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SHORT COMMUNICATION

I CAN HANDLE IRREPARABLE CUFF TEAR WITH REHABILITATION/I AM SURE THAT YOU CAN'T HANDLE ALL WITH REHAB

MOGĘ SOBIE PORADZIĆ Z NIEODWRACALNYM USZKODZENIEM STOŻKA ROTATORÓW STOSUJĄC REHABILITACJĘ/JESTEM PEWIEN, ŻE TY NIE PORADZISZ SOBIE ZE WSZYSTKIM STOSUJĄC REHABILITACJĘ

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ABSTRACT
Rotator cuff tears (RCT) are one of the most commonly treated orthopaedic pathologies, yet controversy exists regarding the management of these injuries. Irreparable rotator cuff tears are unpredictable with respect to their clinical presentation. The spectrum of pain and functional disability varies widely. Rehabilitation protocol is always the first solution in treating irreparable cuff tears, but non-functional and painful shoulders (e.g., arthrosis) is an indication for surgery. Can we ask ourselves a question: where lies the limit of trying "persistent" surgical repair of massive irreparable RC lesions? There is a lack of high-quality comparative studies to guide treatment recommendations. Physical therapy compared to surgery is associated with a lower improvement in perceived functional outcome and higher clinical failure rate. However, there is insufficient evidence to establish an evidence-based treatment algorithm for MRCTs. Treatment is based on patient factors and associated pathology and includes personal experience and data from case series. It has to be underlined that the winner is always team physiotherapist/surgeon, and their cooperation is crucial at all stages of therapy.

Keywords: rotator cuff, irreparable rotator cuff tear, rehabilitation of RC tear, surgical treatment of rotator cuff tear

STRESZCZENIE
Naderwanie stożka rotatorów (RC) jest jedną z najczęściej leczonych patologii ortopedycznych, a mimo to istnieją kontrowersje dotyczące postępowania w przypadku tego uszkodzenia. Nieodwracalne uszkodzenie jest nieprzewidywalne pod względem obrazu klinicznego. Spektrum bólu i niepełnosprawności funkcjonalnej jest bardzo zróżnicowane. Protokół rehabilitacyjny jest zawsze pierwszym rozwiązaniem w leczeniu nieodwracalnego uszkodzenia stożka rotatorów, ale niefunkcjonalny i bolesny bark (np. artroza) jest wskazaniem do operacji. Możemy zadać sobie pytanie: gdzie leży granica prób „uporczywej" naprawy chirurgicznej masywnych nieodwracalnych uszkodzeń RC? Brakuje wysokiej jakości badań porównawczych, które mogłyby ukierunkować zalecenia dotyczące leczenia. Fizjoterapia w porównaniu z operacją wiąże się z mniejszą poprawą postrzeganego wyniku funkcjonalnego i większym odsetkiem niepowodzeń klinicznych. Nie ma jednak wystarczających dowodów, aby ustalić ujednolicony algorytm leczenia uszkodzenia RC. Leczenie opiera się na czynnikach pacjenta i związanej z nim patologii oraz obejmuje osobiste doświadczenia i dane z serii przypadków.

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Należy podkreślić, że zwycięzcą jest zawsze zespół fizjoterapeuta/chirurg, a ich współpraca jest kluczowa na wszystkich etapach terapii.

Słowa kluczowe: mankiet rotatorów, nieodwracalne rozerwanie mankietu rotatorów, rehabilitacja rozerwania RC, leczenie operacyjne rozerwania mankietu rotatorów

Rotator cuff tears (RCT) are one of the most commonly treated orthopaedic pathologies, yet controversy exists regarding the management of these injuries. Irreparable rotator cuff tears are unpredictable with respect to their clinical presentation. The spectrum of pain and functional disability varies widely. Rehabilitation protocol is always the first solution in treating irreparable cuff tears, but non-functional and painful shoulders (e.g. arthrosis) is an indication for surgery. Thus, can we ask ourselves a question: where lies the limit of trying "persistent" surgical repair of massive irreparable RC lesions?

Talking about lesions etiology we can distinguish: extrinsic anatomical causes (type of acromion, os acromiale, acromion spur), extrinsic environmental causes (age and ageing, overload, nicotine addiction, autoimmunologic diseases) and intrinsic causes (degenerative changes: collagen fibres disorders, mucoid degeneration, vessels proliferation, fatty degeneration, chondrometaplasia and calcifications, repetitive microtrauma, chronic inflammation, oxidative stress, tenocyte apoptosis, muscular balance disorders, genetic conditions) (Tashijan, 2012).

"Natural" history of RC lesions was established by Tempelhof in 1998. He discovered that an astonishingly high rate of rotator cuff tears in patients with asymptomatic shoulders was thus demonstrated with increasing patient age (Tempelhof *et al,* 1999).

RC functions are widely known. Proper joint movement and stability depends on it. Supraspinatus initiates abduction, Infraspinatus and Teres Minor are responsible for external rotation, Subscapularis is mainly responsible for internal rotation. They work together with deltoid muscle stabilizing unstable by nature glenohumeral joint. Deltoid with supraspinatus lead humeral head to compression in abduction, but Subscapularis with infraspinatus gives humeral head stabilization in sagittal plane (Collin *et al.,* 2014; Bedi *et al.,* 2010).

Analysing patomechanics we can firmly admit that massive tears destabilize biomechanics, especially in following directions: internal rotation predominance – postero-superior RC lesion, and external rotation predominance – antero-superior RC lesion. Linking lesions cause loss of ROM and increasing RC destruction leads to superior migration of the humeral head, superior subluxation and dysfunction, finally pseudoparalysis.

Pseudoparalysis is characterised by loss of active flexion of the arm > 90 degrees, full passive motion and lack of neurologic deficiency. Reason of that pathology is described as the entire subscapularis and supraspinatus tendon tear or three RC tendons tear (Kim *et al.,* 2012).

Massive RC tears have very important clinical implications for an evaluation of the surgical repair treatment. They are a big challenge for orthopedic surgeons and have a lot of therapeutic options. Massive RC tears create – ca. 40% of RC lesions. Statistically a chance of a retear after a massive RC lesion surgery is higher than after a small RC lesion repair (Bedi *et al.* 2010). Irreparable RC lesions can be described by following pathologies: infraspinatus muscle atrophy with loss of external rotation, antero-superior subluxation of the humeral head, pseudoparalysis of the shoulder – suggests an irreversible RC lesion, AHI < 7 mm, and fatty muscle degeneration = > 3st (Goutallier *et al.,* 1994). We have to claim that there is no clear definition of Irreparable RC lesions (Collin *et al.,* 2014, Goutallier *et al.,* 1994, Hamada *et al.,* 1990). Irreparable rotator

cuff tears can be a challenging treatment for the orthopedic surgeon and physiotherapists. While no singular treatment exists as the gold standard, many options exists. Treatment depends on a patient's functional status as well as on the skills and procedural familiarity of the surgeon and therapist (Juhan *et al.,* 2019). Several criteria of surgical planning should taken into consideration in the treatment strategy, such as: a fatty degeneration and a muscle atrophy level (Goutallier *et al.,* 1994), cuff arthropathy level (Hamada *et al.,* 1990), *subscapularis* role, and role of the long head of the biceps tendon.

RC cable-crescent complex – suspension bridge theory is the initial point of the problem (Burkhart *et al.,* 1993). In addition, the basic problems in irreversible cuff tears can be functional disabilities such as: ILEA (Isolated Loss of Active Elevation) – "pseudoparalysis", ILER (Isolated Loss of External Rotation) – lag sign/Hornblower sign, and CLEER (Combined Loss of Elevation & External Rotation). Treatment algorithm described by Tashjian can be consider as choice of therapy, with classification to three main groups: group 1 – where all chronic full-thickness tears in older age group, and irreparable tears are included group 2 – where all acute tears greater than 1 cm, and all chronic full-thickness tears in population aged lower then 60 year old are included, and group 3 – where all tendinopathy, partial-thickness tears, and full-thickness lower then 1 cm are included. Algorithm is designed to provide the most effective care possible while minimizing the risk of complication or adverse events. The algorithm includes a step-by-step approach to diagnosis and treatment, including diagnostic testing, non-operative treatment options, and surgical procedures if necessary (Tashjian *et al.,* 2012). Feedback from physiotherapists in group I informs about 73–80% good response! Rest of cases presents poor range of motion (ROM), arthrosis, pain, dysfunction (Ryösä, *et al.,* 2017).

Nowadays we have some possibilities of surgical therapy, including arthroscopy debridement, and LHBT tenotomy/tenodesis, a partial reconstruction, patch/scaffold augmentation, a superior capsular reconstruction – SCR + LHBT reconstruction, a subacromial baloon spacer, tendons and muscles transfer or reverse shoulder arthroplasty (RSA) (Boileau *et al.,* 2007; Mihata, 2018; Mihata *et al.* 2016, Mihata *et al.,* 2020; Hermanowicz *et al.,* 2018; Li *et al.,* 2022; Juhan *et al.,* 2019; Ryösä, *et al.,* 2017; Shepet *et al.* 2021; Kovacevic *et al.,* 2020; Valenti, 2018; Cvetanovich *et al.,* 2019; Sevivas, *et al.,* 2017; Lädermann *et al.,* 2015; Davies *et al.,* 2015). Part of them is called rescue procedures. Additionally, some comments for following surgical procedures have been published (Zingg *et al.,* 2007; Boileau *et al.,* 2007):

- Debridement with tenodesis/tenotomy of LHBT is dedicated for elderly patients with low expectations (function): both procedures have similar results, but teres minor atrophy or lesion significantly decreases the final result; contraindication is pseudoparalysis and severe RC arthropathy.
- A partial repair can give good results on conditions that patient has good tissue quality and low expectations (physical work).
- Patch/Scaffold augmentation is a solution for cases with good tissue quality and for younger patients with higher functional demands.
- SCR – technically difficult technique, can expect improvement of joint kinematics, promising early observations.
- Subacromial balloon spacer causes humeral head recalibration procedure.
- Muscle transfer is the option for patients < 60 y.o. with no pseudoparalysis.
- RSA is the option for elderly painful patients and with pseudoparalysis (not improve ER).

Large initial improvements in shoulder scores were demonstrated for all techniques despite high retear rates for reconstructive procedures. Shoulder scores may decline at mid- to long-term follow-up (Davies *et al.* 2022).

Physical therapy was associated with a 30% failure rate and another 30% went on to

have surgery. Partial repair was associated with a 45% re-tear rate and 10% reoperation rate. Latissimus tendon transfer techniques utilizing humeral bone tunnel fixation were associated with a 77% failure rate. Superior capsular reconstruction with fascia lata autograft was associated with a weighted average change that exceeded the MCID (minimum clinically important difference) for ASES score. Reverse arthroplasty was associated with a 10% prosthesis failure rate and 8% revision rate (Kovacevic *et al.,* 2020).

There is a lack of high-quality comparative studies to guide treatment recommendations. Physical therapy compared to surgery is associated with a lower improvement in perceived functional outcome and higher clinical failure rate rate (Kovacevic *et al.,* 2020).

There is insufficient evidence to establish an evidence-based treatment algorithm for MRCTs. Treatment is based on patient factors and associated pathology and includes personal experience and data from case series (Lädermann *et al.,* 2015). The winner is always team physiotherapist/surgeon, and their cooperation is crucial at all stages of therapy.

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