

## SHORT COMMUNICATION

### PSEUDOPARALYSIS

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#### ABSTRACT

The definition of pseudoparalysis in shoulder is controversial. Gwschend initially described pseudoparalysis as an appearance of paralysis with severe rotator cuff tear. Later, Werner described pseudoparesis as active elevation under 90° caused by an irreparable massive cuff tear.

Since these descriptions, many articles across the literature make the confusion between pseudoparesis and pseudoparalysis who differ in term of lesion and treatment options. Subsequently, this adds confusion to confusion when evaluating the results to determine the optimal therapeutic strategy. Conservative and arthroplasty options are discussed but the reverse arthroplasty appears to be the treatment of choice in a true pseudoparalyzed shoulder.

**Keywords:** Pseudoparalysis, rotator cuff tear, pseudoparesis

#### STRESZCZENIE

Definicja pseudoporażenia barku jest kontrowersyjna. Gwschend początkowo opisał pseudoporażenie jako pojawienie się porażenia przy ciężkim uszkodzeniu stożka rotatorów. Później Werner opisał pseudoparezę jako aktywne uniesienie poniżej 90° spowodowane nieodwracalnym, masywnym rozerwaniem stożka.

Od tamtej pory, w wielu artykułach dochodzi do pomylenia pseudoparezy z pseudoporażeniem, które różnią się pod względem zmian chorobowych i możliwości leczenia. W konsekwencji powoduje to dodatkowe zamieszanie przy ocenie wyników w celu określenia optymalnej strategii terapeutycznej. W niniejszej pracy omawiane są opcje zachowawcze i artroplastyka, ale odwrotna artroplastyka wydaje się być leczeniem z wyboru.

**Słowa kluczowe:** Pseudoporażenie, uszkodzenie stożka rotatorów, pseudopareza

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The definition of pseudoparalysis in shoulder is controversial.

The word pseudoparalysis is made up of the combination of pseudo which stands for «false, pretending» and paralysis. In the medical field paralysis is usually used to define a complete loss of motricity (no motion) due to a neurological deficit. Therefore, the etymology of

pseudoparalysis stands for paralysis considered as false because of the absence of neurologic deficit. For instance, in shoulder, pseudoparalysis is primarily used in case of loss of active elevation. By extension, the loss of active external or internal rotation can be named ER and IR pseudoparalysis, respectively. The loss of active motion in the shoulder without neurologic

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deficit has potentially different causes (joint stiffness, scapulo-thoracic abnormal motion, muscular deficit, and rotator cuff tendons deficit). However, the term pseudoparalysis is commonly used in shoulder in the context of a massive rotator cuff tear. Gschwend described in 1988 pseudoparalysis in patients with massive rotator cuff tears, associating the appearance of paralysis with the presence of severe rotator cuff tears (Gschwend, Ivosević-Radovanović and Patte, 1988). Tokish recently interviewed 8 key opinion leaders and they described shoulder pseudoparalysis as: no joint stiffness, loss of active elevation, permanent, does not improve with appropriate treatment (physiotherapy, injections), and generally antero-superior escape (Tokish *et al.*, 2017).

In 2005, Werner reported the results of the treatment of painful pseudoparesis with a reverse arthroplasty. The authors defined a pseudoparesis as no joint stiffness, active elevation under 90° caused by an irreparable massive cuff tear (Werner *et al.*, 2005). In the medical field paresis stands for partial paralysis. Accordingly, the use of pseudoparesis to define a shoulder with possible but limited active elevation under 90° is consistent. Unfortunately, across the literature a lot of articles make the confusion between pseudoparesis and pseudoparalysis who certainly differ from each other in term of lesion and treatment options.

We believe with Bauer and Tokish that a general agreement should be established among the shoulder community on clearly making the distinction between the two clinical entities. Moreover, this agreement would avoid misleading the surgeons and physicians to believe that a shoulder pseudoparalysis can be successfully treated with some treatment options.

Two studies from Oh and Denard reported the results of rotator cuff repair and advocated the reversibility of “pseudoparalysis” in 76% and 90% of the cases, respectively (Oh *et al.*, 2011; Denard *et al.*, 2012). The pseudoparalysis was defined in both studies as active elevation under 90°, typically confusing with

pseudoparesis. Actually, no studies support the use of rotator cuff repairs in “true” shoulder pseudoparalysis.

The use of SCR in massive cuff tears has become more and more popular over the last years. Mihata recently reported the results of the SCR with fascia lata with a 95% rate of reversal of pseudoparalysis (Mihata *et al.*, 2018). Again, pseudoparalysis was defined as active elevation under 90°, confusing with pseudoparesis. A subgroup was defined as “severe” in 15 patients with a positive dropping sign (no ability to maintain forward elevation > 90° after passive elevation). In this subgroup, active elevation improved from 20° to 92°. However, there is no information whether these patients had preoperative antero-superior escape, arguing for a typical pseudoparalysis.

Latissimus dorsi tendon transfer is also used to treat massive rotator cuff. To the best of our knowledge, no reported series advocates the use of LD in shoulder pseudoparalysis. Most of the series include some patients that meet the criteria for pseudoparesis with mixed results. In Iannotti series, patients with the lowest rate of preoperative active elevation appear to provide the worst results, conversely to the results reported by Valenti suggesting the opposite (Iannotti *et al.*, 2006). It is worth noting that in Valenti’s series patients with active elevation < 80° and “antero-superior instability” were excluded. Subsequently there is no published evidence to support the concept of reversal of pseudoparalysis when using a latissimus dorsi transfer (Valenti *et al.*, 2010). The same is true for other transfers such as lower trapezius transfer.

In fact, Gerber contra-indicated the use of the latissimus transfer in pseudoparesis or inability to stabilize the arm at 90° (Gerber *et al.*, 1988).

When considering the pseudoparalyzed shoulder as defined above (no joint stiffness, loss of active elevation, permanent, does not improve with appropriate treatment (physiotherapy, injections), and generally antero-superior escape), there is no true evidence that a non-arthroplasty option can reverse it.

As a mechanical and physiological standpoint, the role of the rotator cuff is to keep the humeral head centered in front of the glenoid to allow for the deltoid to elevate the arm when contracting. In chronic rotator cuff tears the humeral head is not centered anymore and migrates superiorly. In some cases, the head eventually escapes superiorly and anteriorly. When the deltoid contracts, the humeral head escapes antero-superiorly and finds no fulcrum point. Subsequently the elevation is not produced, mimicking a paralysis.

Historically, the use of hemiarthroplasty, including with large heads, in massive cuff tears attempting to articulate with the coracoacromial arch demonstrated its inability to successfully treat these patients. Leung *et al.* compared the results of hemiarthroplasty and reverse shoulder arthroplasty in this indication and concluded to the superiority of the reverse (Leung *et al.*, 2012).

We believe with others that the reverse shoulder arthroplasty is the only effective treatment option to treat a shoulder pseudoparalysis as defined above because the humeral socket allows for the humerus to be stabilized under the glenosphere socket. Therefore, when the deltoid contracts the humerus can elevate.

### Conclusions

The heterogeneity in the literature in defining shoulder pseudoparalysis with other clinical entities, especially pseudoparesis, has led to confusion in patients' identification and treatment options comparison. We believe it is time to come to a consensus to define what is and what is not a pseudoparalytic shoulder. The reverse shoulder arthroplasty appears today as the most successful option.

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