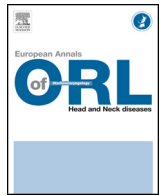




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Technical note

## Thyroglossal duct surgery. Sistrunk procedure



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### ARTICLE INFO

#### Keywords:

Thyroglossal duct  
 Surgery  
 Sistrunk procedure

### ABSTRACT

Midline cysts of the neck are the most common congenital malformations of the neck. They arise along the thyroglossal duct. The presence of a fistula is the result of either spontaneous (suppuration) or surgical fistulisation (simple incision or incomplete excision). The cyst and/or fistula are located between the base of the tongue and the thyroid gland, predominantly adjacent to the hyoid bone. This midline site can be explained by embryological development of the thyroid gland. Treatment is surgical. Many techniques have been described, but Sistrunk procedure (described in 1920), based on embryological studies, remains the reference technique with a recurrence rate of less than 3%, provided surgery is performed correctly, comprising resection of the body of the hyoid. Risk factors for recurrence are: surgery during the inflammatory phase, cyst rupture during dissection, multiple thyroglossal ducts and a technical error during the surgical procedure.

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## 1. Introduction

Midline cysts of the neck are the most common congenital malformations of the neck [1]. They arise along the thyroglossal duct and can be diagnosed at any age, ranging from neonatal forms to forms diagnosed after the age of 80. However, the majority of cysts are diagnosed during the first decade of life [2]. The presence of a fistula is the result of either spontaneous (suppuration) or surgical fistulisation (simple incision or incomplete excision). Clinical examination demonstrates a midline mass and/or fistula in the neck, which is mobile with swallowing and protraction of the tongue. The cyst and/or fistula are situated between the base of the tongue and the thyroid gland, predominantly adjacent to the hyoid bone. This midline position in the neck can be explained by embryological development of the thyroid gland. Treatment is surgical. Several techniques have been described, but the technique described by Sistrunk in 1920 [3] remains the reference technique with a recurrence rate less than 3%, provided the surgical procedure is performed correctly.

## 2. Prerequisites

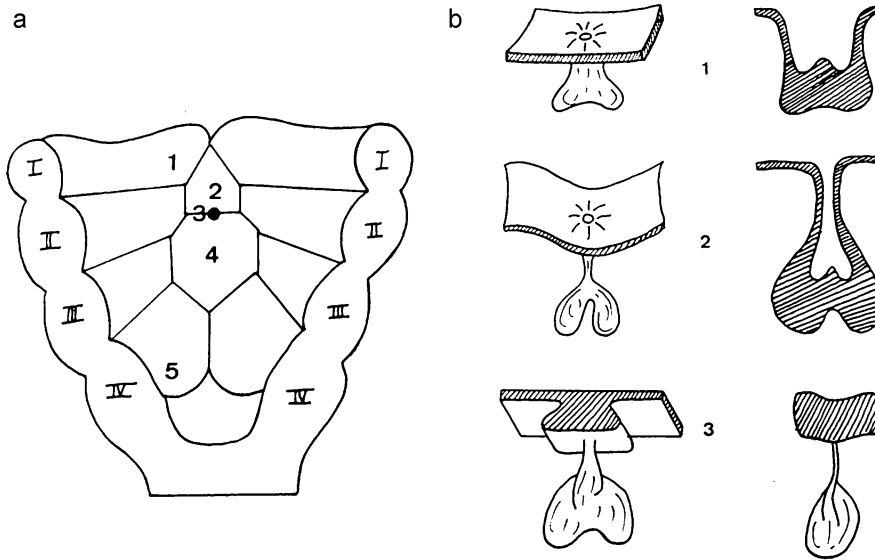
A brief review of histology and embryology is necessary to clearly understand the principles of surgical resection of the thyroglossal duct.

### 2.1. Embryology

The primordial thyroid (lingual thyroid) arises on the 17th day of embryonic life as a proliferation of undifferentiated epithelial cells in the midline of the floor of the pharynx between the tuberculum impar anteriorly and the copula posteriorly, subsequently corresponding to the foramen caecum (Fig. 1a). This endodermal structure gives rise to cords of cells that gradually form a cavity. This formation migrates caudally, descending into the underlying mesoblast in the form of a unilobed or bilobed diverticulum, which remains connected to the floor of the pharynx [4] (Fig. 1b). This diverticulum (thyroglossal duct) then extends to the anterior surface of the trachea (6th week), where it develops and spreads to form two laterotracheal lobes, giving rise to the final thyroid gland (7th week) [2]. During this migration, the thyroglossal duct is situated posteriorly to the first pharyngeal arch and passes anteriorly to the following elements of the 2nd and 3rd pharyngeal arches: hyoid bone, thyroid membrane and thyroid cartilage. Subsequently, due to growth and anterior rotation of the hyoid bone, part of the duct is drawn posteriorly to the deep surface of the body of the hyoid bone

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**Fig. 1.** Development of the thyroglossal duct. a: mesobranchial area of His – 3rd week; (1) lateral swelling; (2) tuberculum impar; (3) foramen caecum; (4) copula; (5) arytenoid; b: steps of thyroid migration; (1) 24 days of embryonic life; (2) 25th day; (3) 30th day.

(Fig. 2a). During this rotation process, the hyoid bone exerts pressure on the thyroglossal duct that can result in segmentation of the duct, which also explains the variable courses of the thyroglossal duct to reach its final destination:

- prehyoid;
- transhyoid;
- retrohyoid [4] (Fig. 2a).

In the majority of cases, involution of the thyroglossal duct starts at the 5th week of gestation and the duct completely disappears at the 4th month of gestation, leaving only a mucosal depression in the foramen caecum and a thyroid formation (pyramidal lobe of thyroid gland) at the superior edge of the isthmus (10 to 25% of cases). The thyroid tissue of the pyramidal lobe constitutes part of the thyroid gland. Only the suspensory ligament that sometimes connects the pyramidal lobe to the hyoid bone can be considered to be a vestigial element of the thyroglossal duct.

2.2. Pathology

Varying degrees of defective involution of the thyroglossal duct can be observed. Two types of vestigial structures are distinguished: thyroglossal duct and thyroglossal cyst.

2.2.1. Thyroglossal duct

It can present in 3 different ways: true duct or a fibrous cord connecting the pyramidal lobe to the hyoid bone, or separate islands. The course of the duct comprises two segments: suprahyoid and infrahyoid and the duct is firmly attached to the periosteum of the hyoid bone in every case.

2.2.2. Thyroglossal cysts

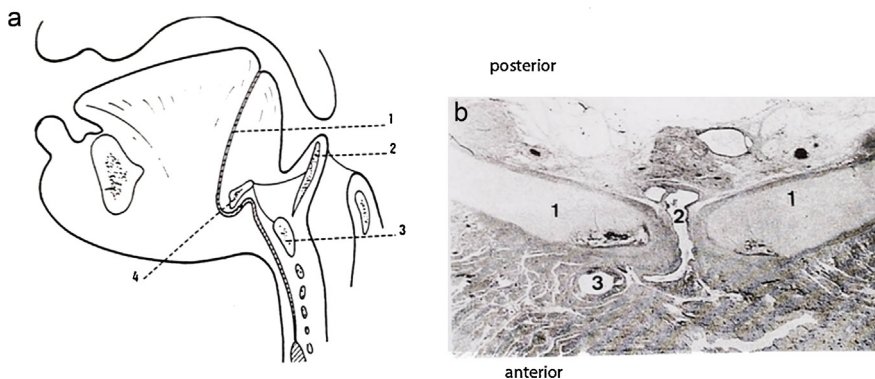
Thyroglossal cysts may be either isolated or associated with a patent duct or a fibrous cord. They are usually solitary, unilocular, round or oval-shaped with a vertical long axis. The cyst wall is smooth and clearly demarcated with respect to peripheral tissues except in the presence of infection.

3. Surgical technique

The reference surgical technique for thyroglossal duct is Sistrunk procedure [3], based on the embryological studies conducted by Wenglowski, and comprises resection of the body of the hyoid bone.

3.1. Patient positioning

The patient is placed in the supine position with a pillow under the shoulders and the head resting on a rubber headrest. The



**Fig. 2.** Thyroglossal duct. a: anatomical relations of the thyroglossal duct; (1) duct; (2) epiglottis; (3) thyroid cartilage; (4) hyoid bone; b: intrahyoid course of the thyroglossal duct, histological section; (1) hyoid bone; (2) duct; (3) superior pole of the cyst.

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