Seminars in Pediatric Surgery 25 (2016) 338–346

Contents lists available at ScienceDirect

Seminars in Pediatric Surgery

journal homepage: www.elsevier.com/locate/sempedsurg

Complications in head and neck surgery

Emily Christison-Lagay, MD, FACS*

Department of Surgery, Yale School of Medicine, PO Box 208062, New Haven, Connecticut 06510

ARTICLE INFO

Keywords:
Branchial cleft cyst
Thyroglossal duct cyst
Thyroid
Lymphatic malformation

ABSTRACT

Head and neck anatomy is topographically complex and the region is densely populated by vital nerves and vascular and lymphatic structures. Injury to many of these structures is associated with significant morbidity and may even be fatal. A thorough knowledge of regional anatomy is imperative and complications need to be managed in a thoughtful directed manner. The pediatric surgeon may be called upon to address both congenital and acquired conditions and should be prepared to encounter reoperative fields after failed initial surgery. This review summarizes the current literature on four frequently encountered surgical conditions of the head and neck: branchial cleft anomalies, thyroglossal duct cyst, thyroid disease, and lymphatic malformations, with a focus on the prevention and treatment of complications.

Introduction

Head and neck anatomy is topographically complex with a dense population of vital nerves and vascular and lymphatic structures. Both congenital and acquired conditions may warrant surgical care which, in turn, is associated with a risk for both intraoperative and postoperative complications.

A thorough knowledge of regional anatomy is crucial to avoiding injury to crucial structures while operating on the head and neck (Figure 1A). The neck is divided into two principle triangles: anterior and posterior (Figure 1B) which themselves can be further divided. The anterior triangle can be further subdivided into muscular, carotid, submandibular, and submental triangles and contains the thyroid, recurrent laryngeal nerve, carotid sheath, portions of cranial nerves VII, IX, X, and XII, and the associated musculature of the anterior neck. The posterior triangle contains the subclavian vessels, brachial plexus roots, cranial nerve XI, phrenic nerve, greater auricular nerve, and multiple transverse cervical nerves.

Branchial cleft anomalies

Branchial cleft anomalies (BCAs) comprise the most common congenital lateral neck masses and can occur as cysts, sinuses, or fistulae. Formed during the 4–7th week of gestation, branchial structures arise from six paired mesodermal arches on the lateral neck of a developing fetus. Four of these arches develop into a nerve, blood vessel, or muscle (two rudimentary arches regress). Each is associated with an external cleft and an internal pouch. Aberrant development of these arches can be associated with incomplete obliteration of the clefts and pouches resulting in a branchial cleft anomaly. Because the arches are associated with development of structures from the ear and muscles of mastication to the cricoid cartilage and intrinsic muscles of the larynx, branchial cleft anomalies can present anywhere from the preauricular skin to the clavicle. Presentation can include cystic neck masses and swelling, recurrent infections, and drainage.

One study suggested that nearly a quarter of all BCAs present with infection that can distort tissue planes and make subsequent total excision more difficult; recurrence of BCAs following excision has been reported as high as 20% if the lesion has been previously infected.[1]

First branchial cleft anomalies

First BCAs are rare and, depending upon the study cited, account for as few as 1% of BCAs to as many as 20%.[2,3] There have been a number of attempts to classify first BCAs. One of the most commonly accepted methods (proposed by Belenky and Medina[4]) separates them into type I and type II. Type I anomalies course laterally or superiorly to the facial nerve and terminate without an opening into the external auditory canal (Figure 2A). Type II anomalies begin near the angle of the mandible and track superiorly or superomedially to join or open into the external auditory canal. Type II anomalies have an inconsistent relationship to the facial nerve (Figure 2B).

Given the variable relationship of the tract with the facial nerve, any surgeon operating upon a first branchial cleft abnormality must

* Corresponding author.
E-mail address: emily.christison-lagay@yale.edu

http://dx.doi.org/10.1053/j.sempedsurg.2016.10.007
1055-8586/

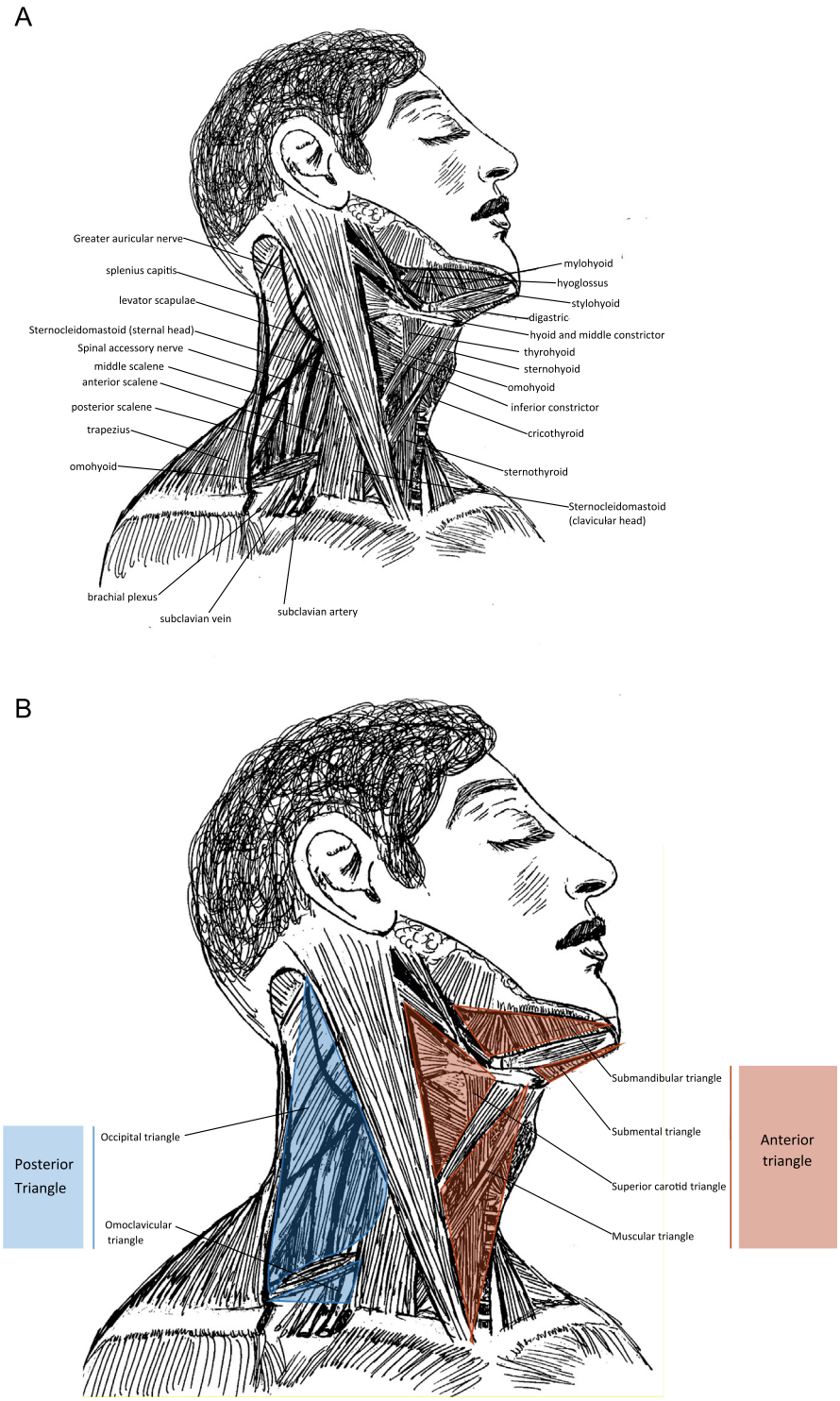

Fig. 1. (A) Muscular anatomy of the neck and (B) triangles of the neck.

be prepared to identify and preserve the facial nerve. Facial nerve monitoring is recommended with early identification of the main trunk of the facial nerve with subsequent dissection and identification of its branches.[5] Alternatively, the main trunk of the facial nerve may be identified emerging at the junction of the sternocleidomastoid and the mastoid process. Failure to adequately identify and preserve the facial nerve can result in facial nerve palsy which has been described in 10–40% of cases.[6,7]

Recurrence remains a chief complication of treatment of first BCAs and can affect greater than 50% of lesions. Resection may require a superficial parotidectomy in up to 25% of cases and any surgeon excising a first BCA should be comfortable with this procedure.

Second branchial cleft anomalies

Second BCAs account for 80–95% of all BCAs.[2,3] The second branchial apparatus gives rise to the hyoid bone and the palatine tonsillar fossa. Second BCAs are commonly diagnosed as a sinus or fistula along the anterior border of the sternocleidomastoid (SCM)