



Case Report

The rare origin of the suprascapular artery arising off the internal thoracic artery in the presence of the thyrocervical trunk: clinical and surgical implications

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ABSTRACT

During routine dissection of the subclavian artery and its branches, the suprascapular artery was found arising from the proximal end of the internal thoracic artery in only the left side of a 68-year-old Caucasian male, despite the presence of the thyrocervical trunk on the ipsilateral side. The suprascapular artery ran deep to the proximal one-third of the clavicle then continued its usual course, running parallel to the suprascapular nerve and passing over the superior transverse scapular ligament distally. Knowledge of this variant origin of the suprascapular artery is clinically important because the internal thoracic artery is utilized for a majority of the 800,000 coronary artery bypass surgeries performed worldwide each year. Its course deep to the clavicle is also significant due to clavicular fractures accounting for approximately 5-15% of adult bone fractures. © IJAV. 2011; 4: 182-184.

Key words [anatomical variant] [suprascapular artery] [internal thoracic artery] [branches of subclavian artery] [thyrocervical trunk] [coronary bypass surgery] [radical and modified neck dissections]

Introduction

Anatomical textbooks usually cite the thyrocervical trunk, which arises from the first part of the subclavian artery, as the most common origin of the suprascapular artery [1, 2]. Variations concerning the origin of the suprascapular artery are rare but have been documented arising from all three parts of the subclavian artery, the costocervical trunk, the axillary artery, and the internal thoracic artery (often called the internal mammary artery by clinicians) [3 – 7]. The suprascapular artery can also be duplicated bilaterally or even absent [6]. Two separate case reports even noted the suprascapular artery taking origin from the dorsal scapular artery [8, 9].

Origin of the suprascapular artery from the internal thoracic artery has been documented during comprehensive studies of the subclavian artery and its branches [3, 4, 7]. The rate of this occurrence varies, however, the authors do not mention if these unusual origins took place in the presence of the thyrocervical trunk. In 1905, Bean noted this variant in 12 of his 104 cases (11.5%); however, most studies report a lower incidence for this variant origin, including Read and Trotter (4.2%), DeGaris (2.2%), Coulouma and Van Varseveld (5.0%), Thomson (1.8%), Adachi (4.3%), and recently Takafuji and Sato (4.2%) [4, 6].

In 2005, Weiglein et al. reported the suprascapular artery as arising from trunks called the “cervico-scapular, dorso-scapular, and cervico-dorso-scapular trunks” [10]. The cervico-scapular trunk contains the superficial cervical and suprascapular arteries. The dorso-scapular trunk contains the dorsal scapular and the suprascapular arteries. The cervico-dorso-scapular trunk contains the superficial cervical, dorsal scapular, and the suprascapular arteries [10].

There were two cases of duplicate suprascapular arteries existing bilaterally [6]. The first suprascapular artery followed its most common pattern but the second suprascapular artery originated from the third part of the subclavian artery, was transfixed to the brachial plexus, and ultimately passed under the suprascapular ligament [6]. The occurrence of a subligamentous suprascapular artery has been extensively studied [9, 11, 12], and a 1999 study by Yücel et al. reported the incidence of the suprascapular artery traveling through the suprascapular notch in 2.5% of cases [13], including one case where the suprascapular artery arose from the third segment of the subclavian artery [14]. In 2009, Reineck and Krishnan reported three individual cases of the suprascapular artery passing through the suprascapular notch during arthroscopic suprascapular nerve release [15]. Interestingly, their clinical incidence of 3% closely correlates with studies reported in cadaveric

literature [15]. In 2010, Adibatti and Prasanna observed the suprascapular artery arising from the first part of the axillary artery on the left side and the thyrocervical trunk on the right side of the same cadaver before accompanying the suprascapular nerve beneath the suprascapular ligament bilaterally [16]. Finally, the suprascapular artery has been reported to be absent in almost 3% of the cases [6].

Case Report

During routine dissection of the subclavian artery and its branches, the suprascapular artery was found arising from the proximal end of the internal thoracic artery in a 68-year-old Caucasian male. This rare origin of the suprascapular artery occurred unilaterally on the left side of the cadaver. In this case, the suprascapular artery arose from the proximal end of the internal thoracic artery, which, in turn, originated from the first part of the subclavian artery. The thyrocervical trunk was present and contained its normal remaining branches: inferior thyroid, transverse cervical, and ascending cervical arteries. The suprascapular artery then coursed posterior to the proximal one-third of the clavicle, but anterior to the anterior scalene muscle, third part of the subclavian artery, and trunks of the brachial plexus. The artery continued its course, running parallel to the suprascapular nerve and passing over the suprascapular ligament (Figure 1).

Discussion

Unusual origins of the suprascapular artery, such as arising from the dorsal scapular or internal thoracic arteries, have been attributed to the absence of a thyrocervical trunk [9].

In our case, the suprascapular artery originated from the internal thoracic artery in the presence of a thyrocervical trunk. In 1999, Yücel et al. reported that the suprascapular artery originated from the internal thoracic artery due to the absence of a thyrocervical trunk on the right side [17]. Likewise, Murakami et al. reported nine cases in which the suprascapular artery originated from the internal thoracic artery in 1980 [18]. Other studies have noted this variant origin in 1.8–11.5% of specimens, but these studies did not mention if the thyrocervical trunk were present on the side of the variant origin of the suprascapular artery [6, 10].

In addition to its distributing branches to the musculature of the shoulder region, Havet et al. showed the suprascapular artery gives off nutrient arteries which supply the majority of blood to the proximal 4/5ths of the clavicle [19]. Specifically, their 2008 study reported the suprascapular artery represents the exclusive blood supply for the middle 1/3rd of the clavicle with nutrient branches penetrating the posterior aspect of the periosteum of this bone [19]. Knowledge of the origin and branches of the suprascapular artery provides importance clinically because clavicular fractures account for 5–15% of all adult bone fractures, including 33–44% of shoulder girdle injuries [20–22]. In addition, about 70–81% of clavicular fractures occur in the middle third of the bone [5, 23, 24]. Due to the variant origin off the internal thoracic artery in this case, the suprascapular artery, which coursed obliquely deep to the posterior aspect of the clavicle, would be more susceptible to injury. A broken clavicle would not



Figure 1. The cadaveric dissection shows the variant origin of the *suprascapular artery (SSA)* arising off the *internal thoracic artery (ITA)*. The *thyrocervical trunk (TCT)* is present and contains its remaining branches: inferior thyroid, transverse cervical, and ascending cervical arteries. (*VA*: vertebral artery; *SSN*: suprascapular nerve; *STSL*: superior transverse scapular ligament)

only endanger the nutrient branches of the suprascapular artery, but the entire suprascapular artery along its course.

Variation in the origin of the suprascapular artery is also clinically significant due to current surgical procedures within the heart, anterior neck, and posterior shoulder regions. The internal thoracic artery is often utilized as a graft for a majority of the 800,000 coronary artery bypass surgeries performed worldwide each year [25]. In fact, the left internal thoracic artery offers numerous benefits over saphenous vein grafting – including a ten year patency rate of 85% compared to 61% for venous grafts, a 29% decreased risk of end stage myocardial infarction, as well as a 50% decreased risk of reoperation for similar symptoms [25 – 27]. Surgeons utilizing the internal thoracic artery as a graft in coronary bypass surgeries need to be aware of this variant origin of the suprascapular artery and make sure to graft the artery distal to its origin. Additionally, ligation of the suprascapular artery is required for surgeries in the anterior neck and supraclavicular regions, specifically during radical and modified neck dissections, so the variant origin described in this study would make the suprascapular difficult to find for ligation [28]. Radical and modified neck

dissections are used primarily to control the lymphogenous spread of cancer affecting the head and neck, historically dating back to 1906 [28]. Furthermore, shoulder pain is increasingly attributed to vascular issues, such as suprascapular neuropathy, which can be caused by damage to, or an irregular course of, the suprascapular artery [16]. Therefore, knowledge of the course of the suprascapular artery and its variant origin off the internal thoracic artery is crucial for clinicians performing coronary bypass, radical and modified neck, or shoulder surgeries.

In this case study, the suprascapular artery arose off the internal thoracic artery on the left side of a cadaveric specimen, despite the presence of the thyrocervical trunk and its usual remaining branches. Other studies have noted this variant origin occurring in approximately 1.8–11.5% of specimens, but these studies did not mention if the thyrocervical trunk were present on the side of the variant origin of the suprascapular artery [6, 10].

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