

Pharyngeal lymphatic ring: anatomical review

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Abstract

The tonsils form part of a circular band of adenoid tissue which guards the opening into the digestive and respiratory tubes, known as Waldeyer's ring. The anterior part of the ring is formed by the submucous lymphoid clusters (lingual tonsil) on the posterior part of the tongue; the lateral portions consist of the palatine tonsils and the lymphoid tissue in the vicinity of the auditory tubes, while the ring is completed behind by the pharyngeal tonsil on the posterior wall of the pharynx. In the intervals between these main smaller collections of lymphoid tissue are found. This paper intends to give to the clinician an anatomical review about the subject.

Keywords: pharynx lymphatic ring, lymphatic drainage, lymphnodes, lymphatics vessels, Waldeyer's ring.

1 Introduction

The lymphatic vessels and the lymphnodes, the same as in the other body parts, have in the head and neck an important clinical application (ANDRADE and JÁCOMO, 2007). Even with the large connections among the lymphatic vessels, the lymph flows through specific and determinate regions.

Despite of the frequent variations between the lymphatics vessels and lymphnodes, the knowledge of the dispose of the lymphatics structures, markedly the lymphnodes, is very important in the diagnosis and treatment of the infections and neoplasms from this region (JÁCOMO and ANDRADE, 2008).

The lower part of oral cavity and the adjacent walls of the pharynx have an clusters of lymphoid tissue which form some isolated lymphatic organs (ROUVIÈRE, 1981). So, we have the palatine tonsil (or faucial), the pharyngeal tonsil, the lingual tonsil and an clusters of lymphoid tissue posterior to the ostium pharyngeum tubae auditivae known as tonsil of the torus tubarius (Figure 1a). Yet, at the pillars and adjacent parts of pharyngeal mucosa there are many lymphatic follicles.

These lymphatic structures protect the entrance of the respiratory and digestive tract. They are named as pharyngeal lymphatic ring or Waldeyer's ring (ROUVIÈRE, 1981). The pharyngeal lymphatic ring is very developed during the first years of live passing through important transformations, becoming regressive and atrophied with age.

2 Material and methods

Classical descriptions of the lymphatic anatomy were reviewed, including our contributions to many books of General and Vascular Surgery published in Brazil (GUEDES NETO and BELCZAK, 2009; MAFFEI, LASTÓRIA, YOSHIDA et al., 2008; PETROIANU, 1999; VOGELFANG, 1995) and abroad (LEONG, 2007). Nevertheless, all relevant anatomical reports on lymphatics are based on Rouvière's pioneer work (ROUVIÈRE, 1981).

3 Anatomical description

3.1 Pharyngeal tonsil

The pharyngeal tonsil is localized at the mucous layer of the roof and posterior wall of nasopharynx. It has a rounded shape, having some degrees and sulcus. It is marked of narrow sulcus, deeper and irregular, known as crypta tonsilaris (Figure 1a). Sometimes, the pharyngeal tonsil has a deeper sulcus at the center, which follows through the connective tissue surrounding. This deeper depression is known as pharyngeal bursa (GRAY, 2000).

3.1.1 Vascularization

The arterial irrigation originates from the branches of external carotid, the ascending pharyngeal artery and the maxillary artery, in its terminal branch, sphenopalatine artery.

3.1.2 Lymphatic drainage

The lymphatic collectors are divided into medial and lateral, corresponding to the lymphatics collectors of the superior part of the pharynx (ROUVIÈRE, 1981).

The medial lymphatic collectors are the most numerous, about 8 to 12. They begins in the roof and the posterior wall of the pharynx, particularly at the pharyngeal tonsil, passing though the anterior wall of the pharynx to the posterior wall, perforating the constrictor pharyngis superior muscle and the buccopharyngeal fascia, reaching a space between this fascia and the pre-vertebralis fascia, called retropharyngeal space. Afterwards, the lymph flow is directed to the retropharyngeal lateral lymphnodes and, in some cases, goes straight to the lymphatic chain of the internal jugular vein or deeper cervical lymphnodes (ANDRADE and JÁCOMO, 2007) (Figure 1b).

The lateral lymphatic collectors also pass through the constrictor pharyngis superior muscle and buccopharyngeal fascia, directing to retropharyngeal lateral lymphnodes or either going straight to the lymphnodes of the internal jugular vein lymphatic chain or to the deeper cervical lymphnodes (ROUVIÈRE, 1981) (Figure 1b).

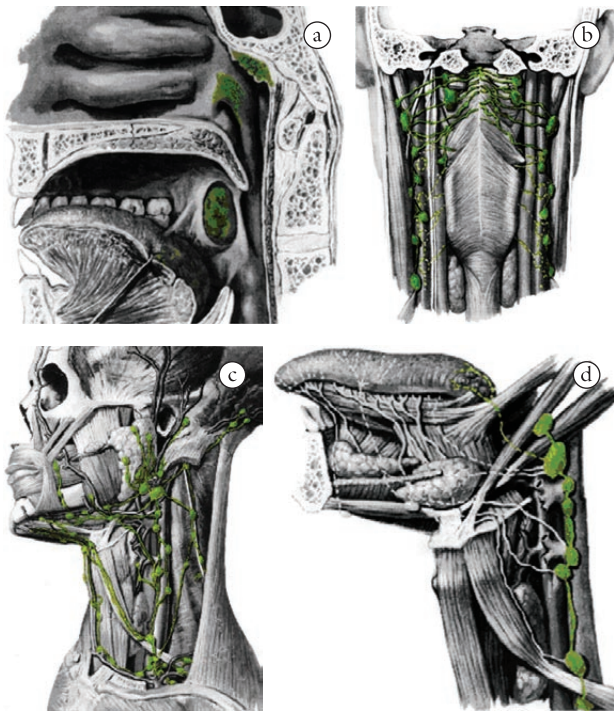


Figure 1. a) Medial view of the pharyngeal lymphatic ring; b) Posterior view of pharynx: retropharyngeal lymph nodes and deep cervical lymph nodes; c) Lateral view: superficial cervical lymph nodes and deep cervical lymph nodes; and d) Lateral view: lymphatic drainage of tongue. (Adapted from NETTER, 2008).

3.2 Tubarius tonsil

The tubarius tonsil is a lymphoid tissue localized at in the submucous layer in the nasopharynx, posterior to the pharyngeal ostium of the auditory tube (ROUVIÈRE, 1981) (Figure 1a).

3.2.1 Vascularization

The arterial irrigation originates from branches of the sphenopalatine artery and the ascending pharyngeal artery, direct branches of external carotid artery.

The lymphatic vessels of these tonsil also go towards to the retropharyngeal space, reaching the lateral retropharyngeal lymphnodes or, without passing in this lymphnodes, going straight to the deeper cervical lymphnodes (ROUVIÈRE, 1981) (Figure 1b).

3.3 Palatine tonsil

The palatine tonsil is a huge lymphoid mass located at the lateral part of the fauces, between the glossopalatine and pharyngopalatine arches (Figure 1a). This lymphoid tissue, however, does not fill all the space between the arcs. So, a small depression, known as supratonsillar fossa, occupies this region (MOORE and DALLEY, 2007). The mucous plica that passes through supratonsillar fossa, between the two arches, is called plica semilunaris and the continuation of this plica is called plica triangularis. Between the plica triangularis and the surface of the tonsil is a space known as the tonsillar sinus. This sinus may be obliterated by its walls becoming adherent.

The palatine tonsil has two surfaces: medial and lateral.

The medial surface of the tonsil is free, except anteriorly, where it is covered by the plica triangularis. According to Gray (GRAY, 2001), it presents from twelve to fifteen orifices leading into small crypts or recesses from which numerous follicles branch out into the tonsillar substance.

The lateral or deep surface is adherent to a fibrous capsule which is continuous with the plica triangularis. It is separated from the inner surface of the constrictor pharyngis superior muscle usually by some loose connective tissue. This muscle intervenes between the tonsil and the external maxillary artery with its tonsillar and ascending palatine branches. The internal carotid artery lies behind and lateral to the tonsil at a distance of 20 to 25 mm. from it.

At childhood, the tonsils are relatively (and frequently absolutely) larger than in the adult, and about one-third of the tonsil is imbedded. After puberty the imbedded portion diminishes considerably in size and the tonsil assumes a disk-like form, flattened from side to side. The shape and size of the tonsil, however, vary considerably in different individuals.

3.3.1 Vascularization

Arterial irrigation: the arteries supplying the tonsil are:

- Tonsillar artery, branch from the external maxillary, which passes through the superior constrictor muscle and reaches the inferior pole of the tonsil;
- The ascending palatine artery, facial artery branch;
- The ascending pharyngeal artery, branch from the external carotid;
- The descending palatine branch of the internal maxillary;
- The lingual artery, branch from the external carotid and;
- A twig from the small meningeal.

Venous drainage: occurs mainly by the external palatine vein, which directs to the pharyngeal plexus and then to the facial vein.

The lymphatic vessels of the palatine tonsil, usually three to five in number, emerge from the pharynx walls, posterior, superior and inferior of the styloglossus muscle and directs posteriorly to the stylohyoideus and posterior belly of digastricus muscle, reaching the deeper cervical lymphnodes, mostly the jugularis-digastricus lymphnode (ROUVIÈRE, 1981; ANDRADE and JÁCOMO, 2007) (Figure 1d). Another and smaller lymphatic vessels follow the ascending palatine artery until its origin in the facial artery, in a deeper cervical lymphnode, together the origin of facial artery (Figure 1c).

3.4 Lingual tonsil

The mucosa of the dorsum of the tongue, posterior to the foramen cecum and the sulcus terminalis is rough and freely mobile over the nearby parts. It has numerous lymph follicles which form the lingual tonsil (MOORE and DALLEY, 2007) (Figure 1a).

Each lymph follicle forms a rounded salience which center has a perforated small orifice that leads into a cavity or recess. Around this cavity lots of nodules of lymphoid tissue are grouped.

3.4.1 Vascularization

The arterial vascularization arises from lingual artery, branch of the external carotid.

The lymphatic drainage: in this region, the embryology knowledge of the development of the tongue is very important, because the anterior two thirds and the posterior third differ, not only in the development, but also in the lymphatic drainage.

So, in the tongue, it has a submucous net or a lymphatic vessel plexus, where the lymph of the posterior third drains to the deeper cervical lymphnodes, located nearby the posterior digastric belly, for the Jugularis digastricus (Figure 1d) lymphnode of the same side and the opposite side and also drains to the deeper cervical lymphnodes, located inferiorly, called jugularis-omohyoideus lymphnode (ANDRADE and JÁCOMO, 2007) (Figure 1d).

4 Conclusion

The pharyngeal lymphatic ring has an important clinical application. General practitioners and specialists must know these structures in order to think about differential diagnosis and apply the adequate treatment for the particular patient, surgical or not (JÁCOMO, 2009).

If surgery is needed, specifically for cancer, knowledge of the patterns of lymphatic drainage and the vascular pedicles are very important in order to proceed the complete surgery (JÁCOMO and RODRIGUES Jr., 1995).

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