J Shoulder Elbow Surg (2021) 30, e237–e244

ELSEVIER

Journal of Shoulder and Elbow Surgery

www.elsevier.com/locate/ymse

Exploring expert variability in defining pseudoparalysis: an international survey

Curtis J. Fahey, MB BCh BAO, MScPT, BSc(Hons)[a],
Ruth A. Delaney, FRCS(Tr&Orth), MB BCh BAO, MMedSc(Sports Med), FFSEM[b,*]

[a]*School of Medicine, University College Cork, Cork, Ireland*
[b]*Dublin Shoulder Institute, Dublin, Ireland*

Background: There is currently disagreement among experts in the field of shoulder surgery when attempting to define the term ''pseudoparalysis.'' Multiple surgical techniques to address this condition have been investigated; however, many studies have recruited heterogeneous patient populations and have used varying definitions of pseudoparalysis. This makes it difficult to compare outcomes among various techniques. To our knowledge, no previous study has surveyed international experts regarding the definition of pseudoparalysis using a questionnaire and video-based patient assessment. The purpose of this study was to evaluate the level of agreement among shoulder surgeons in defining and applying the term ''pseudoparalysis.'' We hypothesized that inter-rater agreement for classifying patients as having pseudoparalysis would be poor.

Methods: Members of the American Shoulder and Elbow Surgeons, the European Society for Surgery of the Shoulder and the Elbow, and our national shoulder and elbow society were surveyed on 2 occasions using an electronic questionnaire. All surgeons were asked to identify their preferred definition of pseudoparalysis from 1 of 4 options. The surgeons then viewed video examinations of 10 patients and labeled them as having pseudoparalysis or not. Inter-rater reliability and intrarater reliability were calculated as κ coefficients. The Pearson χ^2 test was used to detect associations between the preferred definition and demographic information.

Results: A total of 246 surgeons responded to at least 1 survey. Overall inter-rater agreement on classifying patients as having pseudoparalysis based on video consultation showed a κ value of 0.59 (95% confidence interval [CI], 0.58-0.60). The same verbal definition was selected by 56.1% of surgeons. The surgeons were not internally consistent in their choice of definition, with intrarater reliability showing a κ value of 0.64 (95% CI, 0.48-0.81). Intrarater reliability for classifying patients as having pseudoparalysis was better, with a κ value of 0.78 (95% CI, 0.72-0.83). An association was observed between how surgeons defined pseudoparalysis and their age ($P = .03$), as well as their shoulder caseload percentage ($P = .04$).

Conclusion: Shoulder surgeons do not agree on how best to define pseudoparalysis of the shoulder. Inter-rater agreement based on video consultation was weak overall and improved with the elimination of an outlier video. Intrarater agreement was less frequent when selecting a preferred definition compared with classifying patients as having pseudoparalysis based on video examinations. Surgeons may rely less on explicit criteria and more on a conceptual framework when assigning a ''pseudoparalytic'' label. Care should be taken with use of the term ''pseudoparalysis'' in clinical outcome studies when there is clearly a lack of consensus among experts in defining this term.

Level of evidence: Survey Study; Experts

Keywords: Pseudoparalysis; rotator cuff tear; definition; inter-rater and intrarater agreement; reverse shoulder arthroplasty

This study was formally approved by the Sports Surgery Clinic Scientific Advisory and Research Ethics Board (SAREB15/10/18RD/MJ3).

*Reprint requests: Ruth A. Delaney, FRCS(Tr&Orth), MB BCh BAO, MMedSc(Sports Med), FFSEM, Sports Surgery Clinic, Northwood Avenue, Suite 4, Santry, Dublin, D09 C523, Ireland.
E-mail address: Delaney.ortho@gmail.com (R.A. Delaney).

1058-2746/$ - see front matter
https://doi.org/10.1016/j.jse.2020.08.029

Only a small subset of patients with rotator cuff pathology will experience pseudoparalysis; however, it is a challenging condition for shoulder surgeons to treat and causes significant functional difficulty to individuals affected.[2] Patients may have particular difficulty with activities of daily living such as eating, drinking, and brushing their hair because of the inherent shoulder mobility these actions require.[2]The optimal treatment strategy for managing patients with massive rotator cuff tears is controversial. Surgical strategies most frequently investigated include arthroscopic rotator cuff repair,[9,10,21,22] latissimus dorsi tendon transfer,[24] lower trapezius transfer,[13] reverse shoulder arthroplasty with or without tendon transfer,[1-3,11,28,29] and the more recently developed superior capsular reconstruction.[6,14,19,20] Positive clinical outcomes have been reported for each approach, with several authors describing a complete ''reversal'' of pseudoparalysis.[6,9,10,19,20] Although the preoperative patient population for many of these studies has been described as ''pseudoparalytic,'' a closer look reveals a heterogeneous group of participants. This makes it difficult to pool results effectively and compare findings across trials. Ultimately, the ability to determine the most appropriate treatment strategy is hindered by the inconsistency in defining features.

The term ''pseudoparalysis'' has variable definitions both in the literature and anecdotally at major shoulder conferences. The term was first used in publication in 1976, although it can be inferred that the author's description of so-called pseudoparalysis would suggest the term was already being used in clinical practice at that time.[23] A variant of the term appeared again in 2005, when Werner et al[29] formally defined ''painful pseudoparesis'' as active shoulder elevation $< 90^\circ$ with full passive motion. In the subsequent years, multiple adaptations of this definition have been used to describe pseudoparalysis, many of which have removed pain as a criterion.[2,3,27]

The variability in defining pseudoparalysis was recently highlighted in a 2017 systematic review that synthesized current definitions within the literature.[27] The authors rightfully concluded that a consistent definition would improve transparency moving forward and recommended that pseudoparalysis be defined as 0° of active elevation with full passive motion, with or without anterior superior escape, in the absence of pain or neurologic deficit.[27]This definition was subsequently met with resistance, and the argument was made that only patients with neurologic paralysis are unable to demonstrate any active elevation.[5] Instead, it was suggested that pseudoparalysis refer to patients with 20°- 30° of active elevation and full passive motion.[5] It could be argued that the descriptive difference here relates to active elevation achieved by scapulothoracic (shoulder shrug) rather than glenohumeral motion. Further adding to the uncertainty, an opinion piece published some months later in 2017 offered yet another definition.[7] This was the third proposed definition to appear in the literature within a 9-month period. Since then, qualifiers such as ''true,''[27] ''profound,'' [6] ''moderate,'' [19] and ''severe''[19] have come into use to describe pseudoparalysis. From this, we believe it is fair to assume that the variability in defining pseudoparalysis extends beyond the literature into everyday practice. Definition clarity is important because ultimately it enables meaningful treatment comparison.

To our knowledge, no previous study has surveyed international experts regarding pseudoparalysis using a questionnaire and video-based assessment. The aim of this study was to evaluate the variability among orthopedic surgeons in defining and applying the term ''pseudoparalysis'' of the shoulder when presented with the same set of patient examinations. We hypothesized that inter-rater agreement for classifying patients as having pseudoparalysis would be poor. This study was not conducted to arrive at a particular definition based on the majority but simply to quantify the level of disagreement. However, we recognize that a consistent definition has the potential to influence inclusion and exclusion criteria for future studies investigating the most appropriate treatment strategy for this condition.

Materials and methods

Study design

This study was designed to investigate the inter-rater and intrarater reliability among orthopedic surgeons in applying the term ''pseudoparalysis'' to a group of patients with shoulder pathology. To capture these outcomes, a 3-part electronic questionnaire was administered at 2 separate time points. This was a unique questionnaire that had not been previously validated. The first part of the questionnaire recorded demographic information such as surgeon age, sex, experience, fellowship training, current caseload, and region of practice. The surgeons were then asked to identify their preferred definition of pseudoparalysis from 1 of 4 options (Table I). Those who selected ''other'' were presented with an open text field to enter a custom definition. In the final portion, the surgeons viewed video examinations of 10 patients and described them as either having pseudoparalysis or not. All surgeons were shown the same 10 videos. The videos varied in length from 6 to 38 seconds and consisted of anterior and lateral views of attempted bilateral shoulder flexion range of motion (ROM). The surgeons were given no background clinical information except the fact that all patients had full passive shoulder ROM. A minimum of 2 months separated the initial and follow-up questionnaires to reduce response bias. The order of the patient videos was altered between time points to discourage memorization. The follow-up consisted of only the final 2 sections of the initial questionnaire, namely the preferred definition and patient video portions.

Participants

Members of the American Shoulder and Elbow Surgeons, the European Society for Surgery of the Shoulder and the Elbow, and our national shoulder and elbow society were eligible for inclusion in the study. Nonmembers were excluded from participation. An

Table I Definition choices presented to each surgeon

Choice	Description
1	Visible muscle contraction with no active shoulder flexion
2	Active shoulder flexion <90° with full passive range of motion
3	Attempted active shoulder flexion causing anterior-superior escape
4	Other

e-mail with an attached link to the online survey was distributed to the mailing lists of the respective societies. The membership criteria for each society are listed elsewhere.[12,25,26] Participation was voluntary and confidential. Informed consent was obtained from surgeons prior to accessing the questionnaire. A total of 178 surgeons agreed to participate in the initial questionnaire. There were 123 responses to the second questionnaire, 68 of which were original and could not be matched to an initial questionnaire. These 68 were included as part of the inter-rater reliability calculation, for a total of 246 unique participants.

Patients selected for inclusion in the video portion of the questionnaire were chosen on a nonconsecutive basis. The senior investigator selected 10 patients based on an impression of physical examination findings that may or may not be considered pseudoparalytic. All patients were previously referred to the senior investigator for surgical consultation regarding their shoulder pathology. The face and any additional identifying features of each patient were blurred before their videos were embedded in the survey to maintain patient confidentiality. Edited patient videos were then uploaded to a private YouTube channel (Alphabet, Mountain View, CA, USA) that was only accessible via a link in the invitation e-mail. The patient videos were unlisted and not available to the website's search algorithm. Verbal and written consent was obtained from all patients for use of their anonymized clinical videos in an international questionnaire.

Data analysis

The primary outcome was inter-rater reliability in labeling 10 patients as having pseudoparalysis or not. This was calculated using the Fleiss κ value and presented with 95% confidence intervals (CIs). For health research purposes, it has been suggested that κ values between 0 and 0.20 represent no agreement; 0.21-0.39, minimal agreement; 0.40-0.59, weak agreement; 0.60-0.79, moderate agreement; 0.80-0.90, strong agreement; and >0.90, almost perfect agreement.[18]

Secondary outcomes included the frequency of chosen definitions, intrarater reliability, demographic differences in defining pseudoparalysis, and qualitative analysis of ''other'' definitions. The frequency of each definition selected by participating surgeons was presented as a percentage. Intrarater reliability was calculated using the Cohen κ value and presented with 95% CIs. A separate analysis was performed for the preferred definition and video-based segments. The κ coefficient measures the percentage of instances of agreement with consideration for agreement occurring by chance alone.[16] The Pearson χ^2 test was used to assess for differences in defining pseudoparalysis based on demographic characteristics. This included age, sex, experience, fellowship training, current caseload, and region of practice. Tests were only considered valid if <20% of cross-tabulation cells contained an expected count < 5.[15] When >20% of cells contained an expected count < 5, the maximum likelihood ratio and asymptotic significance (2 sided) were used. $P < .05$ was considered significant. When statistically significant differences were found, the Cramér V was used to estimate the effect size. Values < 0.2 suggest the fields are weakly associated despite being statistically significant, values between 0.2 and 0.6 indicate a moderate effect size, and values > 0.6 indicate a strong effect size. All statistical analysis was completed using IBM SPSS Statistics software (version 26; IBM, Armonk, NY, USA). A thematic analysis of ''other'' definitions was conducted using the 6-step framework of Braun and Clarke.[4]

Results

A total of 178 surgeons completed the initial 3-part questionnaire. Table II provides a summary of participant demographic characteristics from the initial questionnaire. The follow-up questionnaire received a total of 123 responses. Fifty-three of these respondents had also completed the initial questionnaire and were therefore included in the intrarater analysis. Sixty-eight responses were original and could not be matched to an initial questionnaire. Demographic information for these 68 surgeons was not available. Two follow-up responses were duplicates and were subsequently eliminated. A total of 246 surgeons completed at least 1 questionnaire; their data were used to calculate inter-rater reliability.

Inter-rater agreement among all surgeons in classifying patients as having pseudoparalysis or not based on the ROM videos was 0.59 (95% CI, 0.58-0.60). Surgeon agreement ranged from 80.1% to 99.2%, except in the case of patient 7, where only 56.1% of surgeons agreed on how best to classify the patient (Fig. 1). Removing patient 7 from the inter-rater analysis increased the κ value to 0.64 (95% CI, 0.63-0.65).

Our evaluation of surgeon preference for defining pseudoparalysis revealed that 17.5% chose to define the term as visible muscle contraction with no active shoulder flexion, 56.1% preferred active shoulder flexion < 90° with full passive ROM, 17.5% preferred attempted active shoulder flexion causing anterior-superior escape, and 8.9% chose ''other'' and provided a definition in the open text field (Fig. 2). Intrarater reliability for participating surgeons' preferred definition by κ coefficient was 0.64 (95% CI, 0.48-0.81). Intrarater reliability when evaluated with respect to labeling patients as having pseudoparalysis or not based on video examinations was 0.78 (95% CI, 0.72-0.83).

An association between how surgeons defined pseudoparalysis and their age was observed, with a likelihood ratio of 23.0 ($P = .03$). Surgeons aged ≤ 55 years were more likely to choose definition 2, whereas those aged ≥ 56 years had an increased tendency to select definition 3

Table II Surgeon demographic and practice characteristics

Characteristic	n (%)
Sex	
Male	172 (96.6)
Female	6 (3.4)
Age	
<35 yr	7 (4.0)
35-45 yr	66 (37.3)
46-55 yr	55 (31.1)
56-65 yr	32 (18.1)
>65 yr	17 (9.6)
Region	
Asia	6 (3.4)
Australasia	1 (0.6)
Western Europe	59 (33.1)
Eastern Europe	8 (4.5)
North America	98 (55.1)
South America	5 (2.8)
Other	1 (0.6)
Experience	
≤5 yr	28 (15.7)
6-10 yr	26 (14.6)
>10 yr	124 (69.7)
Shoulder fellowship	
Yes	150 (84.3)
No	28 (15.7)
Shoulder caseload	
≤25%	2 (1.1)
26%-50%	23 (12.9)
>50%	153 (86.0)
Society membership	
ISES	7 (3.4)
ESSSE	70 (33.6)
ASES	131 (63.0)

ISES, Irish Shoulder and Elbow Society; *ESSSE*, European Society for Surgery of the Shoulder and the Elbow; *ASES*, American Shoulder and Elbow Surgeons.

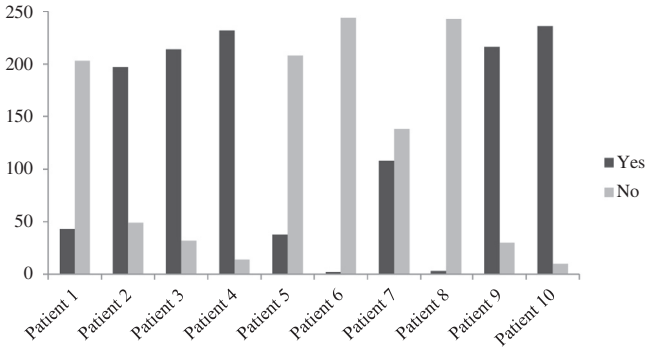

Figure 1 Surgeon response to video examinations classifying patients as having pseudoparalysis *(dark gray)* or not *(light gray)*.

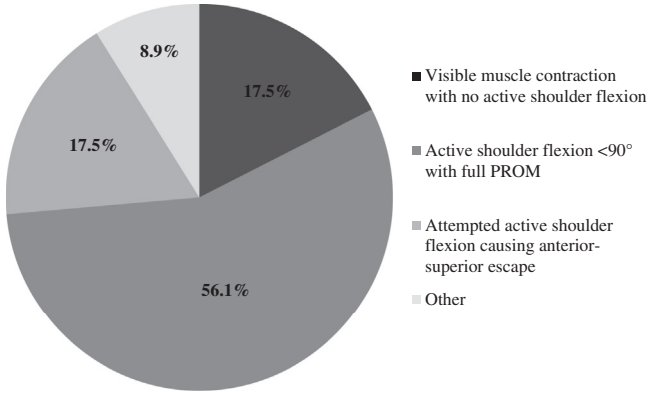

Figure 2 Surgeon preference in defining pseudoparalysis of shoulder: active shoulder flexion < 90° with full passive range of motion *(PROM)*, visible muscle contraction with no active shoulder flexion, attempted active shoulder flexion causing anterior-superior escape, or other.

(Table I). The estimated effect size measured with the Cramér V was 0.20. An association was also observed between the preferred definition and the percentage of a surgeon's caseload that consisted of shoulder pathology, with a likelihood ratio of 13.5 ($P = .04$). Surgeons with shoulder pathology representing >50% of their current practice were more likely to choose definition 2, whereas those with a shoulder caseload of 26%-50% had an increased tendency to select definition 1. The estimated effect size measured with the Cramér V was 0.25. No difference was found between how surgeons defined pseudoparalysis and their sex, region, years in practice, or fellowship training.

Thematic analysis of the "other" definitions revealed 4 main themes. Table III provides verbatim examples reflective of each theme. Four surgeons suggested that pseudoparalysis is active shoulder flexion < 90° with full passive ROM and an additional requirement, such as a positive drop-arm sign or an inability to elevate because of pain. Three surgeons defined the term as active shoulder flexion < 60° with normal passive ROM. Two surgeons preferred active shoulder flexion < 30° with normal passive ROM. Finally, 7 surgeons chose to define the term as muscle contraction in the absence of active shoulder flexion that was not limited by pain. The remaining 2 surgeons who selected "other" did not provide an alternate definition.

Discussion

This study demonstrates weak to moderate agreement among surgeons in classifying patients as having pseudoparalysis or not based on video examinations. Furthermore, this study shows an inconsistency regarding the defining features of the term "pseudoparalysis." This finding is in keeping with our hypothesis and aligns with the available

Table III Verbatim definitions representative of 4 identified themes

Theme	Example definition
1	"Active shoulder flexion <90 [degrees] with full passive ROM and positive drop arm sign"
2	"Painless active shoulder FF <60 degrees"
3	"<30 degrees active forward flexion"
4	"Deltoid contraction, no active forward elevation, pain eliminated (possibly by injection), full passive ROM"

ROM, range of motion; *FF*, forward flexion.

literature and the views shared at international shoulder conferences. We find it worrisome that the term is used to represent multiple patient populations yet is still widely used in practice and in outcome reporting.

Pseudoparalysis is a subspecialist topic within the broader context of orthopedics. Therefore, our first goal was to establish that we had captured an ''expert'' population: 84.3% of participating surgeons had completed shoulder fellowship training, 69.7% were in practice for >10 years, and 86% cited a current caseload consisting of >50% shoulder pathology. We believed that it was important that participants be familiar with the term ''pseudoparalysis'' and possess their own working definition prior to participation.

Despite the widespread use of the term and the variety of treatment strategies that have been investigated, no studies have directly compared treatment options for pseudoparalysis. This exacerbates the definition controversy because it means that variable patient cohorts are being recruited and, therefore, meaningful comparison between trials evaluating different treatment approaches is futile. A recent systematic review of treatment strategies for pseudoparalysis revealed that all studies on the topic were either level III or IV evidence.[27] Randomized and prospective cohort trials are lacking; thus, there is little to guide surgeon decision making other than individual experience and comfort level with a particular approach.

The most commonly selected definition of pseudoparalysis in our study was active shoulder flexion $< 90^\circ$ with full passive ROM. Our survey results demonstrated that 56.1% of surgeons preferred this definition. This is certainly below the rate that should be expected in a health care setting given that most participants were experts in the field of shoulder surgery. This observation is not intended to question the expertise of our participants but rather to comment on the casual use of the term in clinical outcome studies and the impact this can have on settling the debate regarding preferred treatment options. However, our findings are in keeping with the review conclusions of Tokish et al,[27] who found this same definition to be cited most often in the literature. As previously mentioned, these authors subsequently went on to offer their preferred definition of the term; their article was 1 of 3 such articles received for publication in 2017.[5,7,27] Presumably, many of our participants would have read this review and the associated opinion piece and letter given that they were published in high-impact shoulder journals. Our results demonstrate minimal uptake of the newly recommended definitions.

Inter-rater agreement on the clinical examination videos was weak to moderate. The agreement improved when an outlying patient was removed from the analysis. It is encouraging that surgeons tend to agree clinically when labeling a pseudoparalytic shoulder, despite the differences in preferred definitions. This finding offers some hope that surgeons are referring to similar patient populations when using the term in discussions. The consultation in patient 7 was the only one in which <80% of surgeons agreed on the most appropriate classification (43.9% classified this patient as having pseudoparalysis) (Fig. 3). A retrospective review of the clinical notes of patient 7 revealed active forward flexion $< 90^\circ$ that was not limited by pain, full passive ROM, and a negative drop-arm sign. The treating surgeon described this patient's condition as not truly pseudoparalytic. It is possible that the participating surgeons could not agree on how best to classify this patient's video examination findings because forward flexion approached 90°, a defining feature used by the majority of our participants. The strength of inter-rater agreement becomes moderate when this patient is removed from the analysis. A subset of participants likely exist who declined to classify this patient as having pseudoparalysis despite selecting definition 2 as their preferred definition. From this, it could be argued that some surgeons rely on a conceptual mental framework when classifying a patient as having pseudoparalysis rather than applying the explicit criteria of their own definition.

This conclusion is further supported by the strength of the intrarater κ coefficients, which suggest that surgeons are more flexible in how they define pseudoparalysis than they are in labeling patients as having pseudoparalysis. According to data from the follow-up survey, surgeons were more likely to classify the same patients as having pseudoparalysis or not than they were to select the same preferred definition 2 months later—meaning that surgeons cannot even agree with themselves on how best to define the term!

The subgroup analysis revealed that surgeons aged ≤ 55 years had an increased tendency to select definition 2 whereas those aged ≥ 56 years had a tendency to choose

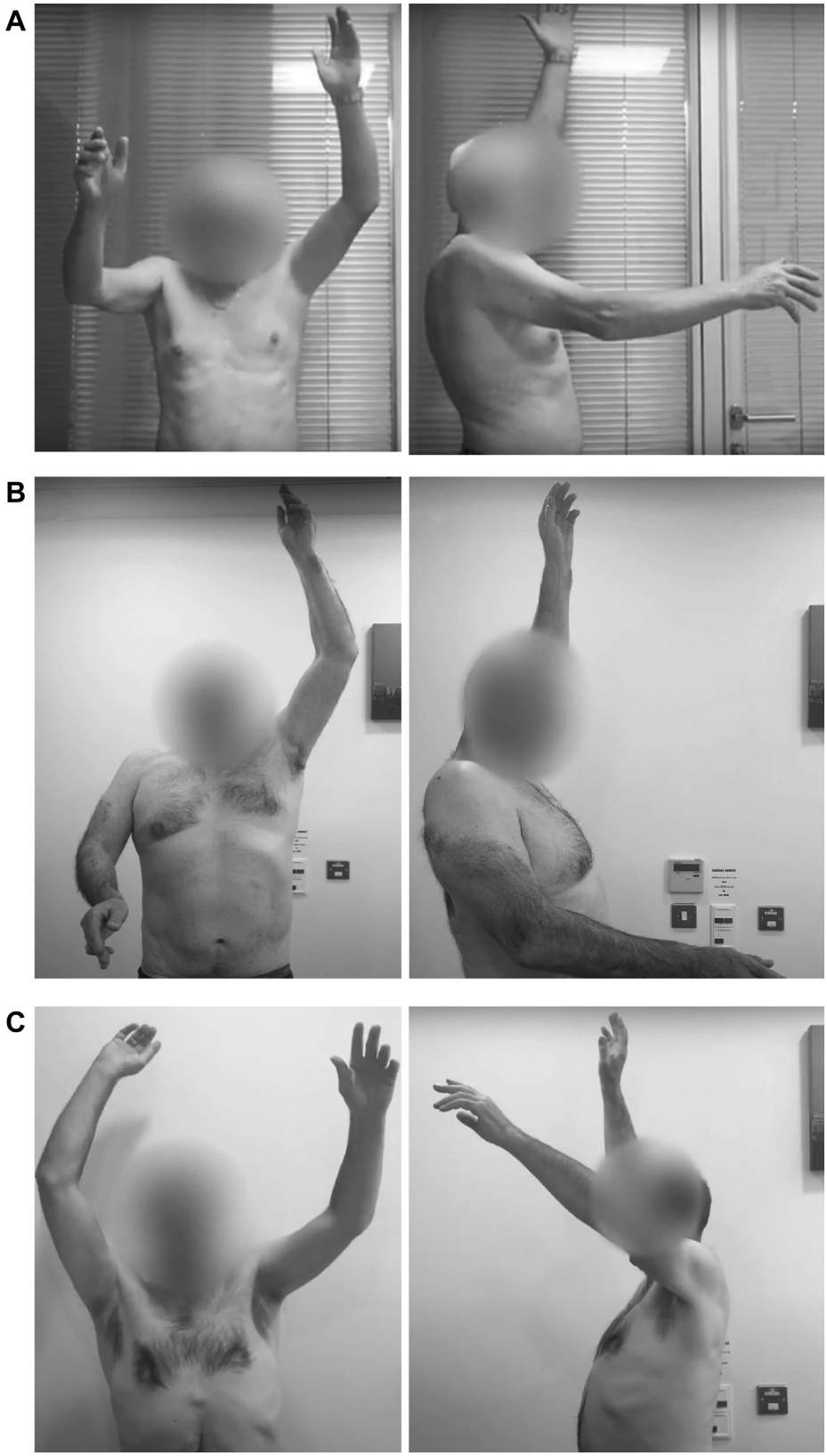

Figure 3 (**A**) Frontal and lateral views of patient 7 at end range of active elevation. Disagreement among surgeons was greatest for this patient, with 43.9% of participants classifying him as having pseudoparalysis. (**B**) Frontal and lateral views of patient 10 at end range of activate elevation. Of the participants, 95.9% classified this patient as having pseudoparalysis. (**C**) Frontal and lateral views of patient 6 at end range of active elevation. Of the participants, 99.2% stated that this patient did not have pseudoparalysis.

definition 3. Meanwhile, surgeons with a caseload that consisted of >50% shoulder practice had a preference toward definition 2, whereas those with a shoulder caseload of 26%-50% were more inclined to choose definition 1. The reason for these findings remains unclear, and given the small effect sizes, it is unlikely the findings are clinically relevant despite being statistically significant. There was no association between the preferred definition and practice region, which we found surprising given the European and North American viewpoints in the current literature.

Thematic analysis of definitions provided in the open text field revealed a number of additional requirements preferred by surgeons, many of which have previously appeared in the literature. The first such requirement is removal of pain as a potential limiting factor in forward flexion. It is interesting to note that in the early version offered by Werner et al,[29] they specifically referred to pain as a component in their patient population. In an investigation of conservative management of rotator cuff tears (injection of local anesthetic with deltoid re-education training), Levy et al[17] similarly described their patient population as pseudoparalytic despite patients reporting significant pain. However, the overwhelming consensus from both our survey and the recent literature would suggest that most surgeons agree forward flexion should be painless.[5,7,27] Full passive ROM also appears to be a universal requirement in the definition of pseudoparalysis. The final condition that was frequently referenced in custom definitions, although variable, was the allowable degree of forward flexion ROM. Participating surgeons were proponents of either <30°, <60°, or <90° of active motion. This finding was to be expected given that it is perhaps the most contentious part of the discussion. An examination of the current literature shows that several authors have made a linguistic argument on the interpretation of the prefix "pseudo" to support their position of what constitutes acceptable forward flexion ROM within their proposed definitions.[5,7,27] The exact degree of forward flexion ROM is not a critical distinction in the treatment of this patient population yet consistently appears in proposed definitions. Instead, an individual treatment strategy will be selected based on a complete picture of the patient's presentation, including fatty infiltration or atrophy of the rotator cuff musculature on advanced imaging and, in cases in which true paralysis may be in question, nerve conduction studies and electromyography.

A piece of clinical information that was not available to participants but that appeared in the comments section of our survey and deserves attention is the differentiation of acute vs. chronic cuff tears. The temporal nature of cuff tears is often overlooked in relation to pseudoparalysis; this was initially introduced elsewhere using a hypothetical scenario.[7] To illustrate this point further, a recent retrospective study demonstrating superior capsular reconstruction to be an effective treatment option for patients with pseudoparalysis included patients with mean preoperative Goutallier changes < 2.5.[6] In particular, the mean subscapularis Goutallier grade in this cohort was 1.0.[6] Subscapularis dysfunction has previously been identified as a strong risk factor for pseudoparalysis.[8] Meanwhile, an investigation of reverse shoulder arthroplasty as a viable treatment strategy for pseudoparalysis only included patients with preoperative Goutallier changes > 3.[29] As has been discussed, these are quite different patient populations despite both being labeled pseudoparalytic. Logic would suggest that different treatment strategies be used, as was done here; however, confusion is created when both cohorts are described as pseudoparalytic.

The limitations of our study primarily relate to the video bank portion of the questionnaire. All 10 patients were hand selected for inclusion by the senior author; these patients may not represent a random group of patients whom a typical shoulder surgeon would encounter. In addition, it was not possible to provide participating surgeons with more detailed clinical information for each patient, such as a brief history or further examination findings. The tradeoff was increased participant recruitment owing to survey brevity. Finally, some surgeons commented that blurring the patients' faces obstructed the surgeons' view of the filmed shoulder ROM, which may have altered responses.

Conclusion

Shoulder surgeons do not agree on how best to define pseudoparalysis of the shoulder. It is possible that surgeons rely on a subjective interpretation of the clinical examination findings rather than applying explicit criteria to decide on the application of the term "pseudoparalysis." Therefore, care should be taken with its use in clinical outcome studies when there is clearly a lack of consensus among experts in defining this term. The term "pseudoparalysis" should be explicitly defined in all future studies attempting to compare treatment strategies for this patient population or perhaps avoided altogether.

Disclaimer

The authors, their immediate families, and any research foundations with which they are affiliated have not received any financial payments or other benefits from any commercial entity related to the subject of this article.

References

1. Al-Hadithy N, Domos P, Sewell MD, Pandit R. Reverse shoulder arthroplasty in 41 patients with cuff tear arthropathy with a mean

follow-up period of 5 years. J Shoulder Elbow Surg 2014;23:1662-8. https://doi.org/10.1016/j.jse.2014.03.001
2. Boileau P, Chuinard C, Roussanne Y, Bicknell RT, Rochet N, Trojani C. Reverse shoulder arthroplasty combined with a modified latissimus dorsi and teres major tendon transfer for shoulder pseudoparalysis associated with dropping arm. Clin Orthop Relat Res 2008; 466:584-93. https://doi.org/10.1007/s11999-008-0114-x
3. Boileau P, Rumian AP, Zumstein MA. Reversed shoulder arthroplasty with modified L'Episcopo for combined loss of active elevation and external rotation. J Shoulder Elbow Surg 2010;19:20-30. https://doi.org/10.1016/j.jse.2009.12.011
4. Braun V, Clarke V. Using thematic analysis in psychology. Qualitative Research in Psychology 2006;3:77-101. https://doi.org/10.1191/1478088706qp063oa
5. Burkhart SS. Letter to the Editor regarding Tokish et al: "Pseudoparalysis: a systematic review of term definitions, treatment approaches, and outcomes of management techniques." J Shoulder Elbow Surg 2018;27:e54-5. https://doi.org/10.1016/j.jse.2017.10.012
6. Burkhart SS, Hartzler RU. Superior capsular reconstruction reverses profound pseudoparalysis in patients with irreparable rotator cuff tears and minimal or no glenohumeral arthritis. Arthroscopy 2019;35:22-8. https://doi.org/10.1016/j.arthro.2018.07.023
7. Burks RT, Tashjian RZ. Should we have a better definition of pseudoparalysis in patients with rotator cuff tears? Arthroscopy 2017;33: 2281-3. https://doi.org/10.1016/j.arthro.2017.07.024
8. Collin P, Matsumura N, Ladermann A, Denard PJ, Walch G. Relationship between massive chronic rotator cuff tear pattern and loss of active shoulder range of motion. J Shoulder Elbow Surg 2014;23: 1195-202. https://doi.org/10.1016/j.jse.2013.11.019
9. Denard PJ, Ladermann A, Brady PC, Narbona P, Adams CR, Arrigoni P, et al. Pseudoparalysis from a massive rotator cuff tear is reliably reversed with an arthroscopic rotator cuff repair in patients without preoperative glenohumeral arthritis. Am J Sports Med 2015; 43:2373-8. https://doi.org/10.1177/0363546515597486
10. Denard PJ, Ladermann A, Jiwani AZ, Burkhart SS. Functional outcome after arthroscopic repair of massive rotator cuff tears in individuals with pseudoparalysis. Arthroscopy 2012;28:1214-9. https://doi.org/10.1016/j.arthro.2012.02.026
11. Ek ET, Neukom L, Catanzaro S, Gerber C. Reverse total shoulder arthroplasty for massive irreparable rotator cuff tears in patients younger than 65 years old: results after five to fifteen years. J Shoulder Elbow Surg 2013;22:1199-208. https://doi.org/10.1016/j.jse.2012.11.016
12. European Society for Surgery of the Shoulder and the Elbow. Become a member; 2019. https://www.secec-essse.org/become-member/. Accessed September, 2019.
13. Elhassan BT, Wagner ER, Werthel JD. Outcome of lower trapezius transfer to reconstruct massive irreparable posterior-superior rotator cuff tear. J Shoulder Elbow Surg 2016;25:1346-53. https://doi.org/10.1016/j.jse.2015.12.006
14. Hartzler RU, Burkhart SS. Superior capsular reconstruction. Orthopedics 2017;40:271-80. https://doi.org/10.3928/01477447-20170920-02
15. Kim HY. Statistical notes for clinical researchers: chi-squared test and Fisher's exact test. Restor Dent Endod 2017;42:152-5. https://doi.org/10.5395/rde.2017.42.2.152
16. Landis JR, Koch GG. The measurement of observer agreement for categorical data. Biometrics 1977;33:159-74.
17. Levy O, Mullett H, Roberts S, Copeland S. The role of anterior deltoid reeducation in patients with massive irreparable degenerative rotator cuff tears. J Shoulder Elbow Surg 2008;17:863-70. https://doi.org/10.1016/j.jse.2008.04.005
18. McHugh ML. Interrater reliability: the kappa statistic. Biochem Med (Zagreb) 2012;22:276-82.
19. Mihata T, Lee TQ, Hasegawa A, Kawakami T, Fukunishi K, Fujisawa Y, et al. Arthroscopic superior capsule reconstruction can eliminate pseudoparalysis in patients with irreparable rotator cuff tears. Am J Sports Med 2018;46:2707-16. https://doi.org/10.1177/0363546518786489
20. Mihata T, Lee TQ, Watanabe C, Fukunishi K, Ohue M, Tsujimura T, et al. Clinical results of arthroscopic superior capsule reconstruction for irreparable rotator cuff tears. Arthroscopy 2013;29:459-70. https://doi.org/10.1016/j.arthro.2012.10.022
21. Miyazaki AN, Fregoneze M, Santos PD, da Silva LA, do Val Sella G, Neto DL, et al. Functional evaluation of arthroscopic repair of rotator cuff injuries in patients with pseudoparalysis. Rev Bras Ortop 2014;49: 178-82. https://doi.org/10.1016/j.rboe.2014.03.025
22. Oh JH, Kim SH, Shin SH, Chung SW, Kim JY, Kim SH, et al. Outcome of rotator cuff repair in large-to-massive tear with pseudoparalysis: a comparative study with propensity score matching. Am J Sports Med 2011;39:1413-20. https://doi.org/10.1177/0363546511399865
23. Rossler H. [Ruptures in the rotator aponeurosis (author's transl)]. Z Orthop Ihre Grenzgeb 1976;114:282-94 [in German].
24. Skedros JG, Henrie TR. Latissimus dorsi tendon transfer with Graft-Jacket(R) augmentation to increase tendon length for an irreparable rotator cuff tear. Case Rep Orthop 2017;2017:8086065. https://doi.org/10.1155/2017/8086065
25. Irish Shoulder and Elbow Society. About us; 2019. https://isesociety.com/about-us/. Accessed September, 2019.
26. American Shoulder and Elbow Society. Become an ASES member; 2019. https://www.ases-assn.org/about-ases/become-an-ases-member/. Accessed September, 2019.
27. Tokish JM, Alexander TC, Kissenberth MJ, Hawkins RJ. Pseudoparalysis: a systematic review of term definitions, treatment approaches, and outcomes of management techniques. J Shoulder Elbow Surg 2017;26:e177-87. https://doi.org/10.1016/j.jse.2017.02.024
28. Valenti P, Sauzieres P, Katz D, Kalouche I, Kilinc AS. Do less medialized reverse shoulder prostheses increase motion and reduce notching? Clin Orthop Relat Res 2011;469:2550-7. https://doi.org/10.1007/s11999-011-1844-8
29. Werner CM, Steinmann PA, Gilbart M, Gerber C. Treatment of painful pseudoparesis due to irreparable rotator cuff dysfunction with the Delta III reverse-ball-and-socket total shoulder prosthesis. J Bone Joint Surg Am 2005;87:1476-86. https://doi.org/10.2106/jbjs.d.02342