


# Comparative Study between Scales: Subjective Elbow Value and Patient-rated Tennis Elbow Evaluation Applied to Patients Affected by Lateral Epicondylitis

## *Estudo comparativo entre as escalas: “Subjective Elbow Value” e “Patient-rated Tennis Elbow Evaluation” aplicadas em pacientes com epicondilite lateral do cotovelo*

Roberto Yukio Ikemoto<sup>1</sup>  Luiz Henrique Oliveira Almeida<sup>1</sup> Giovanna Galvão Braga Motta<sup>1</sup>  
Alexandre Se Moo Kim<sup>1</sup> Carlos Vitor Nunes Lial<sup>1</sup> Johny James Claros<sup>1</sup>

<sup>1</sup>Orthopedics and Traumatology Service, Hospital Ipiranga, São Paulo, SP, Brazil

Address for correspondence Luiz Henrique Oliveira Almeida, Av. Nazaré, 28, Vila Monumento, São Paulo, SP, 04262-000, Brazil (e-mail: lh Almeida3@gmail.com).

Rev Bras Ortop 2020;55(5):564–569.

### Abstract

**Objective** To verify if the subjective elbow value (SEV) scale presents similar results to those of the Patient-rated Tennis Elbow Evaluation (PRTEE) scale in the evaluation of patients with lateral elbow epicondylitis (LEE).

**Methods** Thirty-seven patients were diagnosed with LEE in the outpatient service of our hospital through clinical history, physical examination, X-ray, and ultrasonography. The SEV and PRTEE scales were used and their results were compared using a significance level  $\geq 5\%$  ( $p \geq 0.05$ ).

**Results** A statistically significant relationship was found between the values of SEV and PRTEE in the group of patients studied ( $p = 0.017$ ).

**Conclusion** Subjective elbow value presented similar results to PRTEE in the evaluation of patients with diagnosis of LEE.

### Keywords

- ▶ elbow
- ▶ tendons
- ▶ ultrasonography
- ▶ physical examination
- ▶ tennis elbow

### Resumo

**Objetivo** Avaliar se a aplicação das escalas *subjective elbow value* (SEV) e *Patient-rated Tennis Elbow Evaluation* (PRTEE) apresentam resultados similares na avaliação de pacientes com epicondilite lateral do cotovelo.

**Métodos** Trinta e sete indivíduos com diagnóstico de epicondilite lateral do cotovelo foram avaliados no ambulatório de cirurgia do ombro e cotovelo do nosso hospital. O diagnóstico foi realizado com a história clínica da patologia, exame físico, raio-x, e ultrassonografia. Foram utilizadas as escalas SEV e PRTEE, e os resultados foram comparados estatisticamente, usando-se como nível de significância 5% ( $P \geq 0,05$ ).

**Resultados** Encontramos uma relação estatisticamente significativa entre os valores obtidos pelas escalas SEV e PRTEE quando aplicadas no grupo de pacientes portadores de epicondilite lateral ( $p = 0,017$ ).

**Conclusão** *Subjective elbow value* apresentou resultados similares ao PRTEE na avaliação de pacientes com diagnóstico de epicondilite lateral do cotovelo.

### Palavras-chave

- ▶ cotovelo
- ▶ tendões
- ▶ ultrassonografia
- ▶ exame físico
- ▶ cotovelo de tenista

received  
February 1, 2018  
accepted  
March 28, 2019

DOI <https://doi.org/10.1055/s-0039-3402465>.  
ISSN 0102-3616.

Copyright © 2020 by Sociedade Brasileira de Ortopedia e Traumatologia. Published by Thieme Revinter Publicações Ltda, Rio de Janeiro, Brazil

License terms



## Introduction

Lateral elbow epicondylitis (LEE) is an orthopedic condition affecting the tendon of the extensor digitorum communis muscle. It is a very frequent condition, presenting with tendon degeneration and pain in the lateral region of the elbow.<sup>1</sup> The incidence of LEE is roughly 4/1,000 people per year, affecting a wide variety of workers and athletes who perform repetitive elbow and wrist movements. Its peak incidence is from the 4<sup>th</sup> to the 6<sup>th</sup> decades of life.<sup>2</sup>

Despite being called “tennis elbow”, LEE affects a large number of workers, ranging from office to industrial production line workers. In a study conducted in Washington, USA, between 1987 and 1995, LEE accounted for 11.7% of work-related injury complaints.<sup>3</sup>

The pathophysiology of LEE is not fully understood. Histopathological changes observed in the tendon include increased fibroblast concentration, vascular hyperplasia, and collagen fiber disorganization; as such, the condition can be defined as an elbow tendinopathy.<sup>2</sup>

Ultrasound (US) is the diagnostic method of choice to confirm LEE diagnosis, associated with physical examination and clinical history findings.<sup>3</sup>

The treatment of LEE remains challenging, with a high rate of poor outcomes.<sup>2</sup> Despite being a relatively common condition, there is little scientific evidence to support an algorithm for LEE treatment.<sup>4-6</sup>

The evaluation of LEE treatment outcomes is also challenging. There are several scales for elbow function analysis, such as: the Mayo elbow performance score (MEPS), disabilities of the arm, shoulder and hand (DASH) and upper extremity function scale (UEFS). These scales not only evaluate LEE-associated painful symptoms and associated functional loss, but also various trauma-related factors, such as

stiffness and instability. As such, score values are increased, generating a false impression of discrete elbow involvement in LEE because the limiting factor for elbow functionality in this condition is pain with preserved range of motion and joint stability.<sup>7-10</sup>

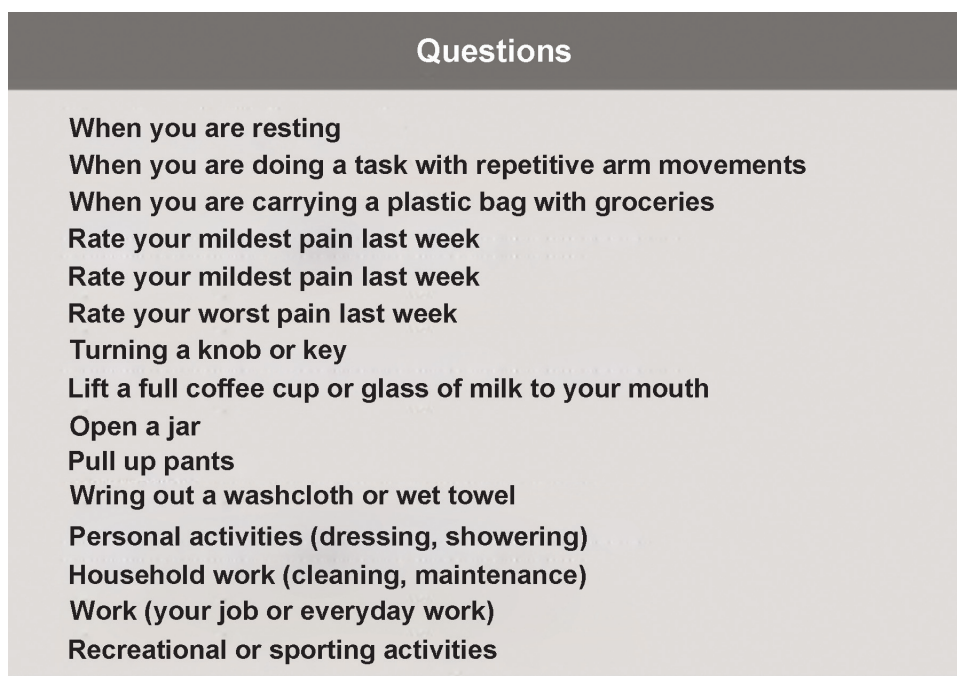
The Patient-rated Tennis Elbow Evaluation (PRTEE) scale was developed by MacDemid<sup>7</sup> and other authors<sup>8,9</sup>, in 1999, specifically to evaluate LEE cases. In 2005, it was modified to its current model by the same group of researchers. The PRTEE consists of 15 items, which are subdivided into 2 parts; the 1<sup>st</sup> part contains 5 items assessing pain, ranging from 0 to 10 according to pain intensity, whereas the second part has 10 items assessing elbow function in daily activities, in which 0 indicates total capacity and 10 refers to total incapacity. Results from the second part are divided by two and added to the results from the first part; the total score ranges from 0, indicating no involvement, to 100 points, referring to the maximum degree of limb involvement by LEE<sup>10,11</sup> (► **Figure 1**).

Subjective elbow value (SEV) is a single numerical value obtained by asking the patient the percentage of impaired functional activity in the affected elbow that can range from 0 to 100; in which 100 corresponds to an elbow with normal function and 0 to an elbow with total inability to perform daily routine and professional activities.<sup>11</sup>

The present study intended to verify if the SEV scale presented similar results to those of the PRTEE scale for the evaluation of patients with untreated LEE.

## Materials and Methods

This study was conducted from July 2016 to March 2017. In total, 53 patients were evaluated at the shoulder and elbow outpatient facility with a diagnostic hypothesis of LEE; 37



**Fig. 1** Patient-Rated Tennis Elbow Evaluation (PRTEE) scale.

subjects met the inclusion and exclusion criteria for this study (► **Table 1**).

The inclusion criteria were: compatible findings at clinical history and physical examination, complemented by ultrasound findings, normal results at elbow radiographs, and lack of any previous treatment.

Clinical criteria used for diagnosis included chronic pain at the lateral aspect of the elbow, defined as pain for more than 12 weeks, pain during lateral epicondyle palpation and positivity in at least two of the following physical examination tests: pain during wrist or finger extension against resistance with the elbow at 90 degrees of flexion (Cozen

**Table 1** Patients list.

PATIENTS	AGE	GENDER	OCCUPATION	AFFECTED SIDE	ROM (F/E; P/S)*	COZEN/MILLS/ GARDNER	PRTEE	SEV
01	52	Female	HOUSEMAID	RIGHT	0-140; 75-80	POS/POS/POS	80	30%
02	56	Male	RETIRED	LEFT	0-140; 75-80	POS/POS/POS	77	20%
03	66	Male	COMMERCIAL REPRESENTATIVE	RIGHT	0-140; 90-90	POS/POS/NEG	60	30%
04	48	Female	HOUSEMAID	RIGHT	5-140; 75-85	POS/POS/NEG	63	50%
05	53	Female	TEACHER	RIGHT	0-130; 70-80	POS/POS/POS	74	40%
06	50	Female	HAIRDRESSER	RIGHT	0-120; 65-80	POS/POS/NEG	87	30%
07	46	Female	CLEANING ATTENDANT	RIGHT	0-140; 75-80	POS/POS/NEG	93	50%
08	49	Female	CLEANING ATTENDANT	RIGHT	0-120; 70-80	POS/POS/POS	75	45%
09	51	Female	UNEMPLOYED	RIGHT	0-130; 65-75	POS/POS/POS	76	30%
10	44	Female	HOUSEMAID	RIGHT	0-120; 60-80	POS/POS/NEG	77	60%
11	48	Female	RADIOLOGY TECHNICIAN	RIGHT	0-140; 70-85	POS/NEG/NEG	68	70%
12	57	Male	TEACHER	RIGHT	0-120; 75-80	POS/POS/NEG	69	50%
13	45	Female	MANICURIST	RIGHT	0-130; 70-85	POS/POS/NEG	74	30%
14	49	Female	FINANCIAL EXECUTIVE	RIGHT	0-140; 75-85	POS/POS/POS	85	90%
15	59	Male	TAXI DRIVER	RIGHT	0-140;90-90	NEG/POS/POS	73	60%
16	55	Male	LAWYER	RIGHT	0-140;90-90	POS/POS/POS	66	30%
17	60	Female	HOUSEKEEPER	RIGHT	0-140;90-90	POS/POS/POS	72	30%
18	40	Female	ELDERLY CAREGIVER	RIGHT	0-140;90-90	NEG/NEG/POS	71	25%
19	51	Male	HAIRDRESSER	LEFT	0-140;80-80	NEG/NEG/POS	74	50%
20	43	Male	DOORMAN	RIGHT	0-130;80-80	POS/POS/POS	73	70%
21	39	Female	SEAMSTRESS	RIGHT	0-140;90-90	POS/POS/POS	78	35%
22	44	Female	HOUSEMAID	RIGHT	0-140;90-90	POS/POS/POS	70	55%
23	45	Male	DRIVER	LEFT	0-140;90-90	POS/POS/POS	60	45%
24	46	Female	CLEANING ATTENDANT	LEFT	0-140; 80-90	POS/NEG/POS	75	40%
25	56	Male	TEACHER	RIGHT	0-130; 75-80	POS/POS/POS	68	30%
26	42	Female	RADIOLOGY TECHNICIAN	LEFT	0-140; 80-90	POS/POS/NEG	62	50%
27	54	Female	NURSE ASSISTANT	LEFT	0-140; 90-90	POS/NEG/NEG	60	50%
28	45	Male	RETIRED	RIGHT	0-140; 80-90	POS/POS/NEG	65	30%
29	33	Female	HAIRDRESSER	RIGHT	0-130;80-80	POS/POS/POS	81	70%
30	47	Female	HOUSEMAID	RIGHT	0-140;80-90	POS/POS/POS	63	60%
31	45	Female	COMMERCIAL REPRESENTATIVE	RIGHT	0-140;90-90	POS/POS/POS	76	80%
32	40	Female	HOUSEKEEPER	RIGHT	0-140;90-90	POS/POS/POS	70	60%
33	54	Female	HAIRDRESSER	RIGHT	0-140;90-90	NEG/POS/POS	82	80%
34	37	Female	HAIRDRESSER	RIGHT	0-140;90-90	NEG/NEG/POS	60	80%
35	47	Female	LAUNDRY WORKER	RIGHT	0-130;80-80	POS/POS/POS	66	60%
36	36	Male	BRICKLAYER ASSISTANT	LEFT	0-130;90-90	POS/POS/POS	67	70%
37	38	Male	MECHANIC	RIGHT	0-140;90-90	POS/NEG/NEG	68	60%

Abbreviation: F/E, flexion/extension; NEG, negative; P/S, pronation/supination; POS, positive; PRTEE, Patient-Rated Tennis Elbow Evaluation; ROM, range of motion; SEV, Subjective Elbow Value.

test),<sup>12</sup> pain with the elbow in extension and passive wrist extension (Mills test),<sup>12</sup> pain during elevation from chair with pronated and semiflexed wrist (Gardner test),<sup>12</sup> pain at resistive supination,<sup>12</sup> and pain during passive stretch of the supinator muscle<sup>12</sup> (► **Figure 2A-B**). All photos belong to the authors' archives and pictures of all physical examination tests would exceed the maximum number of pictures allowed by this journal.

The exclusion criteria were: previous history of rheumatologic disease and/or arthritis, orthopedic disorders affecting the elbow other than LEE, acute elbow pain, diabetes mellitus, pregnancy, neurological diseases, peripheral neuropathies, recent acute upper limb trauma, previous surgery on the affected limb, and chronic polyarthralgia.

The clinical diagnosis was made and then confirmed by an ultrasound examination; an x-ray of the affected elbow was also performed to exclude other orthopedic joint conditions.<sup>11</sup>

The research project was duly approved by the research ethics committee of the institution. All patients participating in this study signed an informed consent form.

The 37 patients diagnosed with lateral epicondylitis were evaluated using the PRTEE and SEV scales during an outpatient visit at our hospital.<sup>8-11</sup>

An Excel spreadsheet (Microsoft Corp., Redmond, WA, USA) was used for data organization. The IBM SPSS statistical package, version 23.0 (IBM Corp., Armonk, NY, USA) was used for results analysis. The Mann-Whitney test was used to verify possible differences between genders and to analyze the relationship between laterality and SEV.

The Spearman's correlation analysis was used to evaluate the degree of relationship between SEV and PRTEE. Values were considered statistically significant when *p*-value was greater than or equal to 5% ( $p \geq 0.05$ ).

## Results

In total, 25 patients were female (67.6%); the mean patients' age was 47 years, 10 months-old, and 27 (79.4%) subjects performed activities associated with repetitive elbow or

wrist movements. At the physical examination tests, 86.4%, 81%, and 67.5% of the patients presented positive results at the Cozen, Mills, and Gardner tests, respectively.

The Mann-Whitney test was used to evaluate whether gender and laterality represented important factors in SEV results and found no statistically significant differences. Therefore, the fact that the patient affected by LEE was male or female did not influence the degree of elbow involvement ( $p = 0.179$ ); similarly, whether the affected side was the right or left one did not represent a statistically significant factor ( $p = 0.433$ ) (► **Table 2**).

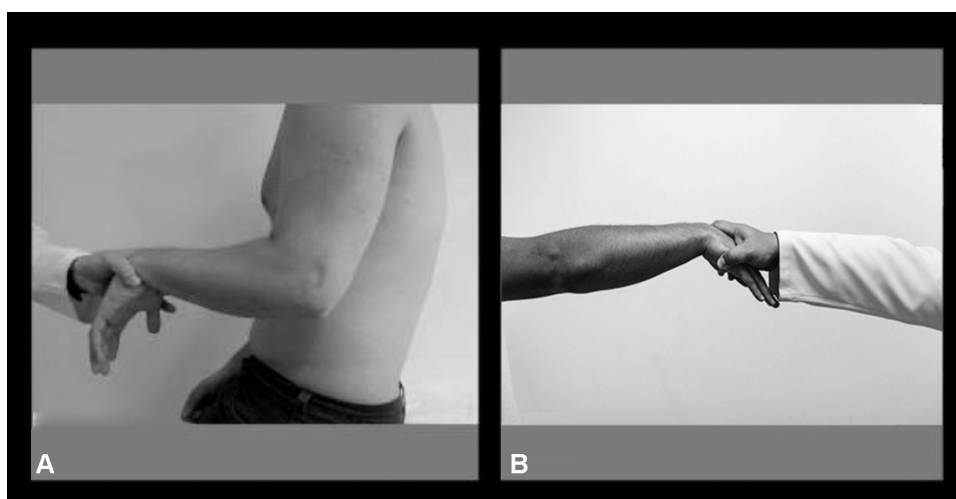
The Spearman correlation analysis evaluated if there was a statistically significant relationship between the results obtained with the SEV and PRTEE scales; since this relationship actually existed, results were equivalent when both scales were applied ( $p = 0.017$ ) (► **Table 3**).

## Discussion

Previous researches have shown that the PRTEE scale is a satisfactory method for evaluating LEE patients, since it was created specifically for the study of these subjects. The PRTEE scale presents a good correlation with clinical complaints in subjects with LEE-associated functional limitations.<sup>7,13</sup> In several case series, the PRTEE scale demonstrated a good sensitivity in the evaluation of LEE patients, but it is very extensive and difficult for the examiner to memorize; these are its main limitations for its use in clinical practice. The PRTEE had good sensitivity and specificity in the evaluation of both acute and chronic LEE cases.<sup>7,13,14</sup>

Consistent with the literature, our study also demonstrated that SEV is a simple and easy-to-use scale for the clinical investigation of the degree of functional impairment in patients with elbow conditions, being easily understood by the subject and rapidly memorized by the physician. In addition, SEV was developed to evaluate any elbow condition.<sup>15</sup>

A study conducted in 2014 observed that there was a moderate statistical relationship between SEV and MEPS in the evaluation of patients with elbow tendon conditions; this



**Fig. 2** (A) Cozen test, (B) Mills test.

**Table 2** Gender and laterality results

Variable	Gender	n	Average	Standard deviation	Minimum	Maximum	25 <sup>th</sup> percentile	50 <sup>th</sup> percentile (Median)	75 <sup>th</sup> percentile	Significance (p)
SEV	Female	25	54.80%	18.62%	30.00%	100.00%	40.00%	50.00%	70.00%	0.179
	Male	12	45.42%	17.25%	20.00%	70.00%	30.00%	47.50%	60.00%	
	Total	37	51.76%	18.49%	20.00%	100.00%	32.50%	50.00%	65.00%	

Abbreviation: SEV, subjective elbow value

Variable	Gender	n	Average	Standard deviation	Minimum	Maximum	25 <sup>th</sup> percentile	50 <sup>th</sup> percentile (Median)	75 <sup>th</sup> percentile	Significance (p)
SEV	Right	30	53.00%	19.24%	30.00%	100.00%	30.00%	52.50%	70.00%	0.1433
	Left	7	46.43%	14.92%	20.00%	70.00%	40.00%	50.00%	50.00%	
	Total	37	51.76%	18.49%	20.00%	100.00%	32.50%	50.00%	65.00%	

**Table 3** Scales comparison results Value.

Variable	Statistical Analysis	SEV
AGE	Coefficient of correlation (r)	-0.409
	Calculated significance (p)	0.012
	n	37
PRTEE	Coefficient of correlation (r)	+0.391
	Calculated significance (p)	0.017
	n	37

Abbreviations: PRTEE, Patient-Rated Tennis Elbow Evaluation; SEV, Subjective Elbow

paper showed that, despite being simple, SEV is as good as a more complex scale, such as MEPS, in evaluating these diseases.<sup>16</sup>

In 2017, Ernstbrunner observed similar results in the postoperative evaluation of patients undergoing total elbow arthroplasty using MEPS or SEV scales.<sup>17</sup>

A 2011 study demonstrated similar results between SEV and MEPS in the evaluation of patients submitted to an anconeus graft at the elbow for chronic posterior skin defect with no joint involvement; this finding confirmed information from the previous study that SEV is a very appropriate scale for elbow conditions.<sup>18</sup>

Our study observed a statistically significant relationship between results obtained with the SEV and PRTEE scales in the evaluation of patients diagnosed with LEE.

## Conclusion

Subjective elbow value is a functional scale with statistically similar results to those of PRTEE in the evaluation of untreated LEE patients.

### Conflicts of Interest

The authors have no conflict of interests to declare.

## References

- Potter HG, Hannafin JA, Morwessel RM, DiCarlo EF, O'Brien SJ, Altchek DW. Lateral epicondylitis: correlation of MR imaging, surgical, and histopathologic findings. *Radiology* 1995;196(01):43–46
- Matache BA, Berdusco R, Momoli F, Lapner PL, Pollock JW. A randomized, double-blind sham-controlled trial on the efficacy of arthroscopic tennis elbow release for the management of chronic lateral epicondylitis. *BMC Musculoskelet Disord* 2016;17(01):239
- Connell D, Burke F, Coombes P, et al. Sonographic examination of lateral epicondylitis. *AJR Am J Roentgenol* 2001;176(03):777–782
- Labelle H, Guibert R, Joncas J, Newman N, Fallaha M, Rivard CH. Lack of scientific evidence for the treatment of lateral epicondylitis of the elbow. An attempted meta-analysis. *J Bone Joint Surg Br* 1992;74(05):646–651
- Smidt N, Assendelft WJ, Arola H, et al. Effectiveness of physiotherapy for lateral epicondylitis: a systematic review. *Ann Med* 2003;35(01):51–62
- Nilsson P, Baigi A, Marklund B, Månsson J. Cross-cultural adaptation and determination of the reliability and validity of PRTEE-S (Patientskattad Utvärdering av Tennisarmbåge), a questionnaire for patients with lateral epicondylalgia, in a Swedish population. *BMC Musculoskelet Disord* 2008;9(01):79
- Macdermid J. Update: the patient-rated forearm evaluation questionnaire is now the patient-rated tennis elbow evaluation. *J Hand Ther* 2005;18(04):407–410
- Rompe JD, Overend TJ, MacDermid JC. Validation of the patient-rated tennis elbow evaluation questionnaire. *J Hand Ther* 2007;20(01):3–10, quiz 11
- Sousa de Andrade C, Costa Souza R, Rosane Chamlian T, et al. Tradução e adaptação cultural do questionário PRTEE (Patient-rated Tennis Elbow Evaluation) para a língua portuguesa. *Cad Ter Ocup UFSCar* 2011;19(03):281–288
- Newcomer KL, Martinez-Silvestrini JA, Schaefer MP, Gay RE, Arendt KW. Sensitivity of the Patient-rated Forearm Evaluation Questionnaire in lateral epicondylitis. *J Hand Ther* 2005;18(04):400–406
- Taylor SA, Hannafin JA. Evaluation and management of elbow tendinopathy. *Sports Health* 2012;4(05):384–393
- Levin D, Nazarian LN, Miller TT, et al. Lateral epicondylitis of the elbow: US findings. *Radiology* 2005;237(01):230–234
- Plancher KD, Halbrecht J, Lourie GM. Medial and lateral epicondylitis in the athlete. *Clin Sports Med* 1996;15(02):283–305

- 14 Overend TJ, Wuori-Fearn JL, Kramer JF, MacDermid JC. Reliability of a patient-rated forearm evaluation questionnaire for patients with lateral epicondylitis. *J Hand Ther* 1999;12(01):31–37
- 15 Sathyamoorthy P, Kemp GJ, Rawal A, Rayner V, Frostick SP. Development and validation of an elbow score. *Rheumatology (Oxford)* 2004;43(11):1434–1440
- 16 Schneeberger AG, Kösters MC, Steens W. Comparison of the subjective elbow value and the Mayo elbow performance score. *J Shoulder Elbow Surg* 2014;23(03):308–312
- 17 Ernstbrunner L, Hingsammer A, Imam MA, et al. Long-term results of total elbow arthroplasty in patients with hemophilia. *J Shoulder Elbow Surg* 2018;27(01):126–132
- 18 Elhassan B, Karabekmez F, Hsu CC, Steinmann S, Moran S. Outcome of local anconeus flap transfer to cover soft tissue defects over the posterior aspect of the elbow. *J Shoulder Elbow Surg* 2011;20(05):807–812