

June 24, 2021

World Journal of Orthopaedics

Reviewers
& c.c.
Science Editor

Company editor-in-chief

Dear Reviewers,

On behalf on my co-authors and myself, thank you for your thoughtful and constructive comments. In this cover letter, we have addressed each of the issues raised and have highlighted the relevant revisions in the manuscript itself (underlined). Below, please find item-by-item responses to the Reviewers' comments.

Please note: Editor's and Reviewers' comments are in italicized red font; Authors' answers are in regular black font; paragraphs from the manuscript are highlighted in light grey.

Sincerely yours,

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Reviewer #1:

Dear Editor,

Thank you very much for allowing me to be a Reviewer of the original paper entitled: „Arthroscopic versus mini-open approach in rotator cuff tear repair: a novel biomechanical study” The problems investigated in the paper are actual. The paper reads well, however, some improvements are necessary. Major revision is required due to extremely modest Discussion section.

We thank the reviewer for appreciating our work.

Title: maybe You should modify it and accent the role of Laboratory of Functional Movement

We revised the title according to the suggestion: The role of biomechanical assessment in rotator cuff tear repair: Arthroscopic versus Mini-open approach

Abstract 1. “Rotator cuff tears are a common shoulder injury often asymptomatic.” It should be deleted. If asymptomatic why treat them? It is obvious that in population in the age after 40-50 y. the RCTs are commonly encountered because of the tendinous tissue degeneration, but maybe paste something like this: „Rotator cuff (RC) tears are one of the most frequent pathologies within the shoulder girdle. Hand dominance and older age are associated with RC tears” 2.

We have followed the suggestion of the reviewer and we have revised the abstract accordingly: Background. Rotator cuff (RC) tears are one of the most frequent pathologies within the shoulder girdle. Hand dominance and older age are associated with RC tears. Two different surgical procedures, the mini-open (MO) and all-arthroscopic (AA) approach represented the standard of treatment. Material and Methods. Eighty-eight participants, 50 following RC repair with AA and 38 with MO approach, were recruited in the present cross-sectional case-control study (ORTHO-SHOULDER, Prot. 0054602). All the patients underwent postoperative clinical evaluation for pain (Visual Analogic Scale), impairment and disability (Disability of the Arm, Shoulder, and Hand) and limitation in daily activity (Constant-Murley score). Patients’ shoulder mobility was also assessed in our Laboratory of Functional Movement through a wearable inertial sensor and surface electromyography (sEMG) to monitor kinematics and muscle activity during the movement on the frontal (abduction/adduction) and sagittal (flexion-extension) planes. Results. No statistically significant differences between the two procedures were observed in either main clinical score and ROM. A significant increase in velocity during the movement execution and a higher contribution of upper trapezius muscles were found in the AA group compared with MO patients. Conclusions. In terms of clinical scores, our findings were in line with previous results. However, the use of technology-based assessment of shoulder mobility has revealed significant differences between the two techniques in terms of mean velocity and scheme of muscle activation.

2. Abbreviations across the Abstract should be updated precisely.

We modified abbreviations, see above.

Introduction: well written Please, add some information about the complexity of the shoulder injuries and RC lesions. “Zabrzyński J, Huri G, Gagat M, et al. The Impact of Smoking on Clinical Results Following the Rotator Cuff and Biceps Tendon Complex

Arthroscopic Surgery. J Clin Med. 2021;10(4):599. Published 2021 Feb 5. doi:10.3390/jcm10040599 “A significant group of the population suffers from shoulder pain due to acute or chronic tendon injuries, which are becoming a considerable cause of work disability. Various tendon disorders may appear simultaneously in different localizations of the shoulder [14]. Rotator cuff tendinopathy and tears (RCTs) are the most common ones among them. They are usually associated with the long head of the biceps tendon (LHBT) pathology, superior labrum anterior to posterior (SLAP) injuries, subacromial impingement syndrome and acromioclavicular joint (ACJ) disorders [15,16,17,18]. After the supraspinatus tendon, the most common injured structure of the rotator cuff (RC) complex, biceps tendon is an element of compensation of the abnormal forces and tears of which predispose to subsequent instability, and further subscapularis tendon tears. Kelly et al. revealed LHBT disorders with various co-existing shoulder pathologies, such as RCTs, resulting in instability of the shoulder and subacromial impingement [19]. Furthermore, the massive RCTs can lead to accelerated omarthrosis and shoulder dysfunction. Complex and multi-tendon shoulder injuries significantly complicate the process of diagnosis, treatment, and rehabilitation.”

We thank the reviewer. We followed the advice of the reviewer and we have added this paragraph in the introduction (with the relative citations):

An important group of the population suffers from shoulder pain due to acute or chronic tendon injuries. It is becoming a considerable cause of work disability. Rotator cuff tendinopathy and tears (RCTs) are the most common lesions. After the supraspinatus tendon, the most common injured structure of the rotator cuff (RC) complex, biceps tendon is an element of compensation of the abnormal forces. Biceps' tears predispose to subsequent instability, and further subscapularis tendon tears. Multi-tendon shoulder injuries, moreover, complicate the process of diagnosis, treatment, and rehabilitation [1,2]. Overall prevalence of RC abnormalities, regardless of symptoms, ranged from 9.7% in patients younger than or 20 years and increased to 62% in patients aged 80 years and older ($P < 0.001$) [3]. Many RCTs also cause restriction of shoulder function. Surgical repair of the RC is a cost-effective solution for all populations and reduces the societal burden of the disease. The choice of surgery varies from surgeon-to-surgeon with arthroscopy taking the lead in the current scenario. Mini-Open (MO) technique has represented the gold standard for years guaranteeing a 90% success rate [4], since it guaranteed stronger suture fixation and shorter learning curve [5]. However, the development of dedicated surgical instruments and improvement of the surgical technique have allowed surgeons to perform all-arthroscopic (AA) technique in rotator cuff repair surgery [6]. The ideal repair of the RC tear must have the potential to withstand physiological loads while allowing simultaneous healing to occur. Currently, no significant superiority of one procedure has been demonstrated over the other [3,7,8], although RCTs in evaluating short- and long-term outcomes of both approaches are limited [9]. Recently, Liu and colleagues performed a RCT in 50 patients who had undergone AA repair and 50 patients who had undergone MO repair with a minimum 1-year follow-up. They concluded that the AA procedure has better recovery at short-term follow-ups, while both techniques are equivalent regarding long-term outcomes [10].

Motion analysis techniques can provide a more thorough description of 3-dimensional (3D) kinematics and offer a noninvasive, dynamic, quantitative alternative to radiographic methods and have been widely used to assess motor abilities of people with neurological and musculoskeletal impairments [11]. To our knowledge, there is limited study regarding what biomechanical effect RTC tears have on different motion tasks and muscle activities after surgical treatment of RC tears. In 2007, Persell and colleagues [12] prospectively evaluated patients who underwent a "mini-open" repair versus a completely arthroscopic

technique for small to large size rotator cuff tears. They found no statistical difference in outcome between the two groups, indicating that either procedure was efficacious. In 2017, Fritz and colleagues [13] applied a quantitative, validated upper extremity model to assess the kinematics and muscle activity of the shoulder following repair of the supraspinatus RC tendon compared to that in healthy shoulders in different activities of daily living (ADLs). They found that the RC repair group participants were able to accomplish the ADLs within the same time frame and through thoracolumbar joint kinematics similar to those in the healthy shoulder group participants. Wearable sensors are acquiring more and more influence in the diagnostic and rehabilitation field to assess motor abilities of aging populations [14]. In a recent systematic literature review, Carnevale and colleagues [15] analyzed the wearable systems for monitoring shoulder kinematics and their applicability in clinical settings and rehabilitation. However, to date no studies have been carried out with wearable technologies in the assessment of quantitative functional recovery of RC tear healing. The present paper aims at comparing the clinical and biomechanical outcomes of two surgical techniques (AA versus MO procedure) to address the painful shoulder syndrome with partial or total supraspinatus tendon tear.

Material&Methods: 1. This text: “Each participant underwent concurrent, synchronized motion and EMG analysis. Postoperative outcome measurements were collected by two medical doctors and a bioengineer. The primary outcome measures were the Constant-Murley score (CMS), the Visual Analogue Scale (VAS) and the Disability of the Arm, Shoulder, and Hand (DASH) score. Secondary outcome measures were the biomechanical parameters in terms of Range Of Motion (ROM), quality of movement (velocity and acceleration) and muscle activation.” should be after surgical treatment paragraph.

We moved the suggested part later.

2. What were the indications for AA and MO techniques?

We modified Introduction: Many RCTs also cause restriction of shoulder function. Surgical repair of the RC is a cost-effective solution for all populations and reduces the societal burden of the disease. The choice of surgery varies from surgeon-to-surgeon with arthroscopy taking the lead in the current scenario. Mini-Open (MO) technique has represented the gold standard for years guaranteeing a 90% success rate [4], since it guaranteed stronger suture fixation and shorter learning curve [5]. However, the development of dedicated surgical instruments and improvement of the surgical technique have allowed surgeons to perform all-arthroscopic (AA) technique in rotator cuff repair surgery [6]. The ideal repair of the RC tear must have the potential to withstand physiological loads while allowing simultaneous healing to occur.

Results: well written

We thank the reviewer for appreciating our work.

The rehabilitation issue should be also discussed, there is recent paper about the RCTs and LHBT mixed injuries and the issue of rehabilitation after shoulder arthroscopy is comprehensively discussed. “To increase ROM and muscular strength after arthroscopy, it is important to consider the position and kinematics of the scapula. Scapular position and

kinematics are important factors that can affect patient symptoms [15,26]. Scapular muscles (serratus anterior, trapezius) are as important for the shoulder as rotator cuff muscles [27,28]. Motivation and cooperation with the patient during the rehabilitation process can influence the final results. The longer follow-up in our cohort correlated positively with the postoperative ASES score and it may be linked to the longer period of cooperation with a physiotherapist. Moreover, the sport-active group had better functional outcomes, which is probably based on improved preoperative musculoskeletal system efficiency and motivation.” Zabrzyński, J.; Huri, G.; Gryckiewicz, S.; Çetik, R.M.; Szwedowski, D.; Łapaj, Ł.; Gagat, M.; Paczesny, Ł. Biceps Tenodesis Versus Tenotomy with Fast Rehabilitation Protocol—A Functional Perspective in Chronic Tendinopathy. J. Clin. Med. 2020, 9, 3938. <https://doi.org/10.3390/jcm9123938>)

We agree with the reviewer. We then followed the advice of the reviewer and we have revised the paragraph in the discussion (with the relative citations):

“Rotator cuff tears are the most common shoulder injury. Treatment options include nonoperative management, arthroscopic debridement with a biceps tenotomy or tenodesis, partial repair, complete repair, muscle-tendon transfer, superior capsular reconstruction, patch augmentation and reverse total shoulder arthroplasty [19]. The treatment can be performed with two different approaches: Mini-open (MO) or all-arthroscopic (AA) technique. The ideal repair of the RC tear should withstand the physiological loads while allowing simultaneous tendon healing to occur. Recently, Liu et al. [10] performed an RCT in 50 patients who had undergone AA repair and 50 patients who had undergone MO repair with a minimum 1-year follow-up. They concluded that the AA procedure has better recovery at short-term follow-ups, while both techniques are equivalent regarding long-term outcomes. Although there is still an open debate on the superiority of surgical treatment over the other [20,21], few attempts have been made in promoting the use of motion capture technologies to analyze kinematics and muscle activity of shoulder mobility in the postoperative phase, especially with the advancing in wearable devices.

The present cross-sectional study enrolled a sample of patients who had undergone AA/MO repair with a minimum 1-year follow-up. Patients were then evaluated using both clinical and biomechanical tests to assess whether there were relevant effects of the surgical treatment on the selected outcomes.

Our findings reported no statistically significant difference in terms of clinical scores and joint excursions after RC repair, in line with what emerged from previous studies [10,12,21]. However, significant differences emerged in terms of other kinematic factors and muscle activation. Patients treated with the MO surgery reported significant lower velocity in the execution of the movement compared with the AA group. The upper trapezius muscle in the AA group showed higher mean activation (RMS) than the MO group during both forward and return phase of both abduction and flexion movements. Furthermore, in the AA group, deltoid anterior and upper trapezius showed a higher percentage of mean activation, while in the MO group deltoid anterior contributed more than fifty percent of the overall activation.

While different normalization processes and range of movement prevent direct comparison with the current study, previous electromyography (EMG) research during coronal plane abduction indicates that high contraction intensities throughout the abduction movement in healthy subjects were seen for glenohumeral and scapulo-thoracic prime movers such as anterior and middle deltoid, supraspinatus, serratus anterior, rhomboids, and upper, middle and lower trapezius [22].

Rehabilitation, probably, plays a role in the increased ROM and muscular strength, due to the position and kinematics of the scapula. They can influence patient symptoms.

Consequently, motivation and cooperation during the rehabilitation process can influence the results [23].

Previous investigations on the role of shoulder muscles in flexion and abduction movements have been carried out mostly in healthy subjects [24,25], showing that deltoids were the largest muscle contributor to humeral elevation during flexion tasks, while trapezius and serratus anterior combined to do more work than deltoids for every task including flexion.”

References – updated and revised according to my suggestions

We corrected it. according to your suggestions

Tables and Figures Add abbreviations under each table and Figure. The title of Table 1 should be revised.

We corrected it.

Table 4 –add mean age of patients in different modalities of LHBT treatment.

We added mean age of patients in different modalities of LHBT treatment

(1) Science editor:

1 Scientific quality: The manuscript describes a Case Control Study of the Rotator cuff repair biomechanics. The topic is within the scope of the WJO. (1) Classification: Grade C; (2) Summary of the Peer-Review Report: The paper reads well. Some sentences need to be rephrased. Tables need a revision. The questions raised by the reviewers should be answered; (3) Format: There are 1 tables and 1 figure;

We thank the science editor for appreciating our work. We corrected some sentences, and abbreviation under tables.

(4) References: A total of 27 references are cited, including 7 references published in the last 3 years; (5) Self-cited references: There are 5 self-cited references. The self-referencing rates should be less than 10%. Please keep the reasonable self-citations (i.e. those that are most closely related to the topic of the manuscript) and remove all other improper self-citations. If the authors fail to address the critical issue of self-citation, the editing process of this manuscript will be terminated;

We reduced selfcitations less than 10%.

(6) References recommendations (kindly remind): The authors have the right to refuse to cite improper references recommended by the peer reviewer(s), especially references published by the peer reviewer(s) him/herself (themselves). If the authors find the peer reviewer(s) request for the authors to cite improper references published by him/herself (themselves), please send the peer reviewer’s ID number to editorialoffice@wjgnet.com. The Editorial Office will close and remove the peer reviewer from the F6Publishing system immediately.

We used only references relevant to the study under examination.

2 Language evaluation: Classification: Grade B. The manuscript is reviewed by a native English speaker. 3 Academic norms and rules: The authors provided the Biostatistics Review Certificate, the Institutional Review Board Approval Form, the Written informed consent and STROBE Statement. No academic misconduct was found in the Bing search. 4 Supplementary comments: This is an invited manuscript. No financial support was obtained for the study. The topic has not previously been published in the WJO. 5 Issues raised: (1) The “Author Contributions” section is missing. Please provide the author contributions;

We added the “Author Contributions”.

(2) The authors did not provide original pictures. Please provide the original figure documents. Please prepare and arrange the figures using PowerPoint to ensure that all graphs or arrows or text portions can be reprocessed by the editor;

We prepared and arranged the figures using PowerPoint program.

(3) PMID and DOI numbers are missing in the reference list. Please provide the PubMed numbers and DOI citation numbers to the reference list and list all authors of the references. Please revise throughout;

We apologize with the editor, and we have provided the PMID and DOI in the reference list.

(4) The “Article Highlights” section is missing. Please add the “Article Highlights” section at the end of the main text;

We added the Article Highlights” section at the end of main text.

(5) The authors need to fill out the STROBE checklist with page numbers. 6 Recommendation: Conditional acceptance.

We completed the Strobe checklist with page numbers.

Company editor-in-chief:

I have reviewed the Peer-Review Report, full text of the manuscript, and the relevant ethics documents, all of which have met the basic publishing requirements of the World Journal of Orthopedics, and the manuscript is conditionally accepted. I have sent the manuscript to the author(s) for its revision according to the Peer-Review Report, Editorial Office’s comments and the Criteria for Manuscript Revision by Authors.

We thank you for giving us this opportunity. We hope to continue a collaboration with your Journal.