

The surgical management of thyroglossal duct remnants (TGDRs) requires an understanding of the embryology of the thyroid gland, as failure to include the embryological course of the thyroid gland in the surgical resection increases the probability of recurrence.

Relevant Embryology

The thyroid gland originates in the base of the tongue at the foramen caecum. In early embryonic life the base of the tongue is adjacent to the pericardial sac. As the embryo unfolds, TGDRs may remain anywhere between the pericardial sac and the foramen caecum. A persistent thyroglossal duct courses through the base of the tongue from the foramen caecum. It then passes inferiorly, anterior to, and rarely through, the hyoid body, and often has a diverticulum that hooks below and behind the hyoid before it courses towards a thyroglossal duct cyst or the thyroid gland (*Figure 1*).

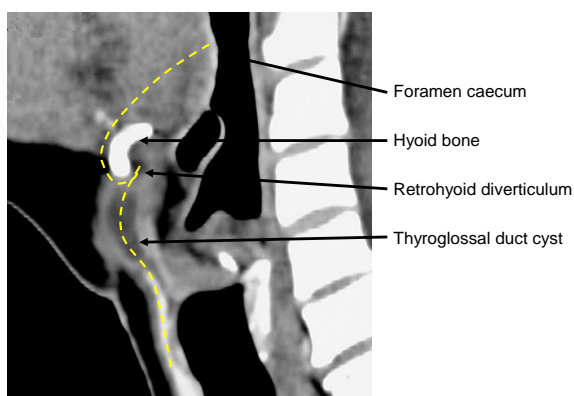


Figure 1: Typical course of thyroglossal duct remnants (yellow line)

The suprahyoid ductal segment may have a branching pattern like the tips of a broom (*Figure 2*). These multiple ductules communicate with secretory glands in the base of the tongue and might drain directly into the mouth.¹

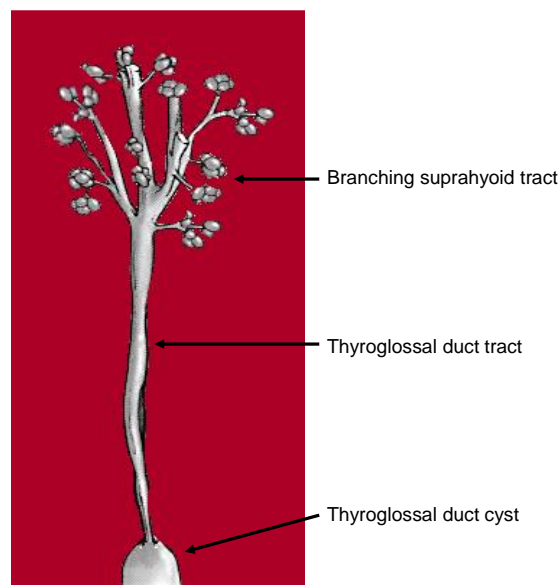


Figure 2: Schematic representation of the suprahyoid duct branching within the muscle of the base of tongue

Clinical presentation

TGDRs may present at any age as a cyst (*Figure 3, 4*), abscess, sinus, fistula, or tumour, anywhere along the embryological course of the thyroid gland.



Figure 3: Thyroglossal duct cyst in thyrohyoid region

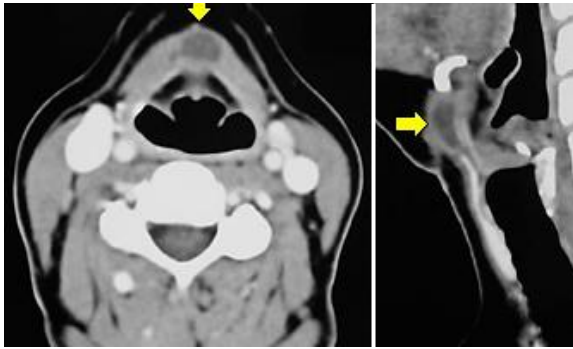


Figure 4: Thyroglossal duct cyst in thyrohyoid region

Patients classically present with a mobile, painless mass in the midline of the neck in proximity of the hyoid bone. Occasionally a cyst may be off the midline (*Figures 5, 10*).



Figure 5: Thyroglossal duct cyst to left of midline overlying lamina of thyroid cartilage

Figure 6 illustrates the distribution of thyroglossal duct cysts.¹

A cyst generally moves upward during deglutition or protrusion of the tongue because of its close anatomical relation to the hyoid bone. This is considered a reliable diagnostic sign as it distinguishes it from other midline neck masses such as a lymph node or a dermoid cyst (*Figure 7*).



| | |
|---------------|--------|
| Lingual: | 2% |
| Suprahyoid: | 24% |
| Thyrohyoid: | 61% |
| Suprasternal: | 13% |
| Mediastinal: | Rarely |

Figure 6: Distribution of thyroglossal duct cysts

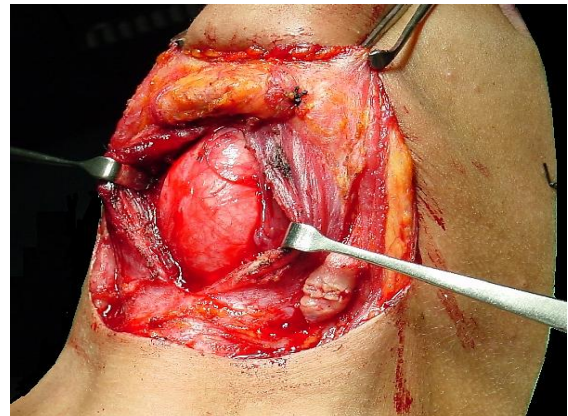


Figure 7: Dermoid cyst

A lingual thyroid usually presents as a mass in the base of the tongue (*Figures 8, 9*); this may be the patient's only thyroid tissue in most cases.



Figure 8: Lingual thyroid



Figure 9: CT scan of lingual thyroid

Preoperative evaluation

The principal issues to determine prior to surgery are:

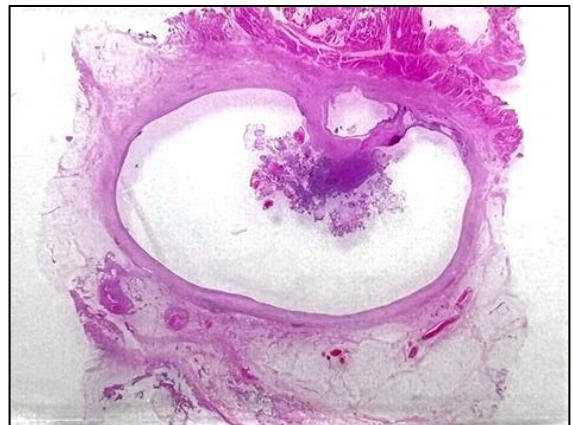
Is it a TGDR? Unlike other midline masses, only TGDRs are treated with a Sistrunk operation. Therefore, it is important to exclude other causes of midline masses prior to surgery such as dermoid cysts and lymph nodes.

Is it the patient's only thyroid tissue? Occasionally a TGDR comprises the only functioning thyroid tissue, and its removal results in hypothyroidism. Ultrasound examination to establish the presence of normal thyroid tissue is a simple investigation. Should imaging not be possible, the surgeon should explore the neck to determine the presence of a normal thyroid gland.

Is the patient hypothyroid? Most patients with lingual thyroids are hypothyroid. Therefore, patients with lingual thyroids have a TSH level determined prior to surgery.

Does the TGDR contain thyroid cancer? Thyroid cancer occurs in only about 1% of operated TGDRs. A solid component and/or calcification on ultrasound examination should raise the possibility of carcinoma,

most commonly papillary. However, even if the diagnosis of thyroid cancer is suspected it does not alter the type of surgery (Sistrunk operation), and the thyroid gland is managed on its own merits ².



Figures 10a,b: Papillary carcinoma in wall of thyroglossal duct cyst

Surgical principles

- It is imperative to achieve a complete resection of the TGDR and its embryonic tract to avoid symptomatic recurrence
- A thyroglossal cyst abscess should initially be aspirated and treated with antibiotics, not incised and drained, to facilitate complete resection once the infection has settled

Sistrunk operation

The Sistrunk operation is the standard of care for TGDRs. It includes resection of the entire embryological tract *i.e.* the thyroglossal duct cyst, the central portion of the body of the hyoid bone, and a broad ($\geq 1\text{cm}$) core of suprahyoid muscle extending up to / close to the foramen caecum.

The following description is for a cyst in the thyrohyoid region

- Make an incision in a skin crease over the cyst. Note that the platysma muscle may be absent in the midline, so take care not to puncture the cyst (*Figure 11*)
- Raise superior and inferior flaps in subplatysmal planes. The superior flap should be raised to approximately 2cms above the body of the hyoid bone
- Identify the infrahyoid strap muscles that are stretched over the superficial aspect of the cyst
- Divide the cervical fascia vertically in the midline, separate the infrahyoid strap muscles, and expose the cyst (*Figure 12*)
- Divide the mylohyoid and geniohyoid muscles with diathermy just above the body of the hyoid bone remaining between the lesser cornua of the hyoid so as not to place the hypoglossal nerves or lingual arteries at risk of injury (*Figure 13*)



Figure 11: Initial skin crease incision

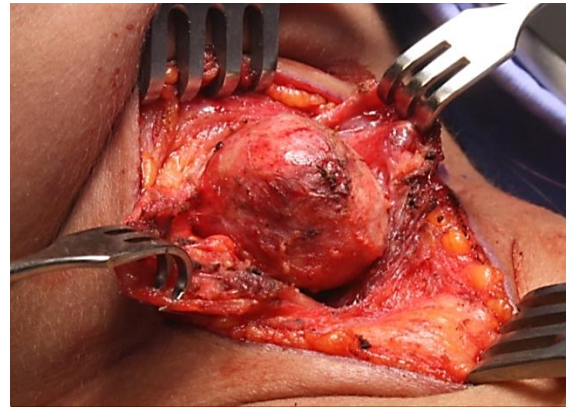


Figure 12: Expose and part infrahyoid strap muscles overlying cyst

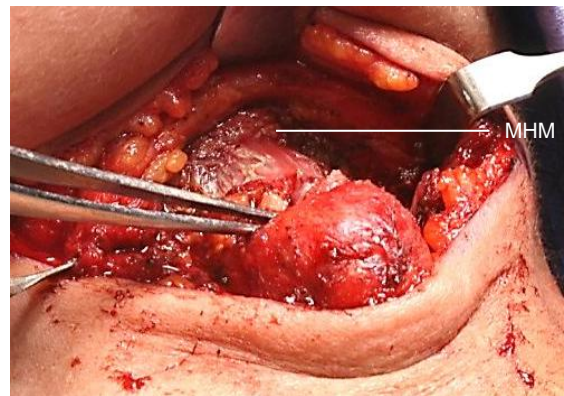


Figure 13: Divide mylohyoid (MHM) and geniohyoid muscles just above body of hyoid bone

- Divide the inferior attachments of the thyroglossal duct cyst, and mobilise the deep aspect of the cyst from the thyrohyoid membrane up to the hyoid bone with sharp dissection (*Figure 14*)

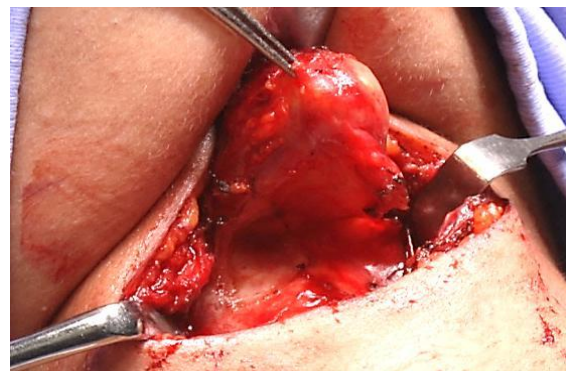


Figure 14: Mobilise deep aspect of cyst from thyroid cartilage and thyrohyoid membrane

- Expose the hyoid bone on either side of the cyst (*Figure 15*)
- Divide the hyoid bone about 1cm to each side of the midline with heavy scissors (children) or a bone cutter (*Figures 16, 17*)

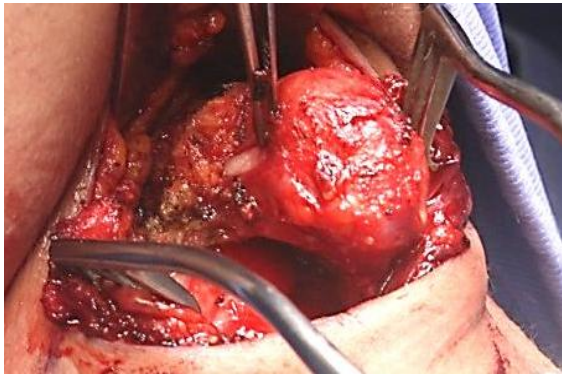


Figure 15: Expose hyoid bone on either side of cyst

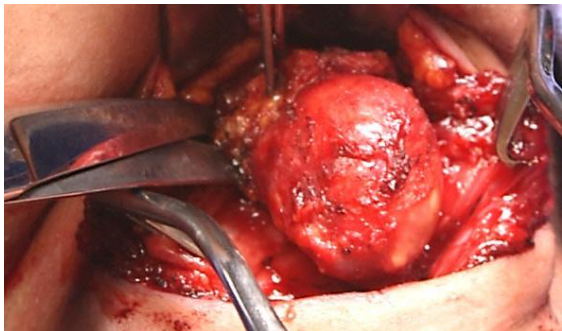


Figure 16: Dividing hyoid bone

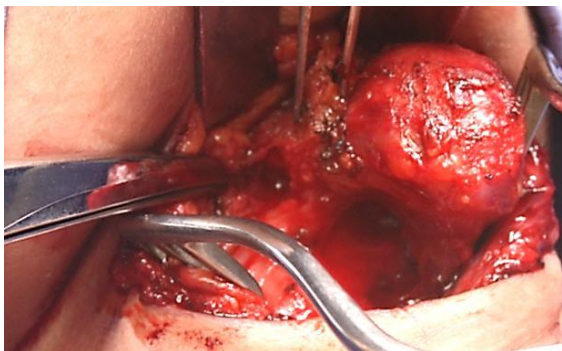


Figure 17: Divided hyoid bone

- Next resect the suprahyoid thyroglossal duct. Do not attempt to identify the thyroglossal duct, as branches of the

duct may be transected in the process, increasing the likelihood of recurrence

- Using monopolar diathermy to resect a 2cm wide core of tongue tissue (hyoglossus) in continuity with the remainder of the operative specimen, including the hyoid bone, directed at an angle of approximately 45° in the sagittal (vertical) plane towards the foramen caecum (*Figures 18, 19, 20*)



Figure 18: Resect a 2cm wide core of tongue (hyoglossus) tissue



Figure 19: Superimposed image (yellow) illustrates direction of suprahyoid dissection and extent of final resection; note proximity of vallecula to hyoid

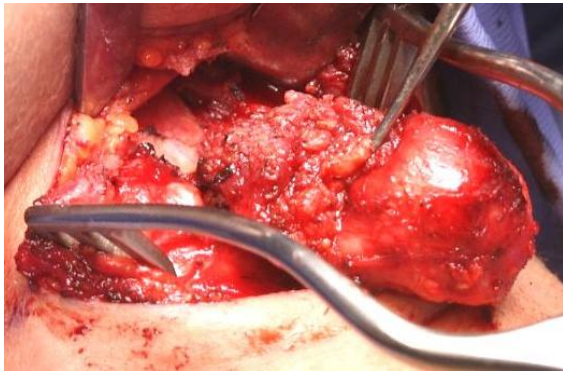


Figure 20: Core of tongue (hyoglossus) tissue extending up to just short of foramen caecum

- If in doubt about the required direction, place a finger in the mouth and on the foramen caecum as a guide. It is remarkable how much base of tongue tissue can be resected without interfering with speech or swallowing. Note the proximity of the hyoid bone to the vallecula. Should the vallecula or base of tongue be accidentally entered, simply close the defect with Vicryl sutures from the neck side
- The tongue defect (*Figure 21*) is then partially obliterated with Vicryl sutures. The two cut ends of the hyoid are not approximated but left floating free

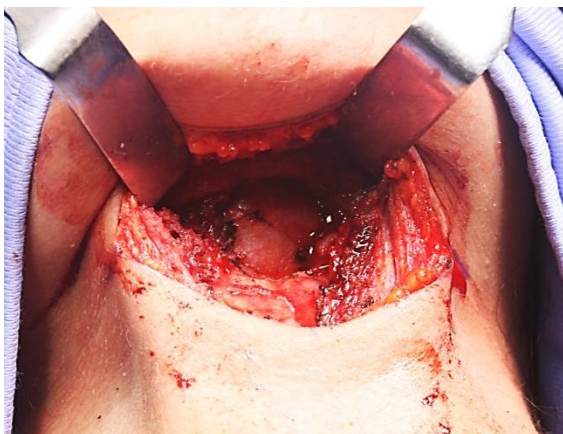


Figure 21: Final defect in base of tongue up to just short of foramen caecum with free floating cut ends of hyoid bone



Figure 22: Resected specimen

- The supra- and infrahyoid muscles are approximated in a transverse plane, as is the platysma muscle, and the skin is closed over a drain
- Antibiotics are not required unless the oral cavity has been entered

Recurrent TGDR

Managing recurrent TGDR becomes challenging because cysts may be multifocal with the presence of fibrosis, distorted surgical landmarks and possible absence of hyoid bone. It is important to obtain an accurate description of the original surgery to determine whether the hyoid bone and suprahyoid tissues had been resected. An MRI scan should be done to serve as a roadmap for the surgeon to find residual TGDRs (*Figure 23*).

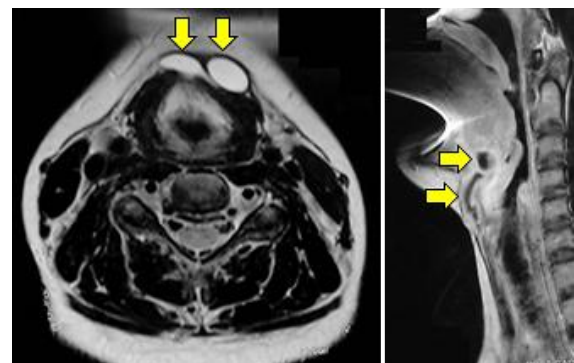


Figure 23: MRI of recurrence demonstrating multiple cysts

References

1. Mondin V, Ferlito A, Muzzi E, Silver CE, Fagan JJ, Devaney KO, Rinaldo A. Thyroglossal duct cyst: Personal experience and literature review. *Auris Nasus Larynx* 35 (2008) 11–25
2. Zizic M, Faquin W, Stephen AE, et al. Upper neck papillary thyroid cancer (UPTC): A new proposed term for the composite of thyroglossal duct cyst-associated papillary thyroid cancer, pyramidal lobe papillary thyroid cancer, and Delphian node papillary thyroid cancer metastasis. *Laryngoscope*. 2016 Jul;126(7):1709-14

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