Pseudoparesis and Pseudoparalysis in the Setting of Massive Irreparable Rotator Cuff Tear: Demographic, Anatomic, and Radiographic Risk Factors

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Disclosures

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American Shoulder and Elbow Surgeon: Committee or board member

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Knee Surgery, Sports Traumatology, Arthroscopy: Editorial or governing board

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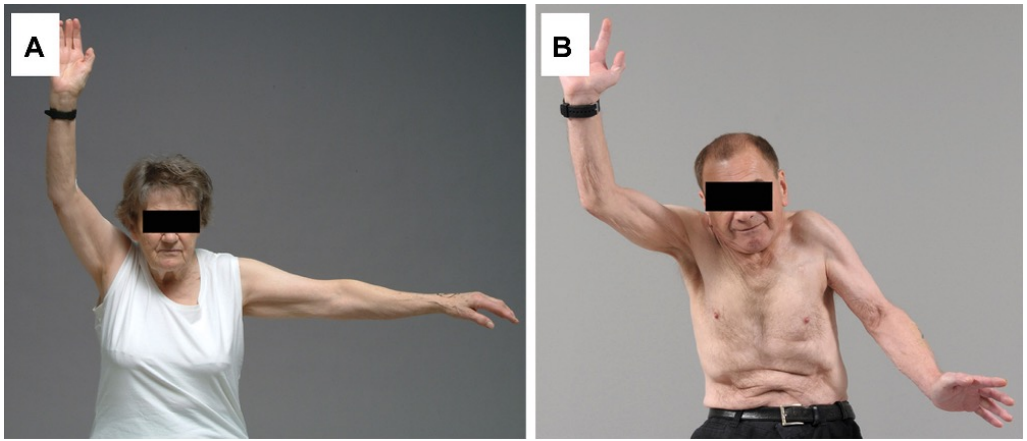
Background

- Recent studies define pseudoparalysis as maintained passive range of motion and limited active forward elevation (AFE) < 45 degrees and pseudoparesis as AFE >45 degrees but <90 degrees[1]
- There remains limited information regarding risk factors for pseudoparalysis and pseudoparesis, particularly in the setting of massive, irreparable rotator cuff tear (miRCT)[2]



Pollock et al[2]

- **Purpose:**
  1. To identify demographic, anatomic, and radiographic risk factors for active forward elevation (AFE) <90 degrees in the setting of massive, irreparable rotator cuff tear (miRCT).
  2. To identify characteristics that can be used to differentiate between patients with pseudoparalysis (AFE <45 degrees) and pseudoparesis (AFE >45 but <90 degrees).
- **Hypothesis:**
  - Age, tobacco use, rotator cuff tear severity, and radiographic anatomic parameters serve as significant independent risk factors for AFE<90 degrees and can be used to predict pseudoparalysis versus pseudoparesis.

Methods

- **Retrospective case-control study of patients with miRCTs at a single institution between 2016-2020**
- **Two cohorts**
  - AFE < 90 degrees
  - AFE > 90 degrees
- **Subgroup Analysis among AFE < 90 cohort**
  - **Pseudoparalysis**: AFE < 45 degrees
  - **Pseudoparesis**: AFE <90 degrees but >45 degrees

Methods

- **Demographics –** Age, sex, BMI, handedness, smoking status, diabetes, osteoporosis, autoimmune disease, side of injury, and duration of symptoms
- **Anatomic characteristics -** Tendons torn, tendon tear thickness, and tendon fatty infiltration ROM
- **Radiographic characteristics** - Presence and severity of arthritis, critical shoulder angle (CSA), and acromiohumeral distance (AHD)
- **Multivariate logistic regression model** to analyze risk factors

Results

- **129 total patients:**
  - **79 with AFE** < 90 degrees (mean AFE 59 ± 26 degrees)
  - **50 control** (mean AFE 151 ± 20 degrees)
- **Univariate Analysis:**
  - AFE<90 cohort **significantly older** (71.9 ± 11.0 years vs 65.9 ± 9.1 years)
  - AFE<90 cohort had **more severe arthritis** (34.2% vs 16.0% Grade 3 Samilson-Prieto)
  - AFE<90 cohort had **lower AHD** (4.8 ± 2.7 vs 7.6 ± 2.6 mm)
  - AFE<90 had **greater fatty infiltration of supraspinatus** (3.3 ± 0.9 vs 2.8 ± 0.8) and the **subscapularis** (2.0 ± 1.2 vs 1.5 ± 1.0)
  - AFE<90 cohort had **greater proportion of torn subscapularis** (55.7% vs 34.0% torn)

Results

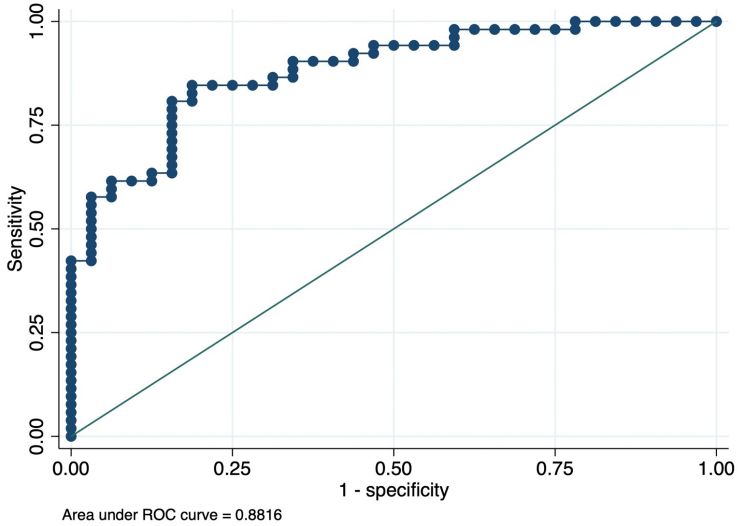
- **Multivariate Analysis:**
  - **Age, AHD, severe arthritis, and subscapularis tear** were significant independent factors predictive of AFE<90 while fatty infiltration of the supraspinatus and subscapularis were no longer significant.

Multivariate predictors of AFE <90 degrees

Variable	Odds Ratio	95% CI	P-value
Age	1.09	(1.02 – 1.17)	0.011
Acromiohumeral Distance	0.65	(0.50 – 0.85)	0.002
Severe Arthritis (SP Grade 3)	2.98	(1.22 – 16.71)	0.043
Supraspinatus Fatty Infiltration			
1	1	[REFERENCE]	[REFERENCE]
2	1.06	(0.07 – 26.81)	0.121
3	2.36	(0.14 – 13.42)	0.073
4	2.65	(0.23 – 104.52)	0.334
Subscapularis Fatty Infiltration			
0	1	[REFERENCE]	[REFERENCE]
1	0.87	(0.03 – 8.95)	0.618
2	1.01	(0.06 – 18.07)	0.997
3	1.43	(0.10 – 65.23)	0.551
4	3.87	(0.12 – 124.62)	0.445
Subscapularis Tear	5.92	(1.41 – 24.80)	0.015

Model Validation

- Model was able to correctly classify 82.2%. The ROC curve demonstrated an AUC of 0.88



Subgroup Analysis

- **Pseudoparalysis vs Pseudoparesis**
  - 34 patients with pseudoparalysis and 45 patients with pseudoparesis
  - **Tobacco use, and fatty infiltration of the supraspinatus and subscapularis** were risk factors for pseudoparalysis vs pseudoparesis

Multivariate predictors of pseudoparalysis

Variable	Odds Ratio	95% CI	P-value
Tobacco Use	3.54	(1.17 – 10.76)	0.026
Supraspinatus Fatty Infiltration			
1	1	[REFERENCE]	[REFERENCE]
2	0.88	(0.09 – 76.32)	0.865
3	1.03	(0.69 – 27.60)	0.243
4	2.22	(1.03 – 9.44)	0.015
Subscapularis Fatty Infiltration			
0	1	[REFERENCE]	[REFERENCE]
1	0.97	(0.12 – 98.67)	0.722
2	0.68	(0.04 – 34.51)	0.652
3	1.13	(0.67 – 42.92)	0.411
4	3.12	(1.50 – 16.65)	0.042

Conclusion

- In patients with massive, irreparable rotator cuff tears, increased age, decreased acromiohumeral distance, severe arthritis, and subscapularis tears are independent risk factors for AFE <90 degrees.
- Furthermore, patients with AFE <90 degrees tend to have greater supraspinatus and subscapularis fatty infiltration.
- Lastly, among patients with AFE <90 degrees, tobacco use and grade 4 fatty infiltration of the supraspinatus/subscapularis are significant risk factors for pseudoparalysis.

References

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