

Anatomical Variation of the Brachiocephalic Trunk and Common Carotid Artery in Neck Dissection

Variación Anatómica del Tronco Braquicefálico y Arteria Carótida Común en Disecciones de Cuello

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SUMMARY: Variations in the trajectory of the brachiocephalic trunk and the common carotid artery predispose to disorders which might be critical in a tracheotomy and/or surgeries. Dissection of 110 formol fixed adult cadavers, both sexes, were performed to increase the anatomic knowledge of the neck vessels and its variations. Cadavers were from the Laboratory of Descriptive and Topographic Anatomy of the Federal University of São Paulo- Paulista Medical School- UNIFESP-EPM. In 109 of these cadavers no variations were found while in one (0.9 %) it was possible to observe a variation in the trajectory of the brachiocephalic trunk and in the right common carotid artery.

KEY WORDS: Brachiocephalic trunk; Common carotid artery; Variation; Anatomy.

INTRODUCTION

In the classic literature, the brachiocephalic trunk is described as the first branch of the aortic arch, with a trajectory from 4 to 5 cm of length. Soon after its origin it emerges to the right of the trachea and from this point continues from the posterior part of the inferior portion of the manubrium of sternum upward to the level of the right sternoclavicular joint, in the posterior part, dividing into right subclavian artery and right common carotid artery. It ascends obliquely upward when it is divided at the plane of the superior margin of thyroid cartilage and giving off no branches and tortuosities (Testut & Latarjet, 1945; Goss, 1988; Comert *et al.*, 2004; Moore & Dalley, 2007).

Description of the variations in the trajectory of the brachiocephalic trunk and the common carotid artery have been described in the literature (Goss).

It was demonstrated that variations predispose to disorders which can be critical as for example in a tracheotomy, in surgeries of the thyroid and parathyroid glands and in the tumor resection of the neck. (Souza, 1999; Choi *et al.*, 1998; Comert *et al.*).

In a tracheotomy, an urgent and elective procedure, in intensive care units, the risk of injury occurs when intending to protect primarily the blood vessels and the surrounding structures, a metal cannula is inserted between the second and fourth tracheal rings (Racic *et al.*, 2005).

In this research, the presentation of variations in the brachiocephalic trunk and in the common carotid artery had the objective to contribute in order to minimize possible injuries of these vessels when previous surgical procedures in the neck are needed, such as in the tracheotomy.

MATERIAL AND METHOD

One hundred and ten anterior cervical areas, 55 in the right and 55 in the left side, of formol-fixed adult cadavers, of both sexes were dissected from the Laboratory of Descriptive and Topographic Anatomy of the Federal University of São Paulo- Paulista Medical School UNIFESP-EPM.

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RESULTS

Among the 110 dissected cadavers, it was observed in one (0,9%) a variation in a 68 year-old female, who had the brachiocephalic trunk measuring 3.4 cm of length and 1.9 cm of diameter, bifurcating anterior to the trachea into subclavium and right common carotid artery. It also presented a variation on its trajectory. After its origin in the median line of the neck, inferiorly to the thyroid gland, still covering the trachea horizontally to the right performing a trajectory of 3.8 cm. Subsequent, it ascended surrounding the right lobe of the thyroid gland and maintaining a distance of 0.8 cm from this gland (Fig.1). The other 109 (99.1%) cadavers did not present any variation in the brachiocephalic trunk and in the common carotid artery.

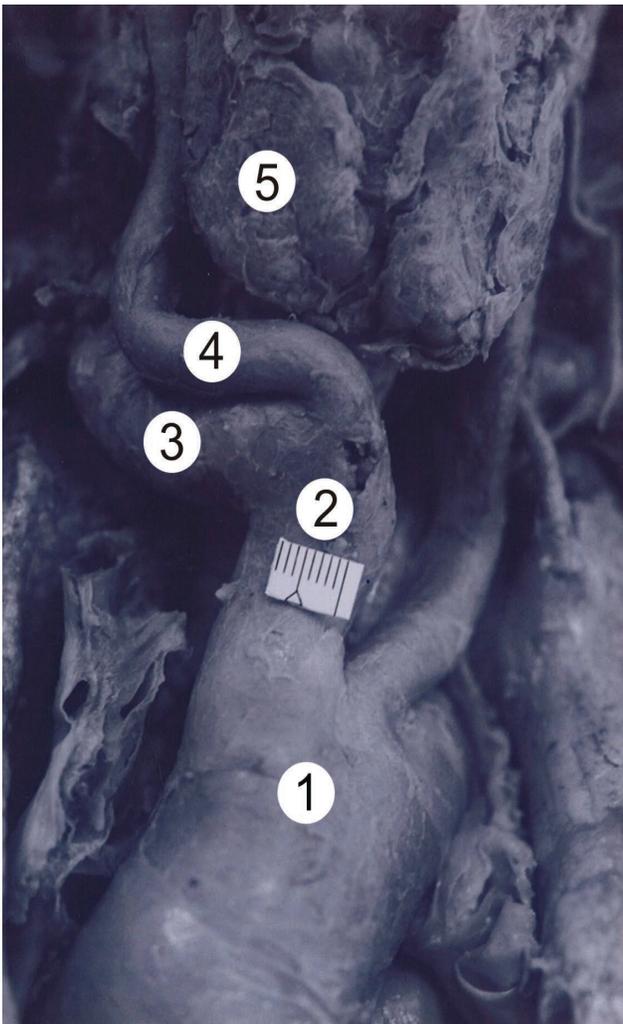


Fig. 1. Anatomical variation of the brachiocephalic trunk and common carotid artery in neck dissection. 1. Aortic arch; 2. Brachiocephalic trunk; 3. Subclavian artery; 4. Right common carotid artery; 5. Right lobe of the thyroid gland.

DISCUSSION

The abnormal course of the common carotid artery and brachiocephalic trunk is almost frequent.

In our case, the aberrant diameter of brachiocephalic trunk measuring 1.9 cm diameter, as well as its disposition overlying the trachea is in accordance with the findings of Mukadam & Hoskins (2002) and Comert *et al.* and differ from Racic *et al.* who found a brachiocephalic trunk with 8 mm diameter.

The most probable cause of this abnormality in the trajectory of the large blood vessels of the aortic arch might be a disproportional elongation and increase of diameter during embryonic life (Venieratos & Anagnostopoulou, 1986).

We observed a brachiocephalic trunk originating from the aortic arch in front of the trachea, where it is divided into the right common artery and right subclavian artery opposing to Comert *et al.* who observed the brachiocephalic trunk originating from the same arch but on the left side of the trachea and bifurcating on the right side of the same.

Some authors found the brachiocephalic trunk positioned in an abnormally high level over the 2nd tracheal ring (Racic *et al.*) or over the 4th to 5th (Bertram *et al.*, 1995; Comert *et al.*). The high localization of common carotid artery and brachiocephalic trunk across the trachea increase major the risk of injury of these vessels in percutaneous procedures (Comert *et al.*; Racic *et al.*).

At present, diagnostic ultrasound used before percutaneous tracheotomy allowed to detect the presence of anatomic variations in the trajectory of these vessels, in the neck area, avoiding inadvertent injuries (Choi *et al.*; Hatfield & Bodenhan, 1999; Mukadan & Hoskins).

In accordance with Venieratos & Anagnostopoulou and Comert *et al.*, we found a common carotid tortuous artery that after its origin was deviated to the right and performed an horizontal trajectory inferior to the thyroid gland and ascending surrounding the right lobe of this gland. However, the distance of 0.8 cm between this artery and the right lobe of the thyroid gland was not observed by the mentioned authors.

In conclusion the preoperative knowledge of these individual anatomical variations of the trajectory of vessels of the cervical region of the neck has clinical surgical importance and the description of these cases also has a statistically significance.

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RESUMEN: Las variaciones en el trayecto del tronco braquicefálico y de la arteria carótida común predisponen a complicaciones que pueden ser fatales durante una traqueotomía y/o cirugías. Con el objetivo de ampliar el conocimiento anatómico de estos vasos del cuello y de sus variaciones, decidimos diseccionar 110 cadáveres, formalizados, adultos, de ambos los sexos, provenientes del Laboratorio de Anatomía Descriptiva y Topográfica de la Universidad Federal de São Paulo-Escuela Paulista de Medicina – UNIFESP-EPM. En 109 (99,1%) de los cadáveres no encontramos variaciones. En un caso (0,9 %) observamos variación en el trayecto del tronco braquicefálico y de la arteria carótida común derecha.

PALABRAS CLAVE: Braquicefálico tronco; Arteria carótida común; Variación; Anatomía.

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