Introduction
The superficial muscles of the back connect the upper limb to the axial skeleton. In the upper back region, the rhomboids (minor and major) and levator scapulae muscles can be identified inserting on the medial scapular border under the trapezius.

Variations of the rhomboids have been described in different names depending on the authors’ understanding of the nature of variant muscles. In this report, we present two cases of variations of the rhomboids and also provide a critical review of the present literature on this topic. Additionally, we aimed to discuss the controversies with the naming of these muscle variations and their proper grouping.

Case Report
In the first case (Figure 1), during routine anatomical dissection of a 70-year-old Caucasian male cadaver, after cutting and retracting the trapezius muscle, a small aberrant muscle bundle was identified between the rhomboid minor and levator scapulae on the left side. The muscle was identified as the rare rhomboid capitis. In the second case, in an adult female cadaver, a bilateral variation in the origin of the rhomboid major fibers was described. On the left side, the rhomboid major fibers started from spinous processes of C1–C6, while on the right side it was narrower and originating from spinous processes of C1–C3. Reviewing the literature about the rhomboid muscles variations, we conclude that one and the same aberrant structure might be named differently. We also discuss the presentation of the known variations of the rhomboids in a common scheme instead of classification.

Keywords: human; rhomboid muscle; variation

Abstract
In this report we present two cases of rhomboid muscle variations observed during routine anatomical dissections. In the first case, on the left side of an adult male cadaver, a long and slender aberrant muscle was identified starting from the lateral part of the superior nuchal line and inserting to the scapula between the rhomboid minor and levator scapulae. The muscle was identified as the rare rhomboid capitis. In the second case, in an adult female cadaver, a bilateral variation in the origin of the rhomboid major fibers was described. On the left side, the rhomboid major fibers started from spinous processes of C1–C6, while on the right side it was narrower and originating from spinous processes of C1–C3. Reviewing the literature about the rhomboid muscles variations, we conclude that one and the same aberrant structure might be named differently. We also discuss the presentation of the known variations of the rhomboids in a common scheme instead of classification.

Keywords: human; rhomboid muscle; variation

Rhomboid muscle variations: notes on their naming and classification principles

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Reference

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Discussion

The rhomboids are composed usually of six flat slips that originate from the spinous processes of either C7–T5 vertebrae or C6–T4 vertebrae. The fibers of the muscles run downwards and laterally to insert on to the medial border of scapula. The upper two slips of the rhomboids belong to the rhomboid minor muscle, while the lower four slips to the rhomboid major muscle. The rhomboids are mainly supplied by the dorsal scapular nerve of the brachial plexus made up of C4 and C5 spinal nerve fibers. Additional fibers contributing from C3 and C6 spinal nerves were also reported in some studies.

Variations of the rhomboids were previously reported as case reports, or in large series. One and the same aberrant muscle is named and grouped differently in majority of these reports. A common problem is the description of this variant muscle with different names, depending on its complete separation or fusion with the usual muscle (Figures 3a and b). Such examples might be the rhomboid minimus (or minus) and rhomboid tertius muscles. When these aberrant muscles are fused with or being a part of the rhomboids they are described as extended attachments or increased number of the slips; however, when well separated from the usual muscles, they are called by their own names (Figures 3a and b). Rhomboideus minimus is a small, nearly horizontal variant muscle below the rhomboid major, which was described by von Haffner. A muscle with the same morphology was named as rhomboideus minus by Mori, who also mentioned that this muscle is common in Japanese. Interestingly, a muscle also called rhomboid minimus was described in quite a different location; just superior to the rhomboid minor. Another interesting variation reported is the rhomboid capitii (rhomboid occipitalis), also named as occipitoscapular muscle. Basically, the rhomboid capitii is a common neck muscle in many lower mammals. But it is quite a rare finding in humans and great apes. Some authors still named the same muscle based on its origin and insertion simply as occipitoscapular muscle.
Some interesting descriptions of non-vertebral origins of a muscle originating from the skull and closely related to rhomboids can be noted in previous reports reviewing the variations of the levator scapulae (Figure 3b). This might be another example of a variation, same as rhomboid capitis, which is fused completely with the usual levator scapulae. In summary, after all these notes on the rhomboid muscles variations, it seems quite difficult to present a classification. The classification principles are simply not clear. To present one and the same structure in different groups with different names simply because it might be well-separated or non-separated is not reasonable. Instead, we propose a scheme that demonstrates the range of rhomboid muscles variations (Figure 3b).

Conclusion
All of these variant muscles can manifest, despite rare, with some clinical symptoms. The rhomboids, rarely presenting aberrant attachments which might influence the proximal myofascial pain of the upper limb. On ultrasound, CT scan and MRI, variant and non-expected muscles like rhomboid capitis, can mimic a tumor. So, it is important to have knowledge about the variations of these muscles for avoiding misinterpretations of diagnostic imaging and approaching the patients with myofascial pain of the upper limb.

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Author Contributions
All authors equally contributed.

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