

# MULTIPLE BILATERAL ANOMALIES OF CAROTID ARTERIES - A CASE REPORT

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## Abstract :

Anatomical variations of carotid arterial system which are not infrequently encountered have a great impact on the surgical approaches of the neck. Although the described individual variations of the carotid arteries are well-known in the literature, the combination of anomalies reported in this case has not been, to the best of our knowledge, previously described. We present a rare case of high bifurcation of the common carotid artery, unusual tortuosity ("S"-shape) of the common carotid and external carotid arteries, anomalous origin of the superior thyroid artery and linguofacial trunk on both sides. The anomalies in the present case were compared with those reported before. The embryogenesis of such a combination of anomalies is not clear, but the anatomic consequences may have important clinical implications.

Keywords : External carotid arteries, high bifurcation of the common carotid arteries, superior thyroid arteries and linguofacial trunks, tortuosity.

## Introduction :

The principal arteries of supply to the head and neck are the two common carotids; they ascend in the neck and each divides into two branches, viz., (1) the external carotid, supplying the exterior of the head, the face, and the greater part of the neck; (2) the internal carotid, supplying to a great extent the parts within the cranial and orbital cavities. For most of the large arterial vessels, surgeons can rely on a constant anatomy. In head and neck surgery, the common carotid arteries are important landmarks, defining the plane of the dissection during radical neck surgery.<sup>1</sup> Conventional angiography is

considered the most accurate technique for diagnosis of carotid bifurcation diseases, such as stenosis.<sup>2</sup> Thus, accurate evaluation of the carotid bifurcation level with non invasive

techniques remains an important goal and external anatomical landmarks can be clinically useful in predicting the bifurcation level of the carotid artery. Despite the large number of anatomical variations descriptions of the carotid arteries, very little information is available in the literature on the diameter of these vessels. Knowledge of the size of these vessels might be important. Here we describe an unusual case report of bilateral high bifurcation of the common carotid artery, the bifurcation was found superior to the posterior belly of the digastric muscle and deep to the mandible, but could only be seen on retracting these structures upward. Presence of bilateral unusual tortuosity ("S" shaped) of common carotid artery, tortuous external carotid artery, anomalous origin of the superior thyroid arteries and linguofacial trunks makes the present case unique.

The knowledge of this kind of variations is of great importance in radiological examinations and surgery. Therefore it is necessary to understand the anatomy of these vessels and its variations to carry out surgeries with

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FIG-1: Showing tortuous ("S" shaped ) common carotid artery (Right side).



1, 2 and 3 -"S"shaped course of common carotid artery; 4- Posterior belly of daigastic muscle; 5- Thyroid Gland

FIG-2: Showing tortuous ("S" shaped ) common carotid artery (Left side).



1, 2 and 3-"S"shaped course of common carotid artery; 4- Posterior belly of daigastic muscle; 5- Thyroid Gland

FIG-3: Showing Multiple Anomalies of Carotid arteries (Right side).



1 and 2- "S"shaped tortuous common carotid artery; 3- External carotid artery; 4- Internal carotid artery; 5- Tortuous external carotid artery; 6- Superior thyroid artery; 7- Linguofacial trunks; 8- Lingual artery; 9- Facial artery; 10- Submadibular gland; 11- Thyroid gland.

FIG-4: Showing Multiple Anomalies of Carotid arteries (Left side).



1 and 2- "S"shaped tortuous common carotid artery; 3- External carotid artery; 4- Internal carotid artery; 5- Tortuous external carotid artery; 6- Superior thyroid artery; 7- Linguofacial trunks; 8- Lingual artery; 9- Facial artery; 10- Submadibular gland; 11- Thyroid gland.

minimum operative and post operative complications.

Case Report :

During routine dissection of (1<sup>ST</sup> M.B.B.s student's batch 2010-2011) of a middle aged female cadaver at pinnamaneni Siddhartha institute of medical sciences & research foundation Gannavaram; Krishna Dist; A.P (INDIA), it was observed that an unusual multiple bilateral anomalies of carotid arteries. These variations included: The common carotid artery has divided into internal and external carotid arteries above the level of hyoid bone which is much higher than the normal site, the bifurcation was found superior to the posterior belly of the digastric muscle and deep to the mandible, but could only

be seen on retracting these structures upward. The first anterior branch of external carotid artery, the superior thyroid artery originated from the common carotid artery just before its bifurcation and it followed its usual course (Fig-3 and 4). Lingual and facial arteries originated from anterior side of the external carotid artery as linguofacial trunk (Fig-3 and 4). All the above-mentioned branches (internal carotid artery, external carotid artery, superior thyroid artery, and linguofacial trunk) were superior to the level of posterior belly of digastric suggesting that these are the contents of digastric triangle. It was also observed the unusual bilateral tortuosity ("S"-shape) of the common carotid and external carotid arteries (Fig-1 and 2).

### Discussion :

It is commonly accepted that the common carotid artery bifurcation occurs about the level of C IV (4<sup>th</sup> – Cervical vertebra) for radiological purposes.<sup>3,4</sup> Nevertheless, most anatomical text books and references in the literature describe the upper border of the thyroid cartilage as the bifurcation level (Agur and Lee, 1991; Ord and Ward-Booth).<sup>5,6</sup> With the advent of the radiological exams, and the need of a more accurate interpretation of them, external anatomical land marks turned to be useful in regular clinical practice, especially during the percutaneous carotid angiography. From the bifurcation landmarks studied, the cervical vertebra was the most variable one, including differences between sides, even though most of the radiological literature continues to use them as a landmark of the common carotid artery bifurcation (Smith & Larsen, 1979; Lemmi et al.).<sup>7,3</sup> In this case, a relatively high bifurcation of the common carotid artery was found on both sides, the bifurcation was found superior to the posterior belly of the digastric muscle and deep to the mandible, but could only be seen on retracting these structures upward. Such variations in the bilateral high bifurcation of the common carotid artery are uncommon.

"Tortuosity" is described as "S" or "C" - shaped elongation or undulation of the carotid arteries. Ashish Gupta, Marc C Winslet reported tortuous common carotid artery as a cause of dysphagia.<sup>8</sup> Deterling cited 68 cases from the literature and reported an additional 21 cases of his own.<sup>9</sup> In this case, tortuosity of the common carotid ("S"-shape)

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and external carotid arteries was found on both sides. In adults, carotid artery tortuosities is considered a risk factor for stroke but are not treated unless symptomatic.<sup>10</sup> Course, variations and angulation of the carotid arteries produce changes in the laminar flow, that lead to swirls which usually evolve all the way to strictures and stenosis.

Yıldırım et al. (2001) observed the total 6 (15%) linguofacial trunk in 40 neck side (20 adult human cadavers).<sup>11</sup> Zumre et al. reported linguofacial trunk in 20% of cases.<sup>12</sup> In this case, a similar common linguofacial trunk was seen on the both sides.

Faller and Scharrer reported superior thyroid artery arise from the common carotid in 18% of cases, the point of division of the common carotid in 36%, or from the external carotid in 36% of cases<sup>13</sup>. In this case, superior thyroid artery was arising from the common carotid artery just below to its bifurcation on both sides.

Variations of the origin and branches of the external carotid arteries on both sides are rare findings and impart important knowledge that is especially useful for surgeons who operate on the face and neck regions, as well as for radiologists in the interpretation of imagings.

### Conclusion :

Anatomical knowledge of variations in the origin, course, and branching pattern of the carotid arteries will be useful in angiographic studies, transcatheter embolization procedures and in surgical procedures of the head and neck region. Additionally, course of the normal and variant facial artery is important in surgeries involving facial flaps.

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