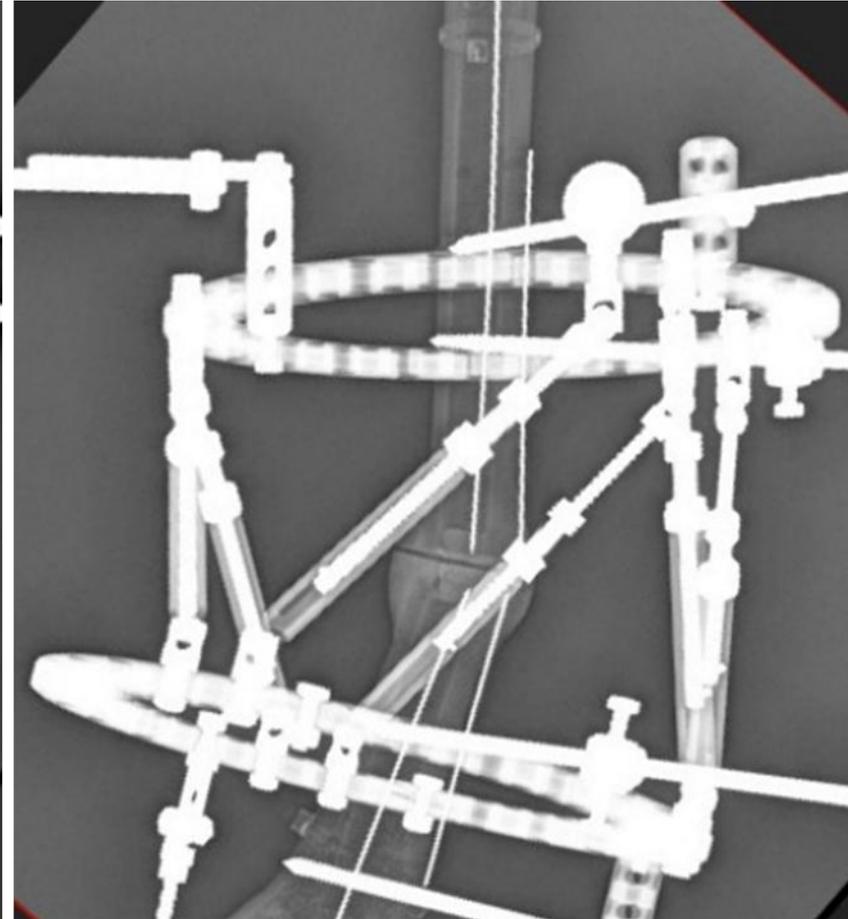
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**AP 0°
Posizione 1**



**AP 5°
Posizione 2**



**AP 10°
Posizione 3**



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Proximal Ring Size

Full Ring 5/8 Ring

Most anterior point

Distal Ring Size

Full Ring 5/8 Ring

Platform nearest point

Struts Dimension

#	Strut A	Strut B	Strut C	Strut D	Strut E	Strut F	Apply ALL
Length	<input type="text" value="167"/>	<input type="text" value="168"/>	<input type="text" value="187"/>	<input type="text" value="187"/>	<input type="text" value="158"/>	<input type="text" value="150"/>	<input type="text"/>
Type	<input type="text" value="L"/>	<input type="text" value="MINI"/>					

Struts Position

#	Strut A	Strut B	Strut C	Strut D	Strut E	Strut F
PROX	<input type="text" value="2"/>	<input type="text" value="3"/>	<input type="text" value="10"/>	<input type="text" value="11"/>	<input type="text" value="20"/>	<input type="text" value="21"/>
DIST	<input type="text" value="25"/>	<input type="text" value="6"/>	<input type="text" value="7"/>	<input type="text" value="14"/>	<input type="text" value="15"/>	<input type="text" value="24"/>



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The screenshot displays a surgical planning software interface for knee arthroplasty, showing two views: AP (Anteroposterior) on the left and LAT (Lateral) on the right. Each view includes a control panel with various settings and a 3D model of the knee joint with alignment lines and angles.

AP View (Left):

- Buttons: AP - Joint line Proximal, AP - Joint line Distal, Cut Area, Place Rotation Center
- Translation: 0
- Medial/Lateral: Medial (selected)
- Correct: 0 over 18 degrees
- Varus/Valgus: Varus (selected)

LAT View (Right):

- Buttons: LAT - Joint line Proximal, LAT - Joint line Distal, Cut Area, Place Rotation Center
- Translation: 0
- Anterior/Posterior: Anterior (selected)
- Correct: 0 over 0 degrees
- Recurvatum/Procurvatum: Procurvatum (selected)

Angles:

- AP View: 93° (top), 73° (bottom)
- LAT View: 90° (top), 91° (bottom)



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The screenshot displays a surgical navigation software interface with two side-by-side views of a knee joint model. The interface includes several control panels and measurement data:

- Left Panel (AP View):**
 - Buttons: AP - Joint line Proximal, AP - Joint line Distal, Cut Area, Place Rotation Center.
 - Translation: 0 (Medial/Lateral).
 - Correct: 18 over 18 degrees (Varus/Valgus).
 - Bottom label: Axial View.
- Right Panel (LAT View):**
 - Buttons: LAT - Joint line Proximal, LAT - Joint line Distal, Cut Area, Place Rotation Center.
 - Translation: 0 (Anterior/Posterior).
 - Correct: 0 over 0 degrees (Recurvatum/Procurvatum).
- Central Views:**
 - Left view shows a 93° angle and a 73° angle.
 - Right view shows a 90° angle and a 91° angle.

Analisi statistica

**ANALISI DELLA CORREZIONE OTTENUTA PER OGNUNA DELLE 130 P.
RADIOGRAFICHE:**

Valori goniometrici iniziali

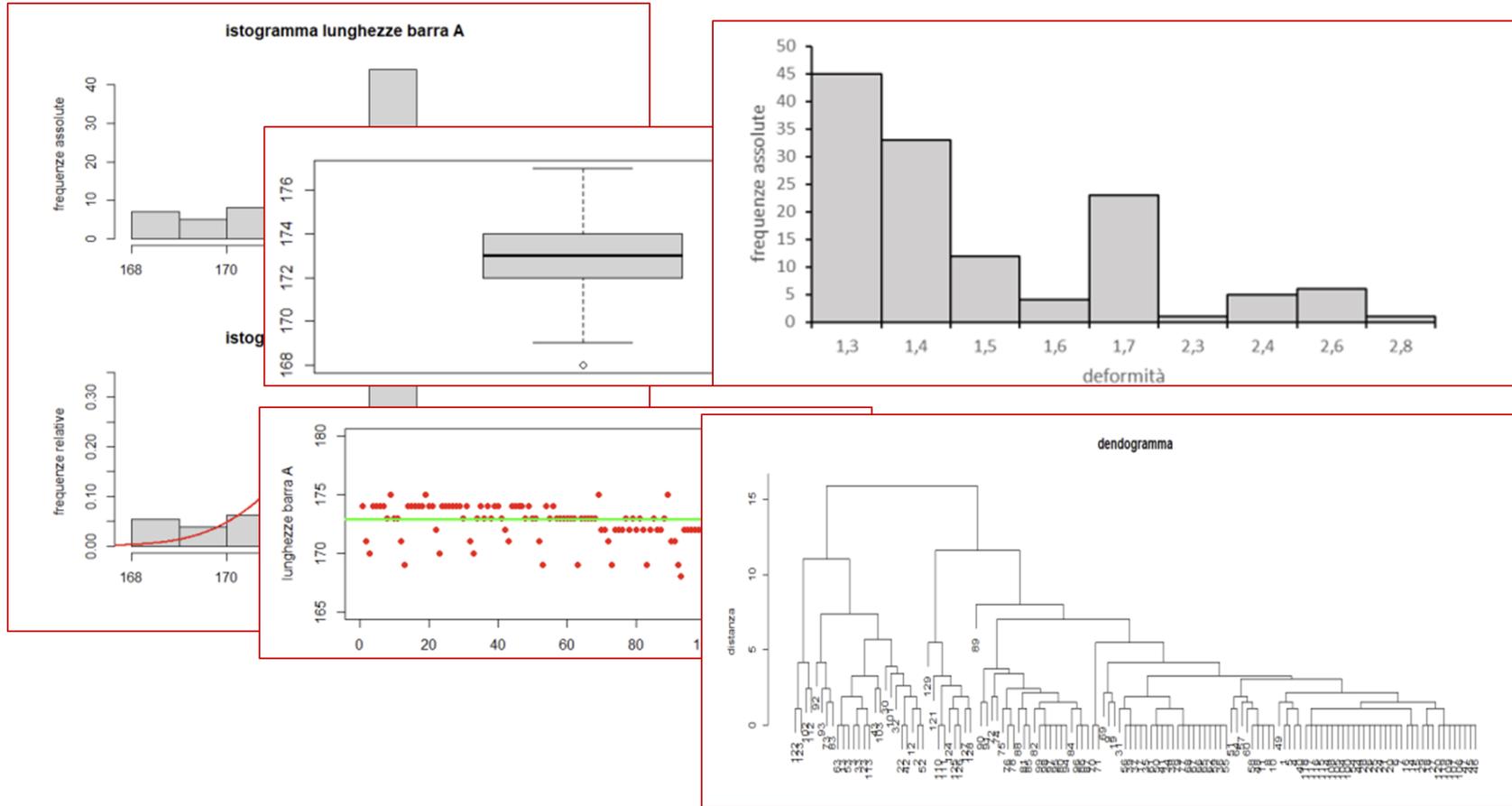
Valore l di ciascuna struts rispetto $l_{ottimale}$

Valori goniometrici deformità residua rispetto valore goniometrico finale ottimale

DISTRIBUZIONI, MEDIE, MEDIANE, FREQUENZA, REGRESSIONI LINEARI



Analisi statistica



Risultati

AP

18°

100%

MISURA DEFORMITÀ INIZIALE

Lat.

0° (71%)

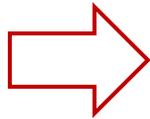
<3° (29%)

All the Sawbones models had a 30° actual coronal angulation. The Orthex software estimated the deformity at around 25.35° (SD 4.6), TSF 25.6° (SD 2), and TL-HEX 29.87° (SD 2.1). One-way analysis of variance (ANOVA) showed a significant difference in the findings (P-value 0.014). Basha et al.

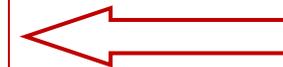
Risultati

MISURA DEFORMITÀ RESIDUA

**Errore indotto
crescente**



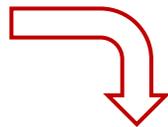
media **1,55°**
(errore massimo 2,8°)



**Peggior
campionamento
(15° AP
15° LL)**

**Correzione buona
(sec. Aversen e Rozbruch)**

Condizioni ideali

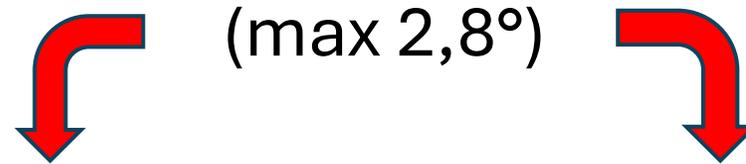


Accuracy was measured by comparing the residual deformity in angulation in the coronal plane after the first and second correction. The Orthex median residual deformity was 1°, TSF was 2.5°, and TL-HEX was 3° with a range of less than 5° for all of them. The independent samples Kruskal-Wallis test shows that there is no significant difference between the three groups (P=0.549). Basha et al.

Risultati

Regressione lineare mostra **PEGGIORAMENTO DELLA PRECISIONE ALL'ALLONTAMENTO DAL PUNTO IDEALE**

La deformità residua rimane **ACCETTABILE**



Il sistema si è mostrato **AFFIDABILE** anche in condizioni di radiografia non ottimale (<math><15^\circ</math> nelle 2 p. standard)

Se, al termine della attuazione della correzione prevista dal programma, la deformità residua fosse rilevante, la responsabilità probabilmente dell'errore sarebbe nostra e non del sistema

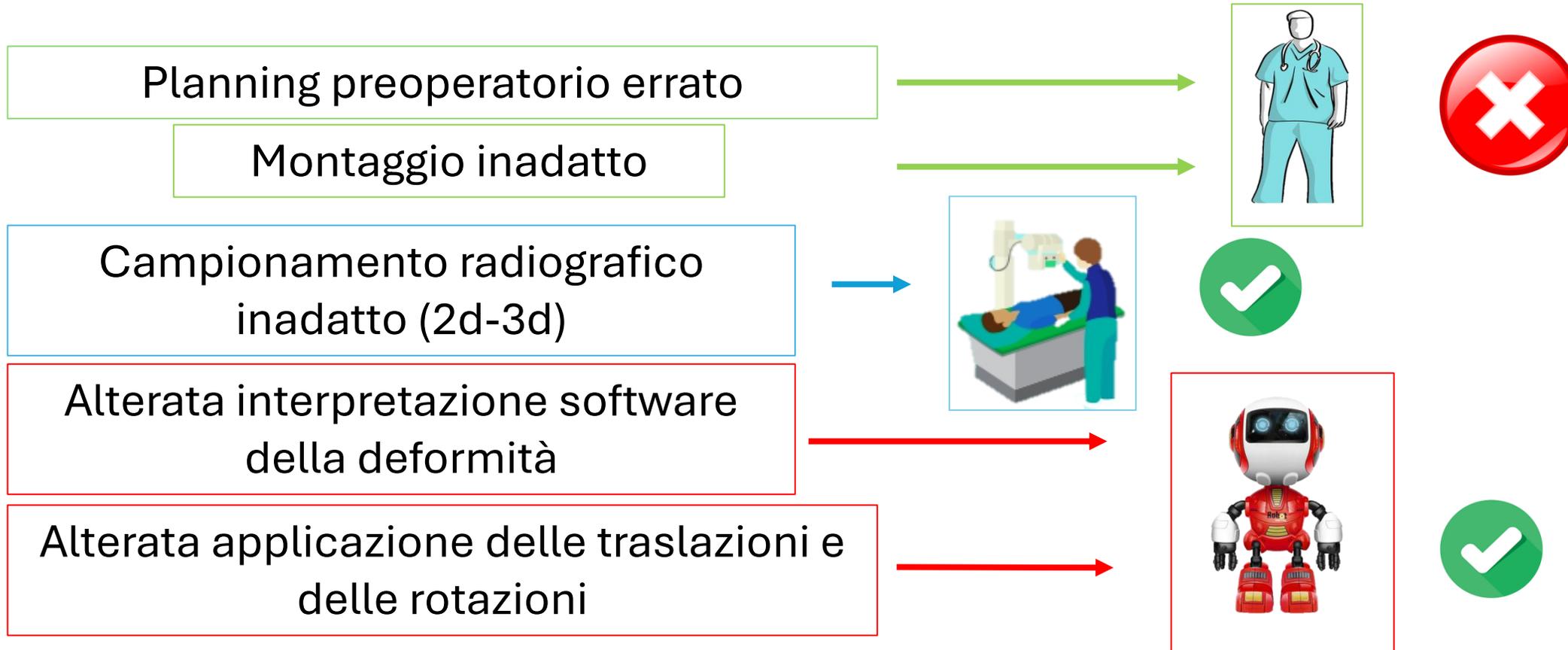
C. Radler



Accuracy of complex lower-limb deformity correction with external fixation: a comparison of the Taylor Spatial Frame with the Ilizarov Ringfixator

Hans Michael Manner · Michael Huebl ·
Christof Radler · Rudolf Ganger · Gert Petje ·
Franz Grill

Cause di errore



Conclusione



Affidabile e versatile anche in caso di radiografie non perfette, ma attenzione...

NON CORREGGE DA SOLO LE DEFORMITÀ!

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GRAZIE PER L'ATTENZIONE

