



UNIVERZITA KARLOVA
3. lékařská fakulta

Opponent's review

of doctoral thesis:

“Scapular region topography concerning peripheral nerves and anatomical implication of nerve entrapment”

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Opponent:
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1. Introduction

The presented dissertation is 108 pages long and is supplemented with 37 figures and four tables. The text is organized in the usual way into 11 chapters. Chapters 7 and 8 contain a summary of the main findings in English and Czech. Chapter 9, titled 'References,' includes 231 citations.

The dissertation is a clinical-anatomical study, which provides a comprehensive analysis of the current perspective on the functional morphology of the upper edge of the human scapula, particularly focusing on the area of the suprascapular notch and suprascapular canal, and their potential roles in cases of suprascapular nerve entrapment.

Chapter 10, 'Publications *in extenso*' includes a list of five of the author's works dedicated to this topic. In all these articles, the candidate is the first author, and all the works have been published in journals with an impact factor above 1.0, with a total value of 12.66.

2. General evaluation

The dissertation is written in very good English and is well-organized.

Although the title suggests that the subject of the dissertation would be a comprehensive anatomical study of the extensive human scapular region, the focus of the dissertation is on a significantly smaller area of the shoulder:

The introduction provides an overview of the current knowledge in systematic and topographic anatomy of the suprascapular notch and suprascapular nerve, including the current state of approaches to nerve entrapment.

The objectives of the dissertation are as follows:

1. A detailed morphometric evaluation of the suprascapular notch on dry scapulae;
2. A detailed topographic-anatomical analysis of this area on embalmed cadaveric material;
3. An analysis of the effectiveness of current imaging methods in studying this area, particularly from the perspective of ultrasonographic diagnosis of suprascapular nerve entrapment.

3. Detailed Descriptions of the Dissertation

The literature review is detailed and extensive. It covers a wide range of scientific information from the entire period during which the upper edge of the scapula has been studied, both from the perspective of normal anatomy and the clinical aspect of suprascapular nerve entrapment.

The morphometric study of the suprascapular notch area was conducted on a substantial sample (513 dry scapulae, of which the sex and age were identified for 180 bones). The study resulted in the identification of five basic morphological types of the notch in relation to the risk level of suprascapular nerve entrapment.

In the topographic-anatomical dissection study (conducted on 159 embalmed specimens), the contents of the suprascapular notch were described in detail, particularly in relation to the suprascapular neuro-vascular bundle, significant morphological structures in its immediate vicinity, and along the course of the suprascapular canal, which may contribute to the development of entrapment syndrome. The conclusion of this section presents a unique set of nine statistically

evaluated types of suprascapular canal that differ in terms of the vascular structures they transmit (i.e., the suprascapular artery and veins).

The third part of the work is also highly significant, summarizing the results of the clinical-anatomical study on the effectiveness of imaging methods in the current diagnosis of suprascapular entrapment syndrome. The author, together with 20 volunteers, conducted a detailed anatomical analysis of the imaging quality of the suprascapular notch area using MRI and ultrasound. This study culminated in the development of a protocol for ultrasonographic diagnosis of suprascapular nerve entrapment.

4. Weaknesses of the Dissertation

I would be a very poor reviewer if I failed to mention the discovered shortcomings, fortunately all of which are very minor:

- Page 29: The citations for Cantrill et al., 1996; Fink et al., 1984; McMillan et al., 2016; and Humprey-Murto et al., 2017 are missing from the References.
- Page 35: SUPSM is not listed in the abbreviations list.
- Pages 47 and 48, Figures 21 and 22: There is no explanation provided for the abbreviation "Slg."
- Page 64: The citations for Vogl 2009, Loukas et al. 2016, and Strzelec et al. 2017 mentioned in the text are missing from the References.
- Page 81: The text mentions "bursectomy," but it does not specify which type the author has in mind.

Aside from these shortcomings, a few minor typos can be found throughout the text. However, I consider these issues to be insignificant details that in no way diminish or disrupt the high quality of the entire dissertation.

5. Questions from the Reviewer

The presented solutions to the hypotheses and the obtained results suggest that all the objectives of the dissertation were successfully achieved. However, one morphological issue remains unclear to me: on page 81, the author mentions "bursectomy" as one of the therapeutic steps. Which bursa is being referred to? The anatomy of the synovial bursae around the shoulder joint is not discussed in the dissertation, which also leads me to question whether the involvement of synovial bursae in the symptomatology of suprascapular entrapment has ever been addressed in the past — such as in the case of the subtendinous bursa of the subscapularis, which is closest to the studied area.

Finally, I am not entirely sure whether it would have been appropriate to cite Bartoníček's work on scapular fractures (Bartoníček J., Tuček M., Naňka O.: *Zlomeniny lopatky / Fractures of the Scapula*. Prague, Maxdorf, 2021) in the discussion on the etiology of entrapment.

6. Summary and Conclusion

The presented dissertation successfully addresses the issue of suprascapular nerve entrapment at a clinical-anatomical level. The dissertation is of high quality both in content and form. The presented results significantly enhance the existing knowledge of the morphology of the critical area, namely the suprascapular notch and suprascapular canal. Given the quantity and quality of the achieved results, it is entirely evident that the objectives of the dissertation have been fully met. The

dissertation is, therefore, also a good example of a work that meets all the current requirements for a modern clinico-anatomical studies, as well as for work in the field of "Experimental Surgery"— as the author *has demonstrated great talent for independent and systematic scientific work.*

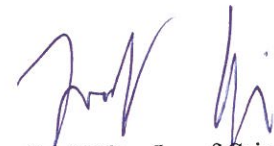
I have thus concluded that the presented dissertation by colleague MUDr. Azzat Al-Redouan fully meets all the requirements for the field of "Experimental Surgery."

I therefore recommend accepting this dissertation for defense, and, following its successful completion, awarding the candidate the title

Ph.D.

according to the relevant law.

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