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Anatomy

STUDY OF VARIATION IN ORIGIN OF SUPERIOR LARYNGEAL ARTERY AND ITS CLINICAL SIGNIFICANCE

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ABSTRACT **Objectives:** The Superior laryngeal artery (SLA) is the dominant arterial supply of the laryngeal muscles, mucosa and glands. Normally it is a branch of Superior thyroid artery (STA). Knowledge of variation in origin of SLA is important to achieve bloodless field of surgery during partial laryngectomy, radical neck dissection and other neck surgeries. **Materials and Method:** 30 formalin fixed human cadavers (60 hemi necks) of both the sex from department of anatomy BGS GIMS and BMC&RI have been dissected to study the origin of SLA. **Result:** In 75% cases SLA originated from STA, in 11.6% cases SLA originated from External carotid artery, in 8.3% cases SLA originated from common carotid artery and in 5% cases it originated from carotid bifurcation. **Conclusion:** Precise anatomical knowledge of variations in the origin of SLA is essential for minimizing complications during laryngeal surgeries, laryngeal transplantation and for selective intra- arterial chemotherapy for laryngeal cancers.

KEYWORDS : Superior Laryngeal Artery, Superior Thyroid Artery, Laryngeal Surgery

INTRODUCTION

The human larynx is an anatomically complex organ lying in the anterior midline of neck extending from root of the tongue to trachea. The major blood supply blood to the human larynx is delivered via the superior laryngeal artery (SLA).SLA is the first major branch of superior thyroid artery (STA) and it accompanies internal laryngeal nerve.[1]

SLA enters the larynx by penetrating the thyrohyoid membrane and divides into number of branches which supply larynx from tip of epiglottis to the inferior margin of thyroarytenoid muscle. SLA ends by anastomosing with the contralateral fellow and with inferior laryngeal branch of inferior thyroid artery.

The variations in the origin of SLA are considered critical issues that surgeons and radiologists should have a thorough envision especially during partial laryngectomy, laryngeal transplantation and during superselective intraarterial chemotherapy for laryngeal cancer.[2]

MATERIALS AND METHOD

The present study of origin of SLA was done in 30 formalin fixed adult cadavers (60 hemi necks) of both the sex in Department of Anatomy, BGS Global institute of medical sciences and Bangalore medical college & Research Institute, Bengaluru.

Midline incision was put in the anterior part of the neck and the incision was extended superiorly towards the angle of mandible and inferiorly along the clavicle. Skin over the neck, superficial fascia along with platysma muscle, investing layer of deep cervical fascia was removed. Sternocleidomastoid muscle was reflected laterally and if needed the muscle was resected for better visibility of the artery. The carotid sheath was removed to expose the carotid arteries. External carotid artery and its branches were dissected after removing the strap muscles. The origin of SLA was observed and photographed.

RESULTS

Superior laryngeal artery normally originates from superior thyroid artery but variable origins from external carotid artery, common carotid artery, carotid bifurcation, lingual artery, facial artery have been reported in the literature.

In present study we observed that the SLA originated from STA in 45 cases (75%). SLA originated from external carotid artery (ECA) in 7 cases (11.6%); from common carotid artery (CCA) in 5 cases (8.3%. We also observed the origin of SLA from the point of carotid bifurcation (CB) in 3 cases (5%).

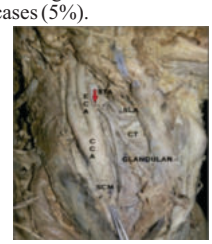

Fig 1: Origin of SLA from STA

STA – Superior thyroid artery, ECA – External carotid artery, SLA – Superior laryngeal artery, SCM – sternocleidomastoid muscle, CCA – Common carotid artery, CT – Cricothyroid

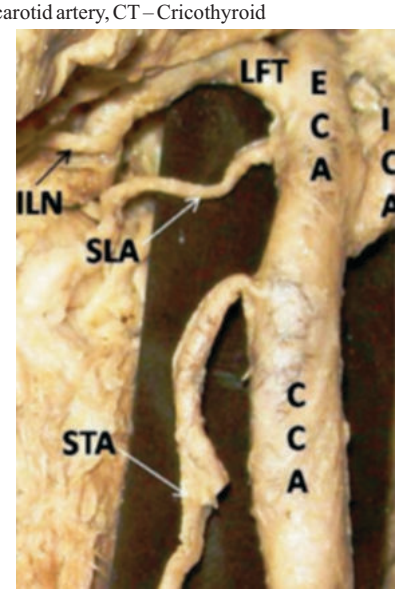

Fig 2: Origin of SLA from ECA

LFT – Linguofacial trunk, ECA – External carotid artery, SLA – Superior laryngeal artery, ICA – Internal carotid artery, ILN – Internal laryngeal nerve, STA – Superior thyroid artery, CCA – Common carotid artery

Fig 3: Origin of SLA from CCA

ECA – External carotid artery, SLA – Superior laryngeal artery, STA – Superior thyroid artery, CCA – Common carotid artery

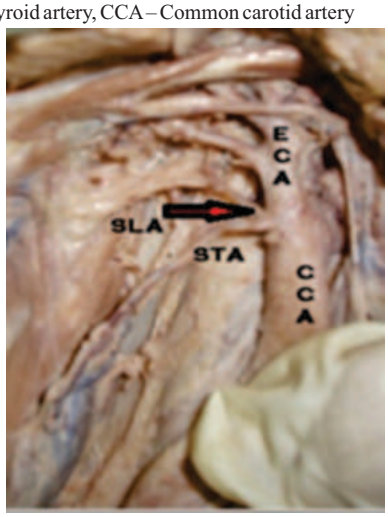

Fig 4: Origin of SLA from CB
ECA – External carotid artery, SLA – Superior laryngeal artery, STA – Superior thyroid artery, CCA – Common carotid artery

DISCUSSION

Larynx is supplied by SLA and inferior laryngeal artery, most of the nutrition to larynx is derived from SLA. The variations in the origin of SLA are considered critical issues that surgeons and radiologists should have a thorough envision and evaluation of the condition. Normally SLA arises from STA. In the present study SLA originated from STA in 75% cases, Nayak SR et al[3] observed this type of origin in 79% cases, Adachi B et al[4] and Rusu MC et al[5] observed it in 68% cases. Devadas et al reported higher incidence of origin of SLA from STA in 91.7% of cases.[6]

We observed origin of SLA from ECA in 11.6% cases. Nayak SR et al[3] reported 9% cases where SLA originated from ECA, Adachi B et al[4] observed this in 4% cases, Devadas et al[6] observed such origin in 5% cases. Schwalbe et al[7] and Rusu MC et al[5] reported higher incidence of this origin in their study where they observed SLA from ECA in 24% and 32% of cases respectively.

Origin of SLA from CCA has been reported in the literature with an incidence rate of 1% by Schwalbe G et al[7] whereas Vazquez et al[8] and Nayak SR et al[3] reported it in 5% of cases. We observed the origin of SLA from CCA in 8.3% of cases which is slightly higher than the previous studies.

In the present study we also observed origin from carotid bifurcation in 5% cases which was also reported by Vazquez et al[8] but not reported in other studies.

A rare origin of SLA from lingual artery (LA) was observed by Devadas et al[6], origin of SLA from Ascending pharyngeal artery (APA) was observed by Devadas et al[6] and Vazquez et al.[8] We didn't observe such origin in our study. Cases of SLA originating from facial artery have also been described in the literature.[9]Complete absence of SLA was reported by Vazquez et al.[8]

Table 1: Origin of SLA Compared with Other Studies.

Study	STA	ECA	CCA	CB	LA	APA	Absent
Schwalbe et al[7]	70%	24%	1%	-		-	-
Adachi et al[4]	68%	4%	-	-	-	-	-
Rusu et al[5]	68%	32%	-	-	-	-	-
Vazquez et al[8]	78%	9%	5%	4%	-	4%	4%
Nayak et al[3]	79.6%	1.21%	5.4%	-	-	-	-
Devadas et al[6]	91.7%	5%	-	-	1.7%	1.7%	-
Present study	75%	11.6%	8.3%	5%	-	-	-

CONCLUSION

Lack of knowledge regarding the possible variations of origin of SLA could lead to fatal errors if one blood vessel is mistaken for another. These variations would help surgeons and radiologists in carrying out successful radical neck dissection, partial laryngectomy re-construction and transplantation of larynx with minimal post operative complications. Finally for clinicians dealing with super selective intra-arterial chemotherapy for laryngeal carcinomas it would be of help to know of above variations for administrating chemotherapeutic drugs through the feeding artery to tumor site directly for achieving greater therapeutic effect and reducing systemic side effects.

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