

# Rare Associated Variation of the Suprascapular and Dorsal Scapular Arteries: Case Report and Potential Clinical Relevance

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## ABSTRACT

**Introduction:** the periscapular anastomotic network plays a crucial role in maintaining blood supply of the structures of the shoulder complex, particularly in the presence of vascular anomalies.

**Case report:** during routine dissection of the lateral cervical region, a noteworthy variation in the origin of the suprascapular artery was observed branching off from the third part of the subclavian artery. Additionally, midway through its course toward the scapular notch, two aberrant branches of the dorsal scapular artery were identified. One branch was ascending towards the levator scapulae muscle, and another descending along the medial margin of the scapula towards the rhomboid muscles, and then towards the ascending part of the trapezius. Upon reviewing the literature, the incidence of the suprascapular artery emerging from the third part of the subclavian artery was verified at 0.7%, with no reference indicating two aberrant branches originating from this artery. Uncommon arterial variations, as observed in this case, can be elucidated through an understanding of embryological development.

**Conclusion:** this knowledge is significant for clinicians and surgeons by emphasizing the need for familiarity with potential variations in normal vascular anatomy. Such knowledge is crucial for achieving precise diagnoses and for avoiding unforeseen challenges during surgical procedures in this region.

**Keywords:** Anatomical variation; Suprascapular artery; Dorsal scapular artery; Vascular abnormality; Lateral cervical.

## Introduction

A significant and crucial network of periscapular arterial anastomoses holds considerable clinical relevance. Several vessels converge to form networks on the anterior and posterior surfaces of the scapula, including the suprascapular, dorsal scapular, and circumflex scapular arteries. Collateral circulation is essential in scenarios requiring ligation of a lacerated subclavian or axillary artery, or in cases of axillary artery stenosis, which leads to reduced blood flow. In such situations, the subscapular artery reverses the flow direction, facilitating blood supply to the axillary artery's third part and sustaining blood flow to the joint structures and muscles of the shoulder complex<sup>1</sup>.

One of the most essential arteries in this anastomotic network is the suprascapular artery that typically originates from the thyrocervical trunk of the subclavian artery. From its origin in the thyrocervical trunk, it initially follows a downward and lateral course across the anterior scalene muscle and phrenic nerve and passes posteriorly to the internal jugular vein and the sternocleidomastoid muscle. Thereafter, it enters the supraspinous fossa to supply muscles on the posterior aspect of the scapula. As it passes over the superior transverse ligament, it gives off a branch that enters the subscapular fossa, forming an anastomosis with the subscapular artery. Upon reaching the infraspinatus muscle, it anastomoses with the circumflex scapular artery<sup>1-4</sup>.

Another significant artery in the periscapular network is the dorsal scapular artery, which most often originates independently from the second or third part of the subclavian artery. Its course follows laterally through the trunks of the brachial plexus in front of the middle scalene muscle. Descending with the dorsal scapular nerve along the medial border of the scapula, it traverses deep and supplies the levator scapulae and rhomboid muscles. Additionally, it forms periscapular anastomoses with the suprascapular and subscapular arteries<sup>1,5</sup>.

The frequent occurrence of vascular variations can be attributed to the entropy introduced during angiogenesis as the limbs develop. During this process, newly formed peripheral vessels join with other vascular sprouts, giving rise to additional vessels and leading to alterations in vascular patterns. In this developmental stage range, these fusions commonly occur without compromising the blood supply, yet maintain high clinical interest<sup>6</sup>.

This case report presents an undescribed associated anatomical variation of the suprascapular and dorsal scapular arteries.

## Case report

During the routine dissection process of the cervical region, a unique combination of variations in the suprascapular and dorsal scapular arteries was observed in a 70-year-old male cadaver. In this case,

an uncommon origin of the suprascapular artery was observed. It appeared as a long, large-caliber branch extending from the third part of the subclavian artery. Subsequently, it went to the scapular notch along with the suprascapular nerve, crossing over the superior transverse ligament of the scapula. Midway through the pathway of this suprascapular artery, a dorsal scapular artery was identified. There were two aberrant branches: one ascending towards the levator scapulae muscle and one descending along the medial border of the scapula towards the rhomboid muscles and the ascending part of the trapezius (Fig. 1). No coexisting variations were observed either ipsi - or contra laterally.

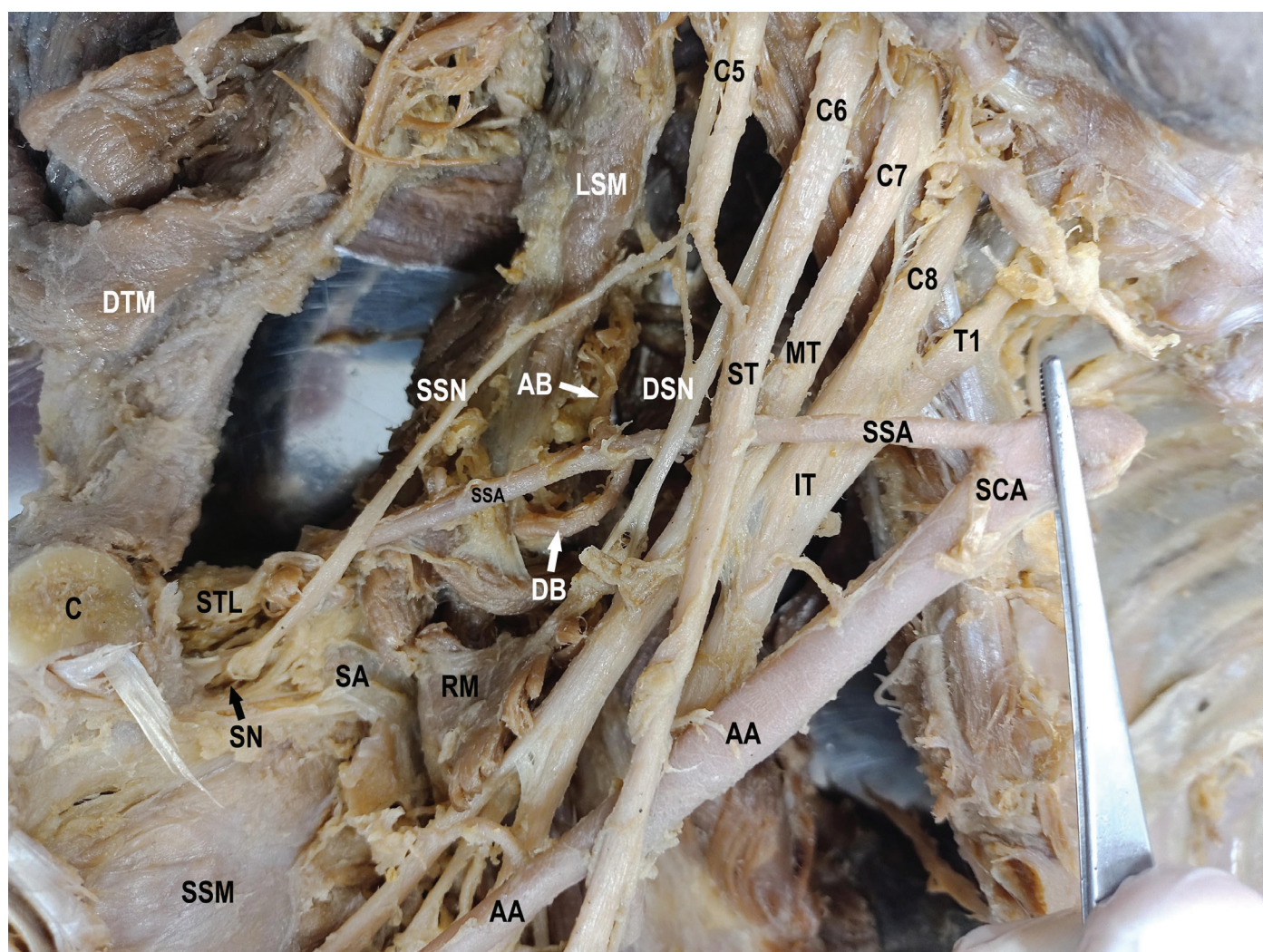
## Discussion

The extensive range of uncommon vascular variations can be elucidated by embryonic development and holds significant clinical interest. During the formation of pharyngeal arches in the fourth and fifth weeks of development, each receives a vascular

supply known as a pharyngeal arch artery. Specifically, the right fourth pharyngeal arch artery becomes the proximal part of the right subclavian artery, whose distal portion derives from the right dorsal aorta and the right seventh intersegmental artery. As fetal development advances, the limbs develop, and the peripheral blood vessels merge to create new blood vessels. At this stage, delays or early development of these structures may suggest anatomical variations or anomalies<sup>2,6</sup>.

An abnormal origin of the suprascapular artery that extends directly from the third part of the subclavian artery was described in this case report. The suprascapular artery typically arises from the thyrocervical trunk in 92% of cases and serves to nourish the periscapular structures<sup>2,3</sup>.

Reports of variations of the suprascapular artery are occasionally encountered in the literature. The origin may originate from the subclavian artery<sup>7,8</sup>, the axillary artery<sup>3,7</sup>, the subscapular arteries<sup>7</sup>, or the internal thoracic artery<sup>2</sup>. However, according to



**Figure 1.** Dissection of the arterial variant on the right side, showing: DTM - Descendent trapezius muscle; LSM - Levator scapulae muscle; SSN - Subscapular nerve; SSA - Suprascapular artery; AB - Ascending branch; DB - Descending branch; DSN - Dorsal scapular nerve; ST - Superior trunk; MT - Medial trunk; IT - Inferior trunk; SCA - Subclavian artery; C - Clavicle; STL - Superior transverse ligament; SN - Scapulae notch; SA - Superior angle of the scapula; RM - Rhomboid minor muscle; SSM - Subscapular muscle; AA - Axillary artery.



Wacker *et al.*<sup>4</sup>, a separate origin of the suprascapular artery accounts for about 5% of all reported cases of variation, and an independent origin extended directly from the subclavian artery, as described in this report, and occurred in only 2% of cases reported by Tubbs *et al.*<sup>2</sup>, which underscores the significance of our account.

What renders this report unmatched is the uncommon observation of two branches emerging in the central part of the suprascapular artery, and considering that the structures were vascularized by both, these branches corresponded to the dorsal scapular artery. Furthermore, despite what the literature indicates, a dorsal scapular artery emerging from the suprascapular artery<sup>2</sup> or the presence of a common cervicodorsoscapular trunk<sup>9</sup>, was not found in the literature review to describe a variation similar to that found by the authors of this case report. This underscores the rarity of this case and its relevance to clinical practice, thereby preventing potential vascular injuries and undesirable bleeding during surgical procedures<sup>10</sup>. Furthermore, the dorsal scapular artery has been the subject of studies involving surgical applications, which suggest that this artery may be a viable vessel in the molding of the trapezius muscle flap when used in reconstructions after tumor resections, or head and neck burns<sup>11</sup>.

A trapezial branch originating from the dorsal scapular artery was consistently identified in a study by Manyacka Ma Nyemb *et al.*<sup>12</sup>, even though these variations did not impact the distribution and size of the trapezius perforator arteries. Kim *et al.*<sup>13</sup> express concerns about an insufficient perfusion in the distal region of the trapezius muscle, despite anatomical studies citing a reliable perforator in the dorsal scapular artery. In this case report, the authors suggest that a perforator flap from the dorsal scapular artery, augmented by a perfusion by the assortment of multiple perforator vessels, could be a safe and

convenient option. Manyacka Ma Nyemb *et al.*<sup>12</sup> support this concern, emphasizing the importance of paying attention to the vascularization of the trapezius muscle itself, particularly in scenarios requiring a long arterial pedicle.

Therefore, we can conclude that variations in the arteries of the lateral cervical region are considered highly important, not only for fundamental anatomical knowledge, but also for clinical and surgical practices. For instance, avoiding iatrogenic puncture in the case of atypical positioning of the dorsal scapular artery during supraclavicular brachial plexus block<sup>14</sup>; imaging diagnosis mistakes; or obtaining trapezius muscle flaps in plastic and reconstructive surgeries, that can be used in the reconstructive treatment of the head, neck, esophagus, and mandibular defects as a result of tumors or burns. A thorough preoperative radiological evaluation of vascular pedicles can prove crucial for selecting the optimal flap, preventing ischemic complications, and contributing to increased treatment outcomes<sup>5,12,13,15</sup>.

### Ethics Statement

The authors state that every effort was made to follow all local and international ethical guidelines and laws that pertain to the use of human cadaveric donors in anatomical research.<sup>16</sup> This case report has been approved by the College Ethics Committee (no. 6.585.692/2023).

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