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Precision Medicine for Patients with Rotator Cuff Diseases: Relationship Between Clinical Scores and Shoulder Kinematic Parameters

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Faculty Disclosure Information

- Nothing to disclosure

Background

Rotator cuff injury affects about the 50% of the working population and results in pain and high functional disability of the shoulder[1–2]

DIAGNOSIS

Functional

Structural

TREATMENT

Surgical

Conservative

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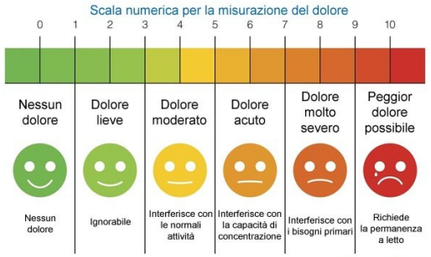
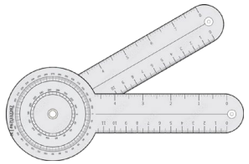
Background

EVALUATION

CLINICAL SCALE

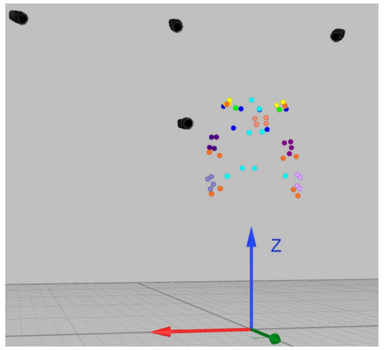


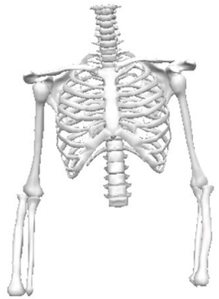
KINEMATIC ANALYSIS



Goniometer

Inertial sensors





Optoelectronic system

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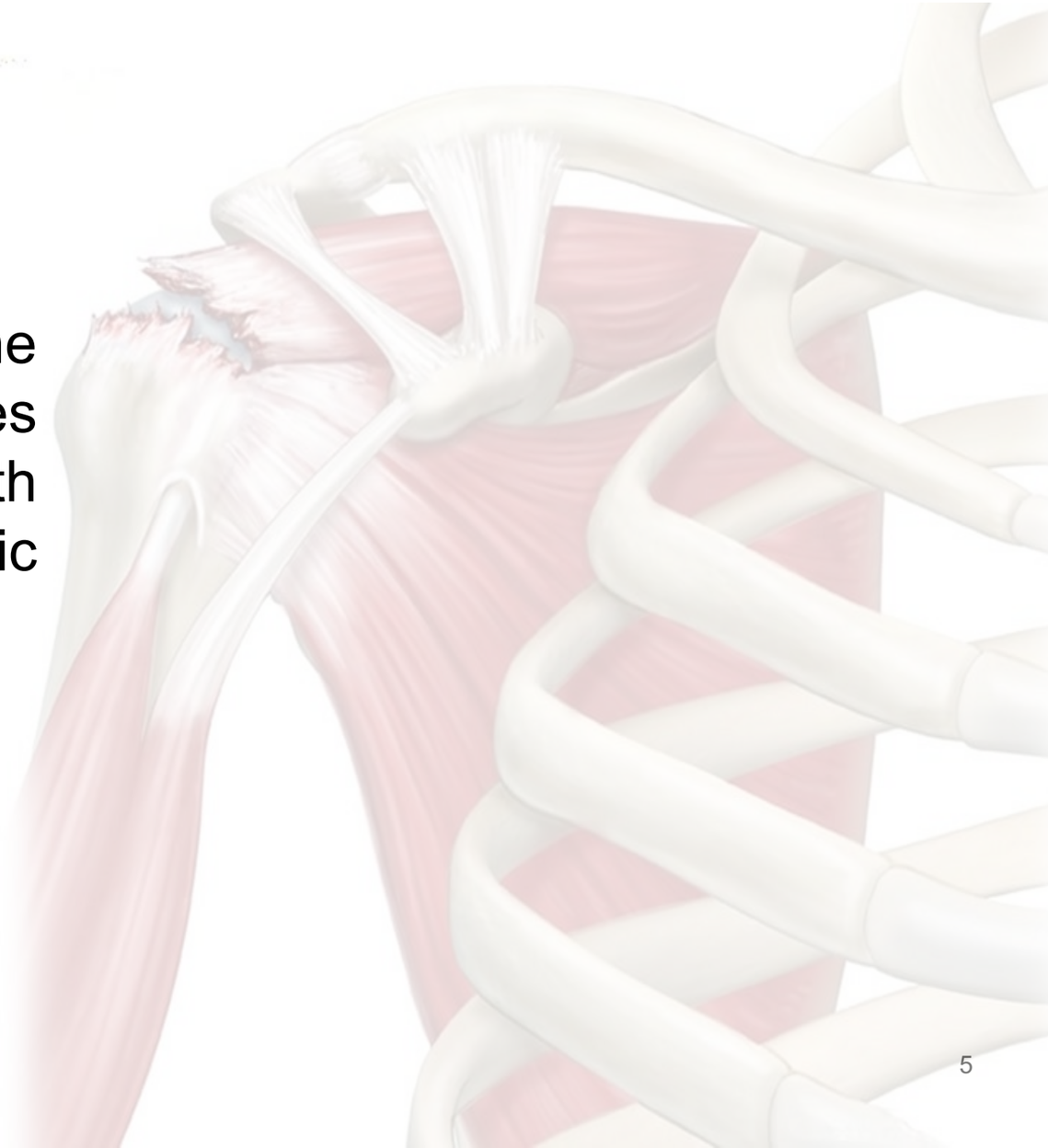
Aim

Correlation analysis between the most commonly used clinical scales for the assessment of patients with cuff tear and objective kinematic measures



Methods

Study design and enrollment

Population: **102 patients enrolled**

INCLUSION CRITERIA

- ✓ Complete supraspinatus tendon injury documented with MRI
- ✓ Age **over 18 years.**
- ✓ **Full Shoulder ROM**

EXCLUSION CRITERIA

- **Refusal** or inability to provide informed **consent**.
- **Previous surgical treatment** of the shoulder
- Presence of **additional pathological conditions o**f the shoulder (adhesive capsulitis, instability)

Methods

Clinical Scales

ASES

0
100

3 sections:

- Pain (VAS)
- Instability
- ADL

SF-36

0
100

3 sections:

- MCS
- PCS
- Health change

CMS

0
100

4 sections:

- Pain
- ADL
- ROM
- Strength

OSS

60
12

2 sections:

- Pain
- Shoulder function

SPADI

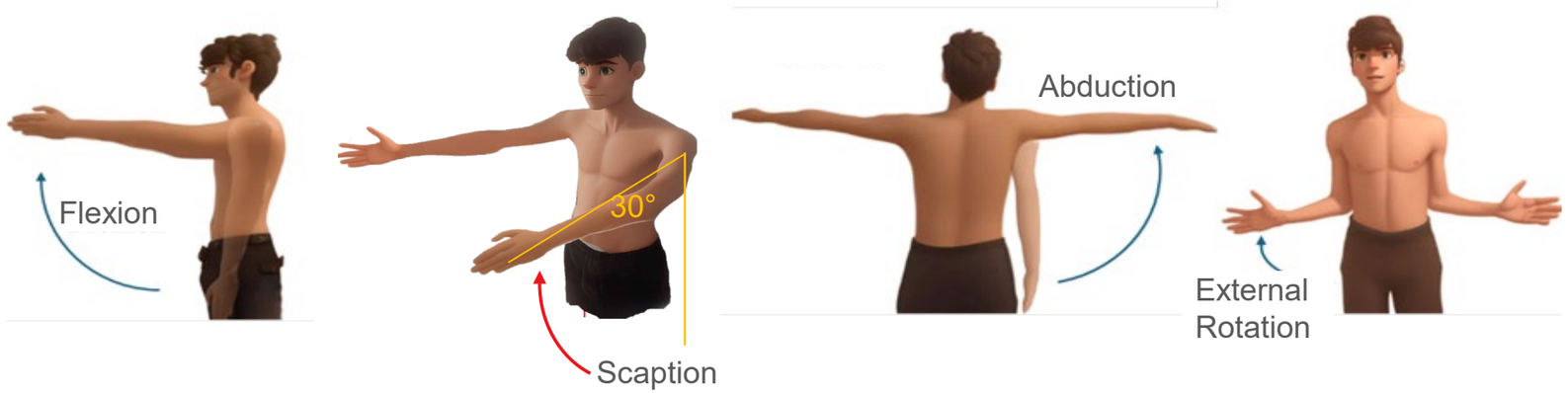
100
0

2 sub-scales:

- Pain
- Disability

Methods

Experimental Setup and Protocol



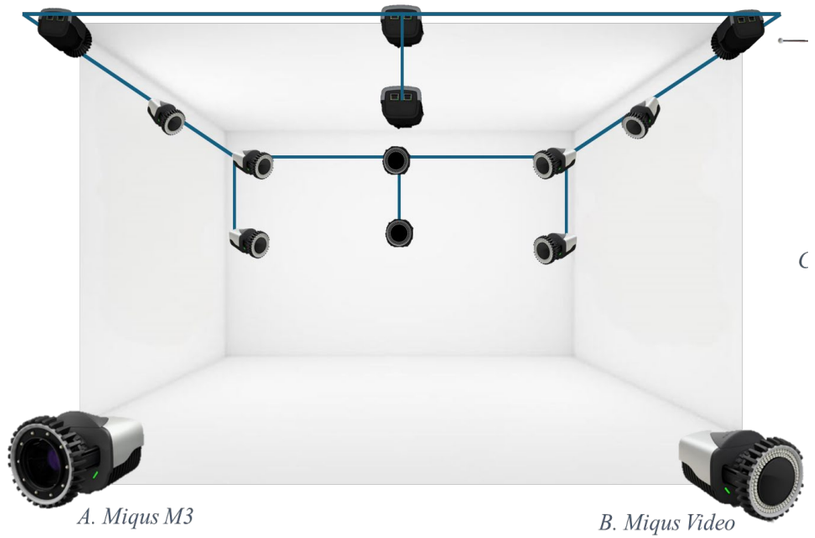
Each patient performed **4 tasks bilaterally**.

- Flexion
- Scaption
- Abduction
- External Rotation

For each task, **5 repetitions** were performed.

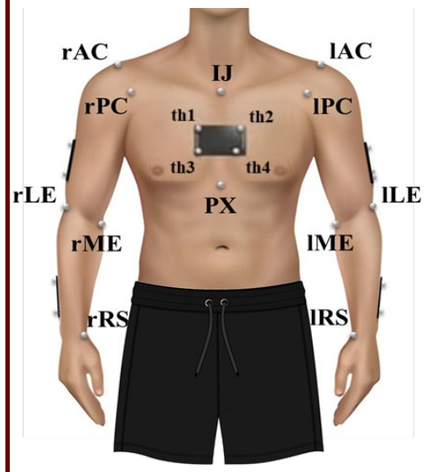
Methods

Experimental Setup and Protocol



A. Miqus M3 *B. Miqus Video*

Stereophotogrammetric System



22 Anatomical markers[3], **7** rigid Cluster

Marker set

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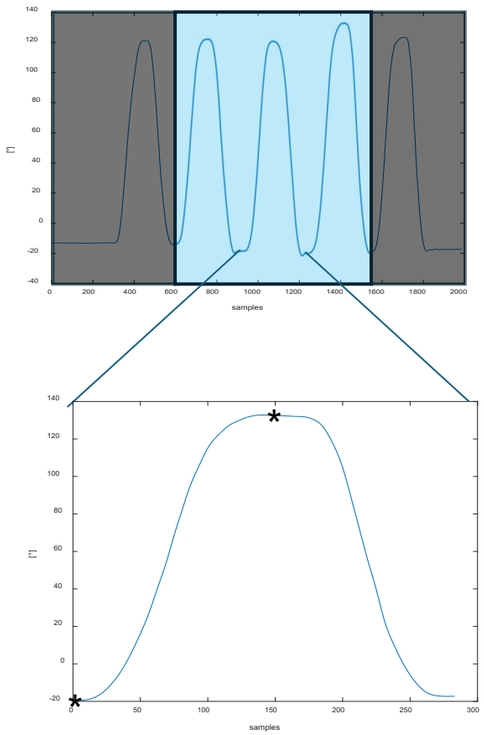
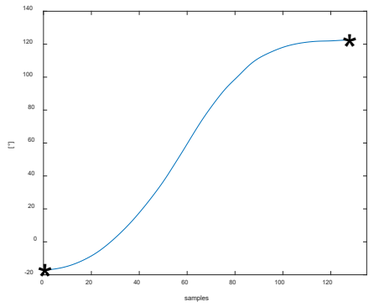
Methods

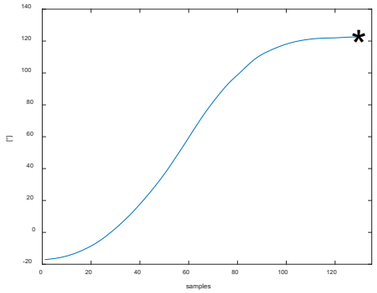
Kinematic Analysis[4]



$$ROM = \max(x) - \min(x)$$



$$Peaks = \max(x)$$



Considering the 3 central repetitions, for each Task are calculated:

Mean $\mu = \frac{1}{N}\sum_{i=1}^{N} A_i.$

Standard deviation $S = \sqrt{\frac{1}{N-1}\sum_{i=1}^{N} |A_i - \mu|^2}$

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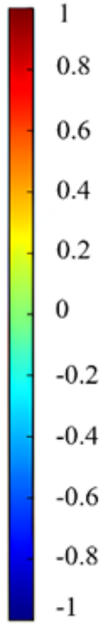
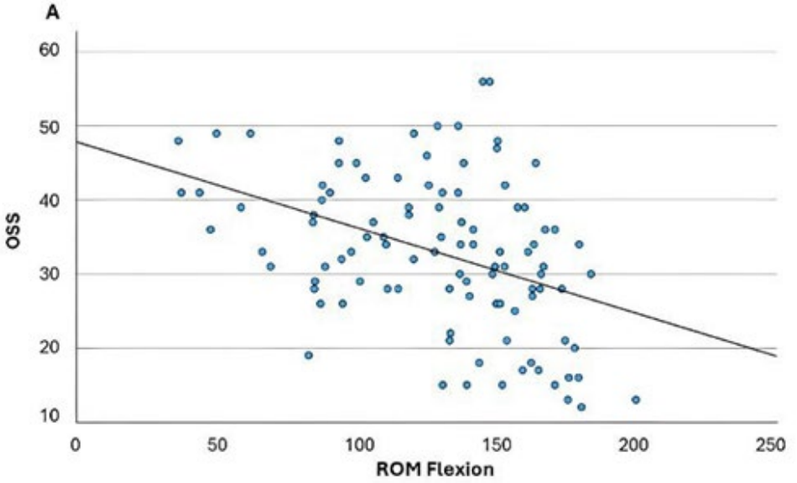
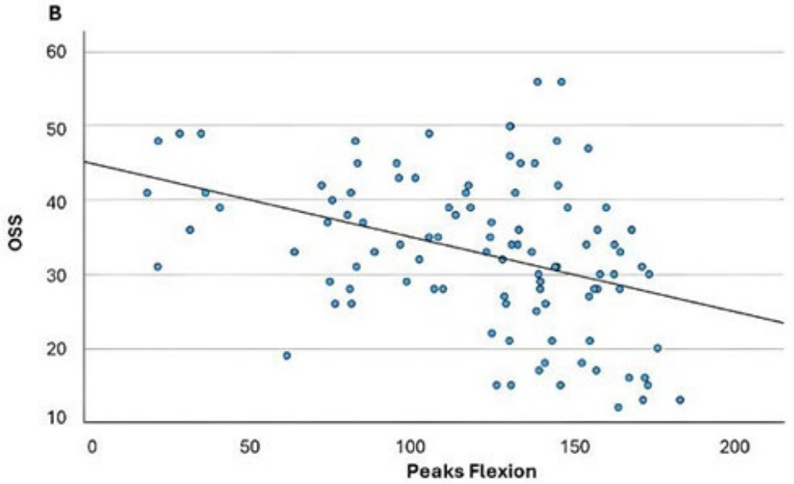
Results

Correlation analysis

	ASES	VAS	SF36	OSS	SPADI
ROM Flexion	0.191	-0.296*	0.297*	-0.428*	-0.453*
Peaks Flexion	0.166	-0.323*	0.271*	-0.403*	-0.485*
ROM Scaption	0.166	-0.235*	0.155	-0.374*	-0.452*
Peaks Scaption	0.138	-0.186*	0.135	-0.351*	-0.392*
ROM Abduction	0.287*	-0.338*	0.226*	-0.415*	-0.543*
Peaks Abduction	0.254*	-0.299*	0.208*	-0.407*	-0.493*
ROM Ext Rotation	0.039	-0.282*	0.367*	-0.314*	-0.288*
Peaks Ext Rotation	0.038	-0.285*	0.363*	-0.317*	-0.293*







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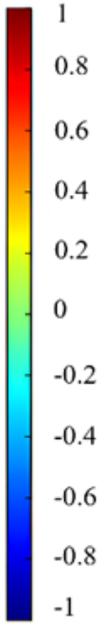

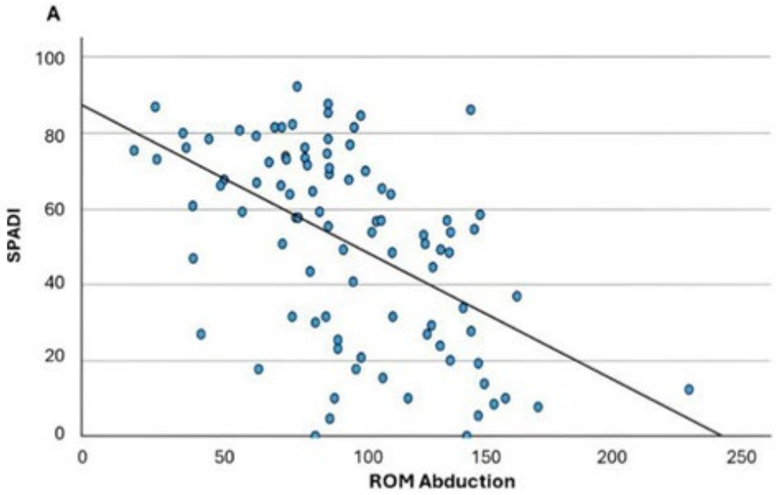

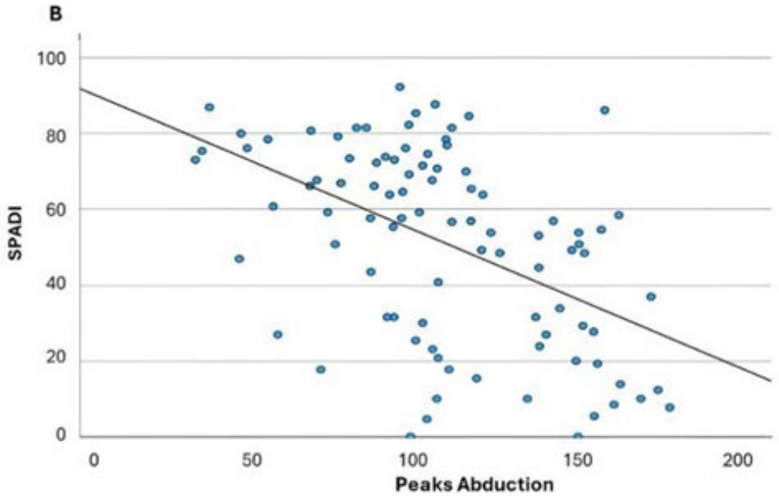

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Discussion and conclusion

Moderate correlation between ROM and peak values and clinical scales (SPADI, OSS) assessing strength, pain, disability

Weak or poor correlation between ROM and peak values and clinical scales (ASES, SF-36) assessing patient's psychological status

This study emphasizes the importance of a multidimensional approach for RCT management, highlighting the complementary role of clinical scores and quantitative shoulder kinematic assessments

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