Nusantara Medical Science Journal
Volume 10, Issue 1, January – June 2025
P-ISSN: 2460-9757, E-ISSN: 2597-7288
Nationally Accredited Journal, Decree No. 230/E/KPT/2022.

Case Report

Thyroglossal Duct Cyst: Clinical Insights from a Case Report

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ARTICLE INFO

Keywords:
Thyroglossal duct cyst, midline neck mass, Sistrunk procedure, recurrence prevention
How to cite:

DOI:

ABSTRACT

Introduction and importance:
A thyroglossal duct cyst (TGDC) is the most common congenital midline neck mass, resulting from the persistence of the thyroglossal duct during thyroid gland descent
Presentation of case:
A 46-year-old male presented with a slowly enlarging, painless midline neck mass for ten years. The lesion moved with tongue protrusion and swallowing. Ultrasonography revealed a well-defined, cystic midline lesion superior to the thyroid cartilage with minimal vascularity. Fine-needle aspiration yielded benign cytology. The patient underwent complete excision via the Sistrunk procedure. Histopathology confirmed a benign TGDC lined by ciliated respiratory and stratified squamous epithelium, with thyroid follicular elements. Recovery was uneventful, and no recurrence occurred on follow-up.
Discussion:
The Sistrunk procedure remains the gold-standard surgical management for TGDC, markedly reducing recurrence compared to simple excision. Comprehensive preoperative imaging is essential to confirm normal thyroid location and rule out ectopic thyroid tissue. Surgical precision in removing the central hyoid bone and entire tract is critical to minimize recurrence risk.
Conclusions:

TGDC should be suspected in any midline neck mass that moves with swallowing or tongue protrusion. The Sistrunk procedure offers excellent outcomes with low recurrence when performed meticulously.

1. INTRODUCTION

A thyroglossal duct cyst (TGDC) is the most common congenital neck mass, arising from incomplete involution of the thyroglossal duct — an embryological tract connecting the foramen cecum of the tongue to the thyroid gland's final pretracheal position.(1) In general, this duct will then undergo obliteration. If obliteration does not occur, TGDC formation may occur somewhere along the pathway from the foramen caecum to the thyroid isthmus.(2,3) In children, approximately 70-75% of masses located on the anterior midline of the neck are TGDC. TGDCs may persist undetected until adulthood, representing approximately 7% of midline neck masses in adults.(4)

Clinically, a TGDC manifests as a painless, smooth, and mobile mass in the anterior midline of the neck that moves vertically with tongue protrusion and swallowing — a pathognomonic feature resulting from its attachment to the tract that passes through or around the hyoid bone.(2–4) While usually benign, recurrent infections or rare malignant transformation (<1%) may occur.(2) The Sistrunk procedure, introduced in 1920, involves en bloc excision of the cyst, tract, and central portion of the hyoid bone, achieving recurrence rates below 10% compared to 45–55% after simple excision.(5)

This report describes the management of a TGDC in an adult patient, emphasizing surgical technique, diagnostic evaluation, and the importance of complete tract removal to prevent recurrence.

2. CASE PRESENTATION

A 46-year-old man presented with a progressively enlarging lump at the anterior midline of his neck, first noticed approximately ten years earlier. The mass had grown gradually without pain, discharge, or signs of infection. There were no symptoms of dysphagia, odynophagia, or hoarseness. He denied systemic symptoms such as weight loss, fever, or thyrotoxic complaints.

Physical examination: The patient was healthy, afebrile, and clinically euthyroid. A well-circumscribed, round, soft, non-tender, and mobile cystic mass measuring approximately 3.5 × 3.3 cm was palpated just above the thyroid cartilage. The swelling moved upward with tongue protrusion and swallowing. Overlying skin was normal, and there was no cervical lymphadenopathy (Figure 1).

Investigations: Routine hematologic and thyroid function tests were normal (FT4: 0.96 ng/dl; TSH: 0.67 mIU/ml). Ultrasonography revealed a well-defined, isoechoic cystic lesion (3.1 × 3.5 cm) at the infrahyoid midline with smooth margins and minimal vascularity on color Doppler (Figures 2a and 2b). Both thyroid lobes appeared normal with no evidence of ectopic tissue. Fine-needle aspiration cytology (FNAC) yielded thick yellow fluid containing lymphocytes, macrophages, and squamous cells — consistent with a benign cystic lesion.

Surgical management: The patient underwent surgery under general anesthesia with endotracheal intubation and was positioned supine with the neck in mild extension. Perioperative antibiotic prophylaxis with intravenous ceftriaxone (1 g) was administered at induction (60 minutes before incision). A 5-cm transverse collar incision was made along a natural skin crease just superior to the cyst. Dissection was carried through the platysma and superficial cervical fascia to expose the cyst, which was carefully mobilized to avoid rupture. The infrahyoid muscles were divided in the midline, and the central segment of the hyoid bone (approximately 1.5 cm) was identified and excised en bloc along with the cyst and its tract. Dissection was continued cranially along the tract to the base of the tongue (Figure 3). The duct was ligated with 2-0 silk suture and divided near the foramen cecum. Hemostasis was meticulously secured, and a suction drain was placed. The cervical fascia and subcutaneous tissue were closed with 3-0 polyglactin 910 sutures, and the skin was approximated using 4-0 polypropylene sutures. The procedure was completed without intraoperative complications, and the cyst and tract were sent for histopathological examination.

Postoperative course: The patient had an uneventful postoperative recovery. He was monitored for airway compromise and wound drainage, receiving intravenous antibiotics and analgesics for 24 hours, followed by oral regimen. The suction drain produced minimal output and was removed after 48 hours. He was discharged on the second postoperative day in stable condition with advice on wound care and activity limitation. At the one-week review, the surgical site was clean and well-approximated with no signs of infection, hematoma, or seroma formation. Sutures were removed on the tenth postoperative day. At one month, the incision had healed completely with no discomfort, dysphagia, or tongue mobility restriction, and the cosmetic result was satisfactory. Subsequent follow-ups at three and six months demonstrated a well-healed scar and no clinical or ultrasonographic evidence of recurrence or residual cystic component. The patient remained asymptomatic, with no dysphonia, dysphagia, or neck swelling, and expressed satisfaction with both the functional and aesthetic outcomes.

Histopathology: The excised specimen consisted of a cystic lesion measuring 3.5 × 3 × 1.5 cm. Microscopic examination revealed a cyst wall partially lined by stratified squamous and ciliated columnar epithelium, with interspersed thyroid follicles in the fibrous stroma and lymphocytic infiltration — findings diagnostic of a benign TGDC.

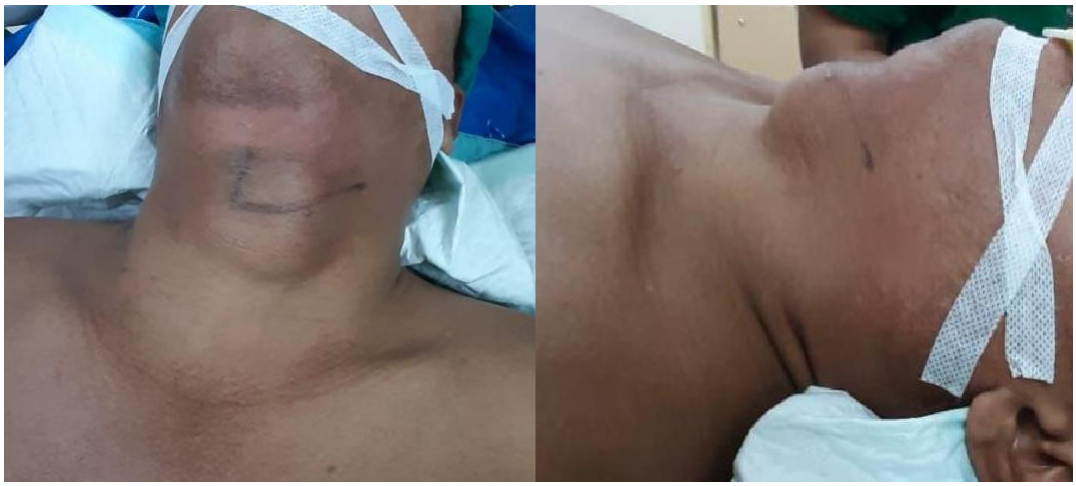
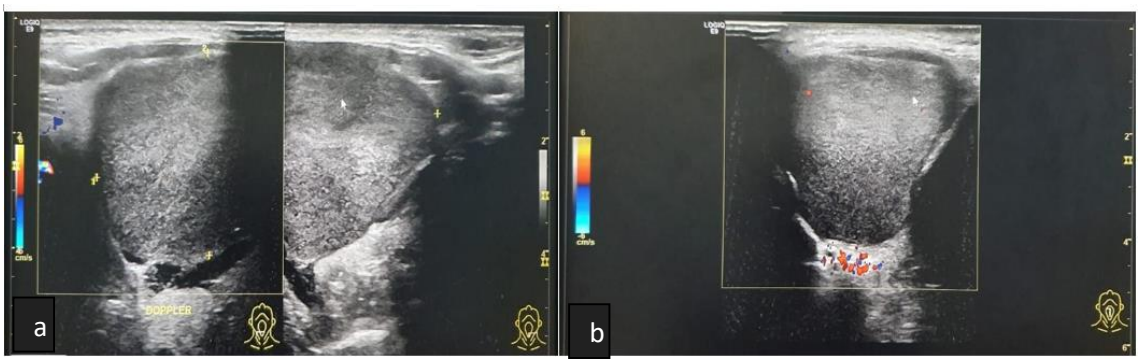


Figure 1. Localized status of the mass in the anterior midline of the neck (anterior and lateral views)

Figure 2a. Ultrasound image of the neck mass (axial view), 2b. Ultrasound image of the mass in the neck (sagittal section) with minimal vascularization



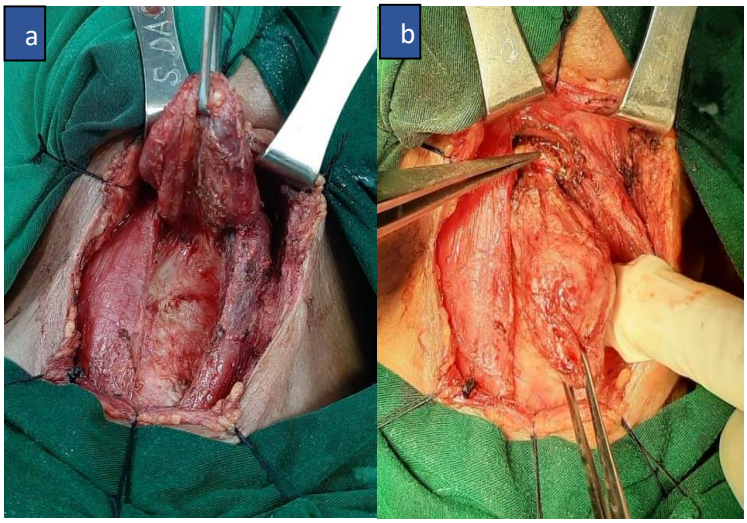


Figure 3a. Intraoperative assessment of the cystic mass, b. Tracing of the TGDC to the proximal end of the hyoid

3. DISCUSSION

A thyroglossal duct cyst (TGDC) is a congenital midline cervical anomaly that arises from the persistence of the thyroglossal duct. This duct is an embryological structure that extends from the foramen cecum at the base of the tongue to the superior aspect of the thyroid gland, anterior to the trachea. Failure of complete involution during development can result in cystic formation anywhere along this tract, most commonly in the infrahyoid region.(6,7)

TGDC are more commonly observed in children, although they may present at any age. While the majority of cases are diagnosed before the age of 5 years, up to 60% of cases are identified in individuals younger than 20 years.(8,9) About 7% of thyroglossal duct cyst cases are found in adults.(9) TGDC are estimated to occur in

approximately 7% of the global population and exhibit an equal prevalence among males and females. These cysts are closely associated with the hyoid bone along the tract of the thyroglossal duct. Anatomically, about 20–25% of cysts are located at the suprahyoid level, 15–20% at the level of the hyoid bone, and 25–65% at the infrahyoid level.(10,11)

A thyroglossal duct cyst (TGDC) is a congenital midline neck anomaly resulting from incomplete obliteration of the thyroglossal duct, which extends from the foramen cecum at the tongue base to the thyroid gland. Tongue development begins in the fourth week of embryogenesis, with the first three pharyngeal arches contributing to its formation. The first arch forms the anterior two-thirds of the tongue, while portions of the second and third arches contribute to the tongue base, foramen cecum, and proximal thyroglossal duct.(12)

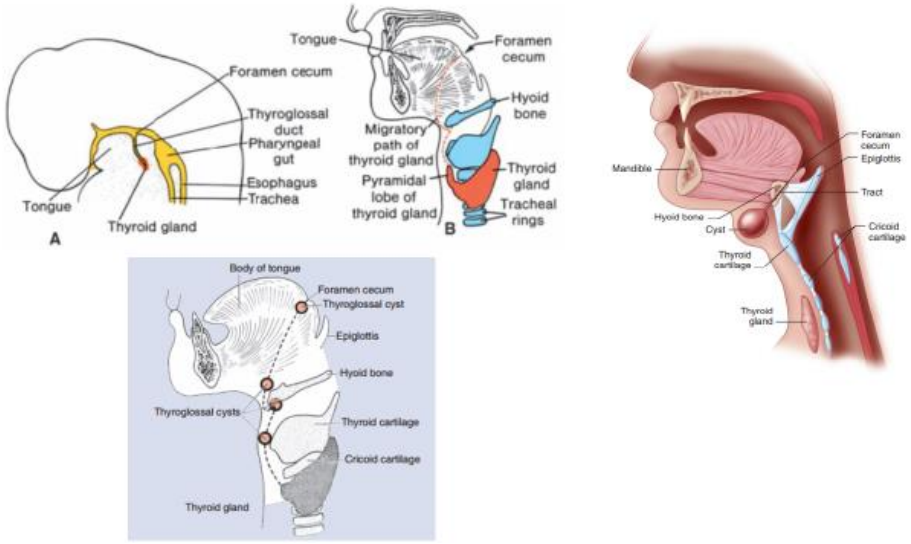


Figure 4.Embryology and anatomy of thyroglossal duct cyst formation(13)

The thyroid gland develops from the invagination of endodermal cells at the ventral base of the primitive pharynx, between the copula and tuberculum impar. The thyroid primordium arises at the foramen cecum, located at the junction of the anterior two-thirds and posterior third of the tongue, and begins its descent through the anterior neck. During this migration, the developing gland passes anterior to the hyoid bone, ultimately reaching its final position in the inferior pre-tracheal neck by the seventh to eighth week of gestation.(14)

During its descent, the thyroid gland leaves an epithelial tract known as the thyroglossal duct. By the end of the seventh week of gestation, the thyroid reaches its definitive position anterior to the upper trachea. The smaller lateral thyroid component, which gives rise to parafollicular C cells, originates from the ventral portion of the fourth pharyngeal pouch and fuses with the posterior surface of the thyroid by the fifth week of gestation.(12)

The thyroglossal duct is a narrow tubular structure remaining from thyroid descent, connecting the thyroid gland to the foramen cecum. In approximately 50% of individuals, the distal portion of the duct persists as the pyramidal lobe of the thyroid gland.(7) The thyroglossal duct normally undergoes involution by the 10th

week of gestation. If any part of the duct remains, secretions from the epithelial lining can lead to inflammation and cyst formation of the thyroglossal duct.(15)

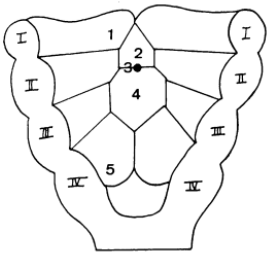


Figure 5. Development of the thyroglossal duct: Mesobranchial area of His at 3 weeks gestation: (1) lateral swelling, (2) impar tubercle, (3) foramen Caecum, (4) copula, (5) arytenoid. [5]

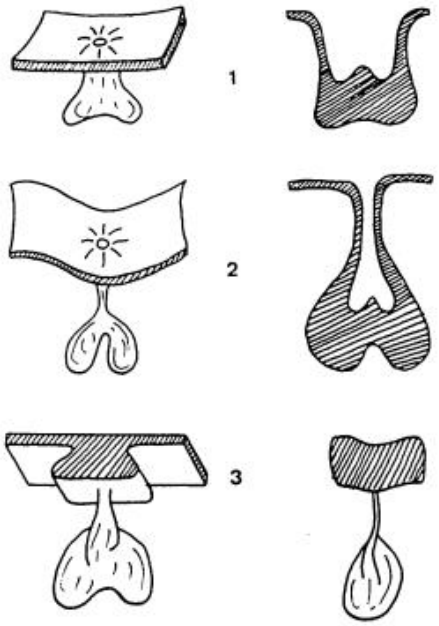


Figure 6.Stage of thyroid gland displacement: (1) day 24 of embryonic life, (2) day 25, (3) day 30 (6)

A thyroglossal duct cyst (TGDC) usually presents as a midline neck mass near or just below the hyoid bone. Most are asymptomatic, but infection can cause abscesses or draining sinuses. The mass typically moves upward with tongue protrusion or swallowing due to its attachment to the thyroglossal duct tract.(7)

A 47-year-old man presented with a slowly enlarging midline neck mass that had been present for approximately 10 years, representing a rare late-onset presentation of a thyroglossal duct cyst (TGDC), which is typically diagnosed in childhood or adolescence. The patient reported that the mass moved with tongue protrusion, a classical feature of TGDCs. On examination, a well-circumscribed, cystic mass measuring 3.5 × 3.3 cm was

observed superior to the thyroid cartilage. The lesion was mobile, non-tender, and similar in color to the surrounding skin, with characteristic upward movement on tongue protrusion and swallowing.

This case is notable for the late presentation in adulthood—most TGDCs are diagnosed in childhood or adolescence. For example, a recent systematic review (n = 47) found that 63.8% of cases occurred in children ≤10 years and only 4.3% in the 41-50 year age group.(16) Another series comparing children and adults (n = 102) reported a mean age of 20.2 ± 15.6 years and demonstrated larger cysts and longer operative times in adult patients (median size 30 mm in adults vs 22 mm in children; p = 0.005).(17)

In our patient, the 10-year duration and size of approximately 35 mm highlight the potential for indolent growth in adults. The lesion's characteristic upward displacement with tongue protrusion underscores the classical tract-attachment phenomenon, which although described in the pediatric literature, remains less frequently emphasized in adult-onset cases. The prolonged course without infection or fistula formation in this adult patient highlights the need to consider thyroglossal duct cysts in the differential diagnosis of midline anterior neck masses, regardless of age.

Imaging studies are essential for the diagnosis of thyroglossal duct cysts and for the assessment of functional thyroid tissue. In the absence of normal thyroid tissue in the lower neck, lifelong postoperative thyroid hormone replacement therapy is required. Ultrasound represents an ideal first-line imaging modality due to its accessibility, non-invasiveness, and ability to delineate cystic structures and thyroid tissue.(18) Ultrasound is widely available, cost-effective, non-invasive, and free of ionizing radiation or sedation requirements. In adults, ultrasound differentiates midline neck cysts: TGDCs typically attach to the hyoid, are intramuscular, multilocular, and show heterogeneous echogenicity, whereas dermoids are superficial, well-defined, and echogenic. Cystic metastatic nodes or ectopic thyroid present with suspicious lymph nodes or thyroid nodules. While CT and MRI can be used to assess thyroglossal duct cysts and thyroid tissue, ultrasonography is typically sufficient. Routine preoperative thyroid function testing is recommended to detect the presence of ectopic thyroid tissue.(7) This algorithmic assessment guides diagnostic reasoning, preoperative planning, and surgical strategy.

The differential diagnosis of thyroglossal duct cysts includes midline cystic neck masses such as cystic metastatic lymph nodes, dermoid or epidermoid cysts, and second branchial cleft cysts. Thyroglossal duct cysts are distinguished by their close relationship to the hyoid bone, moving with tongue protrusion and swallowing, whereas second branchial cleft cysts are typically more lateral and unrelated to the hyoid. Cystic metastatic nodes usually originate from papillary thyroid carcinoma or upper aerodigestive tract squamous cell carcinoma.(9)

The histologic diagnosis of a thyroglossal duct cyst is based on the finding of respiratory tract epithelium (pseudostratified ciliated columnar) and/or squamous epithelium associated with the thyroglossal duct or thyroid follicles in the surrounding stroma.(12) Histopathological examination in the present case

revealed a cyst wall lined by both ciliated respiratory (pseudostratified) epithelium and stratified squamous epithelium with atypical nuclei, with adjacent thyroid follicular structures lined by cuboidal epithelium and containing colloid.(7) These findings are consistent with recent institutional series of Thyroglossal duct cyst (TGDC) demonstrating lining by squamous or pseudostratified ciliated columnar epithelium and frequent presence of ectopic thyroid tissue within the duct wall.(19)

The moderately dense lymphocytic inflammatory infiltrate noted in our specimen also parallels the high frequency of sub-epithelial inflammation in TGDC (87 % in one large series), suggesting prior or subclinical infection of the cyst wall despite the absence of overt clinical signs.(20) Thus, the histological features in this adult case mirror those described in the literature, reinforcing the typical spectrum of TGDC morphology across age groups.

TGDC should be surgically excised to allow definitive diagnosis, prevent recurrent infection and related complications, address cosmetic concerns, and mitigate the rare risk of malignancy. Simple excision carries a high recurrence rate (45–55%), whereas the Sistrunk procedure, which removes the cyst, central hyoid, and tract tissue, remains the gold standard and markedly reduces recurrence.(7)

In this case, the decision was made to perform the gold-standard Sistrunk procedure. First described in 1920, the Sistrunk procedure involves several key steps:

- The patient is positioned supine with a pillow under the shoulders and the head supported on a rubber headrest. The surgical field is prepared by exposing the midline of the neck from the mandibular symphysis to the manubrium sterni.
- A horizontal incision, up to 5 cm in length, is made midway between the superior edge of the thyroid cartilage and the hyoid bone. If a fistula is present, its opening is excised using a wedge-shaped incision. Subcutaneous tissue is dissected to the level of the platysma using Metzenbaum scissors and electrocautery, taking care to avoid cyst rupture, which could lead to incomplete excision and recurrence.(6)
- The midline cervical fascia (fascia cervicalis profunda) is opened, and gentle elevation of the cyst exposes the infrahyoid strap muscles. Dissection proceeds through the linea alba, allowing inferior mobilization down to the thyroid isthmus and identification of the pyramidal lobe, when present.(6)
- The cyst was dissected from surrounding tissues, and the space between the sternohyoid muscle and hyoid bone was developed. The central portion of the hyoid was freed from attachments to the sternohyoid, mylohyoid, and geniohyoid muscles. Dissection proceeded from the pyramidal lobe, if present, to the hyoid, with resection of prelaryngeal connective tissue. Finally, the central 1–1.5 cm of the hyoid bone along with the attached thyroglossal duct was excised.(21)
- The hyoid bone was resected en bloc with the cyst after detaching superior

and inferior muscle attachments and splitting between the minor hyoid cornua. Bleeding was controlled with bipolar cautery. The hyoid and cyst were mobilized with Allis forceps, and the rarely visible thyroglossal duct was dissected along with associated muscle from the hyoid base to the foramen cecum, guided by the Sistrunk maneuver. The duct was ligated before transection.(21)

- Hemostasis was achieved with bipolar coagulation after saline irrigation. The greater hyoid cornua were sutured with resorbable material, and the strap muscles were reapproximated in the midline with interrupted sutures.(6)
- The wound was closed over a suction drain, with skin closure performed using either subcuticular or interrupted monofilament sutures, resorbable or non-resorbable as appropriate.(21)

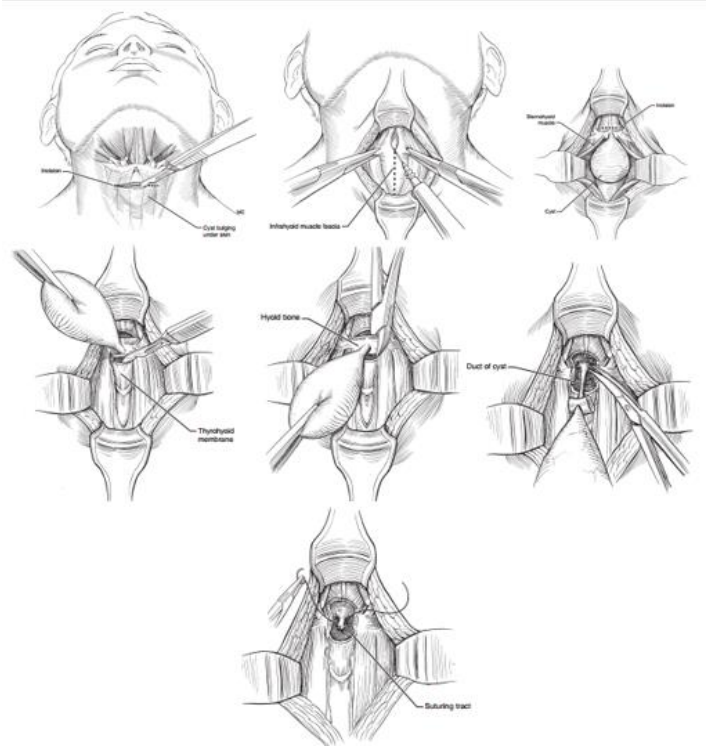


Figure 7. Sistrunk procedure sequence(21)

The Sistrunk procedure should not be performed under conditions of acute infection. The patient should receive systemic antibiotics and removal should be planned after the infection has cleared.(6)

The most common complication of the Sistrunk procedure is recurrence of the thyroglossal duct cyst, which occurs in about 10% of cases. Risk factors contributing to recurrence are incomplete cyst excision, intraoperative cyst rupture, operator inexperience, and presence of infection. In adult TGDC, the principal aim to prevent recurrence is complete excision via a proper Sistrunk procedure—removing the cyst, the central hyoid segment and the ductal tract to the foramen cecum—because incomplete excision markedly increases recurrence (5.3 % with Sistrunk vs 55.6 % with simple excision in one large

series).(22) Key risk factors for recurrence include intraoperative cyst rupture, residual microscopic ductules, and postoperative infection or seroma (postoperative infection adjusted OR ≈11.98; seroma OR ≈5.03).(23) Adults pose additional surgical-precision challenges: longer duration of lesion, potential fibrotic changes from subclinical infection, deeper tract course or branching, and a broader differential diagnosis prompting cautious planning. Surgeons must anticipate possible multiple tracts, maintain meticulous dissection, optimize preoperative imaging, avoid cyst rupture, and ensure hemostatic and anatomical closure to mitigate recurrence.

Laryngotracheal injury is a rare complication and has the potential to cause problems with the airway, swallowing function, and/or voice production.(7) It can be caused by resection performed on the thyroid cartilage due to misidentification. Proper identification of the hyoid bone, thyroid cartilage, and thyrohyoid membrane is essential to prevent this complication during surgery. Hypoglossal nerve injury is also rare, but has been reported after the Sistrunk procedure, resulting in partial paralysis of the tongue. The nervus hypoglossal runs lateral to the musculus hyoglossus and medial to the musculus stylohyoid and the lingual nerve near the lateral part of the hyoid bone. It is important to ensure the hyoid resection is performed on the medial side of the minor hyoid cornu to avoid injury to the nervus hypoglossal.(7)

In our case, the patient experienced an uneventful postoperative recovery. He was discharged on postoperative day 2 in stable condition. At one week, the wound was clean and well-approximated; sutures were removed on day 10. By one month, the incision had healed completely with no discomfort or functional limitation, and cosmetic results were satisfactory. Follow-ups at three and six months demonstrated a well-healed scar, no recurrence, and the patient remained asymptomatic and satisfied with both functional and aesthetic outcomes.

This outcome aligns with recent literature. A retrospective review of 357 patients undergoing the Sistrunk procedure found recurrence in approximately 5 % of cases; patients who developed postoperative infections had a significantly higher risk of recurrence (adjusted OR ~12).(23) Another study of 273 paediatric patients reported wound complication rates of ~12 % (surgical-site infections) and a recurrence rate of 11 %; prior cyst infection increased wound complications.(24)

When performed meticulously without perioperative complications, the Sistrunk procedure reliably achieves early discharge, minimal morbidity, excellent cosmetic outcomes, and low recurrence, as demonstrated in our patient and supported by recent literature.

After the Sistrunk procedure, the patient was instructed to avoid heavy lifting for 2 to 6 weeks. Depending on the size of the thyroglossal duct cyst. The drain tube may be removed within a few days post-surgery. Analgesics or antibiotics are given postoperatively. Patients can usually return to work or school after 1 week postoperatively.[6] Patients in this case are also educated to avoid heavy lifting for 2 weeks to 6 weeks.

4. CONCLUSION

A thyroglossal duct cyst (TGDC) is a congenital anomaly from persistence of the thyroglossal duct, extending from the foramen cecum to the anterior thyroid. It can present at any age and is typically diagnosed clinically and radiologically, with confirmation via intraoperative and histopathological findings. Surgical excision using the Sistrunk procedure is the gold standard, ensuring excellent prognosis and low recurrence. This case is unique for its prolonged, asymptomatic course without infection or fistula formation, highlighting that TGDCs can remain indolent in adults and should be considered in the differential diagnosis of midline neck masses regardless of age.

ETHICAL APPROVAL

Ethical approval was not required for this case report as per institutional policy; however, all procedures were conducted in accordance with the ethical standards of the institution

CONSENT FOR PUBLICATION

Written informed consent was obtained from the patient for the publication of this case report and accompanying images.

ACKNOWLEDGMENTS

The authors would like to thank the surgical team and medical staff involved in the management of this patient, as well as the institution for their support in completing this report.

Conflict of Interest Statement:

This case report was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Conflict of Interest Statement:

The author declares that the case report was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.