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Research Article

Predictive Value of the Jobe, Patte, Hertel I, and Yocum Tests in the Patients with Shoulder Pain

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Abstract

The basis of adequate therapeutic practice in medicine is based on the accurate diagnosis. To be able through the clinical exam to approximate as close as possible what is happening in the organism. There is great diversity of clinical tests for the physical examination of the shoulder, many of which were described more than 30 years ago, at a time when paraclinical diagnostic methods such as nuclear magnetic resonance, ultrasound and arthroscopy had little development, resulting in poor quality images, and most of the procedures performed were open surgery. This research proposes a clinical-arthroscopic evaluation of patients with shoulder pain who attend the shoulder clinic of the Children's Orthopedic Hospital Foundation (FHOI) in the period November 2013-April 2014 through the Jobe, Patte, Hertel I, Yocum tests. The predictive value of these diagnostic tests was measured regarding injuries of the supra and infraspinatus tendons. The following is a descriptive and descriptive investigation, which the sample is represented by 54 patients admitted for arthroscopic route in the period November 2013 to April 2014 inclusive. The results are expressed in absolute and relative values. In the sample, the female sex predominated, and the patients older than 50 years of age. The most injured tendon was the supraspinatus, and the most frequent type of injury was complete rotator cuff tear. The tests that significantly exacerbated pain were Jobe and Yocum ($p = 0.001$). Jobe's test turned out to be quite non-specific for clinically diagnosing supraspinatus tears. The Patte and Hertel I tests demonstrated a 100% positive predictive value for identifying infraspinatus tendon injuries. In conclusion, the Jobe and Yocum tests have low specificity for clinically determining injuries to the supraspinatus tendon; while the Patte and Hertel I tests, despite their low sensitivity, their positivity predict significant damage to the infraspinatus tendon.

Keywords: Arthroscopy; Infraspinatus; Supraspinatus; Clinical Tests

Introduction

The basis of adequate therapeutic exercise in medicine is based on the accurate diagnosis. In order to beable through the clinical exam to approximate as close as possible what is happened in the organism. Thereare great diversity of clinical tests for the physical examination of the shoulder, many of which were described more than 30 years ago [1] at a time when paraclinical diagnostic methods such as nuclear magnetic resonance, joint ultrasound, and arthroscopy had little development, resulting in poor quality images, and most of the procedures performed were open surgery. Since the description of these tests to date, imaging and advances in arthroscopic technology have given a greater understanding of rotator cuffinjuries, to the point of questioning many of the diagnoses and pathophysiology described and institutionalized as dogmas in the past [2]. Today, many diagnoses such as subacromial impingement syndrome [3]. are being questioned, which leads us to wonder if they are currently valid, if the classic clinical tests for examination of the shoulder continues to be valid or other way they will remain in the past, and willhave to give way to new clinical tests for the phpast andamination of the shoulder.

In 2009, Beaudreuil J, Boileau P, Walch G., *et al*, carried out a systematic review to determine the contributionof clinical tests in the diagnosis of rotator cuff injuries, concluding that many lack objective support, and are necessary carrying out validation studies of the same [2].

Ostör., *et al,* in 2013 carried out an investigation in which they compared the results of some clinical tests for the evaluation of the rotator cuff with nuclear magnetic resonance (MRI) results, and arthroscopic results, but it does not establish the validation of tests rather it compares the general sensitivity and specificity of the three diagnostic methods, with the result that arthroscopy is the most specific method for the detectionof rotator cuff injuries, being seconded by MRI. While clinical evaluation turns out to be very sensitive when assessing rotator cuff injuries [4].

In 2013, Hermans., *et al*, published a systematic review, in which they raised the question of whether patients with shoulder pain and positive clinical tests actually have a rotator cuff injury; in this investigation they found data regarding the fact that specialists do not perform more than 03 (three tests) in their physical examination, and the most used were those related to the assessment of the painful range of motion [5].

For this reason, this research proposes a clinical – arthroscopic correlation to evaluate patients with shoulder pain who attend the shoulder clinic of the Children's Orthopedic Hospital Foundation (FHOI) in the period November 2013-April 2014 through the Jobe, Patte tests. Hertel I, Yocum, in order to know the predictive value of these tests with respect to supraspinatus and infraspinatus tendons tears.

Material and Methods

It is a descriptive and transverse research [9]. The sample was represented by 54 patients with shoulder pain planned for arthroscopic surgery by the FHOI shoulder clinic who met the following criteria

Inclusion criteria

- Age between 18 and 70 years inclusive.
- Arthroscopic Surgical Intervention.
- Patients with muscle strength between 2 and 5 inclusive according to the Daniel's score.

Exclusion criteria

- Patient with adhesive capsulitis or arthrofibrosis.

Using the RAOSOFT® software, the sample size was calculated and the power of it was 53 patients. Thesample has a reliability level of 95%, and a 5% error.

The research data was collected through a form. The physical examination of the preoperative patient and intraoperative observation by arthroscopic approach of the supraspinatus and infraspinatus tendons. The preoperative examiner was different from the one who made the arthroscopic diagnosis to avoid information bias.

Variable	Indicator	Categorization	Measure scale
Age group	Date of birth	Years old	18 a 70
Gender	Secondary characters	Male, Female	Nominal
Supraspinatus tendonstatus	Arthroscpic diagnose	Intact Injured	Nominal
Infraspinatus tendonstatus	Arthroscpic diagnose	Intact Injured	Nominal
Pain	E.V.A categoric	Nothing = 0 mild = 1-3 moderate = 4-8 severe = 9 - 10	Ordinal
Muscular strength	Daniel's scale	Active, no gravity = 2 Active, gravity = 3 Active, gravity,resistance = 4 Normal = 5	Ordinal
Supraspinatus tendontear classification	Articular Bursal Complete	A = articularB = bursal C = both layers	Categoric
Infraspinatus tendontear classification	Articular Bursal Completa	A = articularB = bursal C = both layers	Categoric

Table 1: System of Variables and Operationalization of the sample.

The results were analyzed obtaining the predictive values (positive and negative) of each diagnostic test. These values measure the actual efficacy of a diagnostic test. They are probabilities of the result that givethe likelihood of suffering or not from a disease once the result of the diagnostic test is known [10].

Positive predictive value (PV+): probability of having the disease if the result of the diagnostic test ispositive.

$$PPV = \frac{\text{True positive}}{\text{True positive + false positive}}$$

Negative predictive value (PV-): probability of not having the disease if the result of the diagnostic test is negative.

$$NPV = \frac{\text{True negative}}{\text{True negative + false negative}}$$

The statistical significance of the variables will be calculated by the Chi Square method since the sampleis greater than 30, and it allows us to establish an association between the variables.

Results

Patients older than 50 years of age predominated in the sample. The results show that the most frequently injured tendon is the supraspinatus, and half of the times are complete lesions, but it is noteworthy that injuries to the articular layer occur up to three times more than those to the bursal layer. An important detail to highlight is that the injuries found to the infraspinatus tendon were not isolated, that is, they were associated with injuries to the supraspinatus tendon.

Patients	18-35 y/o		36-50 y/o		51-70 y/o		TOTAL	
Male	2	3,7%	4	7,4%	6	11,1%	12	22,2%
Female	1	1,9%	13	24,1%	28	51,8%	42	77,8%
Total	3	5,6%	17	31,5%	34	62,9%	54	100%

Table 2: Distribution according to age group and gender.

Groups	Patients				
(Supraspinatus tear)	45	100%	Articular	16	35,6%
			Bursal	6	13,3%
			Complete	23	51,1%
(Infraspinatus tear)	16	35,6%	Articular	2	12,5%
			Bursal	3	18,8%
			Complete	11	68,7%

Table 3: Classify the lesion of the supra and infraspinatus according to the involvement of thearticular and bursal layers.

In the study was observed that the Jobe and Yocum tests are significantly more painful when areperformed than the Patte and Hertel I tests (p = 0.001).

A 13% of the patients belonging to group I present decreased muscle strength when examined by the explorer, a detail not observed with the other clinical tests. An outstanding detail is that the patients in group II with normal muscle strength when performing the Jobe and Yocum tests, only presented injury to the bursal layer of the tendon.

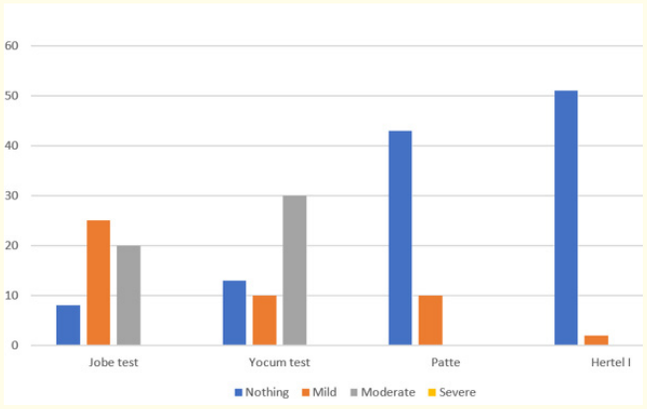

Chart 1: Estimation of the level of pain according to the categorical visual analogue scale (VAS).

Grupo	Jobe %			Yocum %			Patte %			Hertel I %		
	3	4	5	3	4	5	3	4	5	3	4	5
I	0	13	3,7	0	0	16,7	0	0	16,7	0	0	16,7
II	22,2	22,2	9,3	9,3	33,3	11,1	0	0	53,6	0	0	53,6
III	29,6	0	0	22,2	7,4	0	1,9	18,5	9,3	0	0	29,6

Table 4: Assessment of muscle strength according to Daniel's score.

I = no rotator cuff test: II = Supraspinatus tear: III = Both tendons tear (supra and infraspinatus).

Tests	S	E	VP +	VP -
Jobe	88,9%	22,2%	85,1%	28,9%
Yocum	77,5%	64,3%	86,1%	50%
Patte	62,5%	100%	100%	88,4%
Hertel I	25%	100%	100%	76%

Table 5: Positive and negative predictive value of the Jobe, Patte, Hertel I, Yocum tests.

VP (+): positive predictive value; VP (-): negative predictive value; S = sensibility; E = specificity.

Regarding the statistical validation of clinical tests, it is notable that the Hertel I and Patte tests are highly specific for the diagnosis of rotator cuff injuries, unlike the Jobe test which can be positive in many patientswith shoulder pain without any rotator cuff tear. The Jobe test has little predictive value in specifying the source of pain in clinical assessment.

Discussion

This study shows that two thirds of it was over 50 years of age, inferring that the predominant pathology causing shoulder pain is related to some degree of degenerative process, either in the cartilage or in the tendons that make up the rotator cuff. This match with publications by the AAOS (American Academy of Orthopedic Surgeons) where they show that the largest group of people who consult for shoulder pain arelocated in this age group [11].

By classifying the lesions of the supraspinatus and infraspinatus tendons present in the sample, we show that complete lesions of the supraspinatus tendon predominate. This data is in contrast to those reported in the world literature, which reports partial (articular or bursal) injuries as the most frequent rotator cuff injuries [12]. This is because as described by Andrews., *et al* in a systematic review published in 2006 on partial rotator cuff injuries, despite being more frequent many are asymptomatic and most of them when diagnosed evolve satisfactorily with conservative treatment [12]. Therefore, surgical treatment is mostly reserved for patients with complete and partial tears, which matched with our criteria for rotator cuff tear treatment.

Regarding the pain reported by the patients once the clinical tests were performed, it is concluded that Jobeand Yocum tests are significantly more painful than the Hertel I and Patte test. This higher pain could be biomechanically generate because a decrease in the subacromial space and therefore could generate friction of the rotator cuff and bursa with the coracoacromial arch which triggered the pain.

Conclusion

Finally, in this research the positivity of the Patte and Hertel I tests are highly specific for the clinical diagnosis of complete injuries of the infraspinatus tendon, but they present a low sensitivity, for which it can be concluded that the negativity of these tests does not rule out the absence of a lesion in the tendon structure. Regarding Jobe and Yocum tests, they are one of the most described in the literature, but as demonstrated in the research are positive in various shoulder conditions even if there is no rotator cuff giving a high number of false positives.

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