Development and validation of a model predicting post-operative shoulder stiffness after arthroscopic rotator cuff repair in Switzerland

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INTRODUCTION

- Post-operative shoulder stiffness (POSS) is one of the most frequent adverse event (AE) after arthroscopic rotator cuff repair (ARCR)
- Predicting POSS occurrence supports physicians in closely monitoring high risk patients

OBJECTIVES

To update and validate a clinical prediction model for POSS using a large representative patient cohort (ARCR_Pred cohort)

METHODS

SETTING

Enrollment of 973 patients undergoing primary ARCR between June 2020 and November 2021 in 18 Swiss and one German orthopaedic tertiary care center (Figure 1).
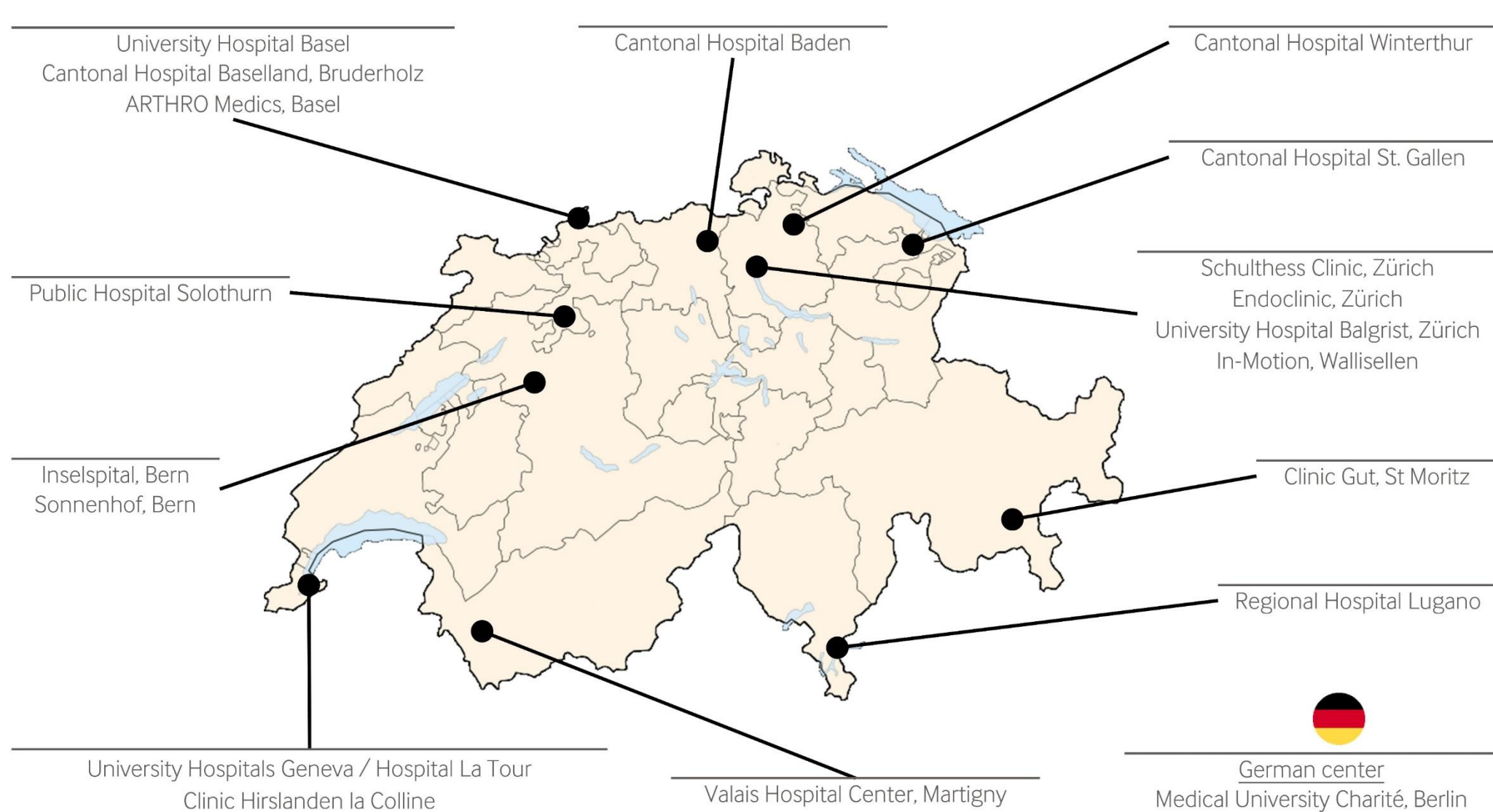

Figure 1: Study centers involved in the ARCR_Pred study

OUTCOME

POSS defined and validated using a Delphi process as limitation in range of motion at 6 months, or a symptomatic stiff shoulder leading to deviation from routine postoperative management between 3 and 6 months.

STATISTICAL ANALYSIS

A logistic regression model was used. The full model was composed of 35 baseline factors. A backward elimination procedure was used to maximize the apparent and bootstrap validated area under the receiver-operating characteristics curve (AUC).

RESULTS

- Suggested POSS definition showed a high agreement rate between the 44 involved surgeons (88%)
- 105 patients (10.8%) out of 973 suffered from POSS
- The reduced model had a higher AUC after bootstrap validation (0.68 compared to 0.64) (Figure 2)
- 10 patient and diagnostic-related baseline factors composed the reduced model (Figure 3)

Characteristic	β	(95% CI)	Increases POSS risk
Female sex	1.51	(0.96 to 2.39)	
Smoking status			
— Never smoked	Reference	—	
— Smoked before	1.70	(0.98 to 2.91)	
— Current smoker	1.57	(0.92 to 2.63)	
Traumatic onset	1.57	(0.95 to 2.61)	
Symptoms duration for more than 6 months	1.80	(1.09 to 2.99)	
Baseline level of external rotation	0.99	(0.97 to 1.00)	
Baseline Oxford Shoulder Score	0.95	(0.93 to 0.98)	
Acromiohumeral distance	0.85	(0.77 to 0.93)	
Pre-operative medication	1.58	(1.03 to 2.42)	
At least daily alcohol consumption	1.78	(0.93 to 3.28)	
Moderate or heavy work without overhead activity	1.60	(1.03 to 2.53)	

Figure 3: Reduced model factors associations

CONCLUSIONS

- POSS definition validated using a Delphi approach by 88% of the 44 surgeons involved in the Delphi process
- Female sex, riskier lifestyle, traumatic onset, longer symptom duration, worse baseline scores, pre-operative medication and higher working loads were associated with a higher risk of POSS
- Use of 6 weeks data and development of a user-friendly model presentation format are still required before potential implementation in the clinical routine
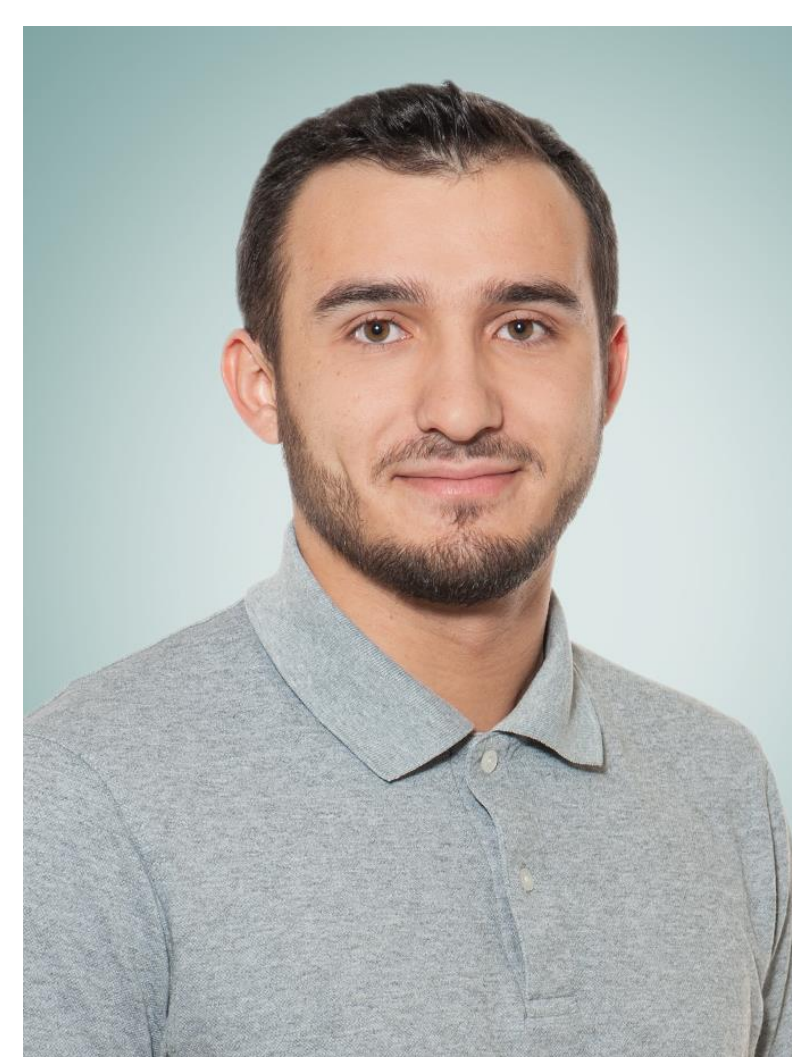
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