



CLINICOPATHOLOGICAL SPECTRUM OF THYROGLOSSAL DUCT CYSTS WITH AN INCIDENTAL PAPILLARY CARCINOMA.

Dr. Nidhi Mohan S¹, Dr. Aravinda Sathya Seelan A P^{2*}, Dr. Srikantha R³.

¹Assistant Professor, Department of ENT, Sri Madhusudan Sai Institute of Medical Sciences and Research, Karnataka, India.

²Assistant Professor, Department of General Surgery, Sri Madhusudan Sai Institute of Medical Sciences and Research, Karnataka, India.

³Assistant Professor, Department of General Surgery, Sri Madhusudan Sai Institute of Medical Sciences and Research, Karnataka, India.



Correspondence:

Dr. Aravinda Sathya Seelan A P.

Assistant Professor, Department of General Surgery, Sri Madhusudan Sai Institute of Medical Sciences and Research, Karnataka, India.

Received: 03-02-2026

Revised: 21-02-2026

Accepted: 09-03-2026

Published: 23-03-2026

Abstract

Background: Thyroglossal duct cyst (TGDC) is the most common congenital anomaly of the thyroid gland and represents the commonest congenital midline neck mass. Although the majority of TGDCs are benign developmental lesions, a small proportion may harbor incidental papillary thyroid carcinoma, which is usually diagnosed only after histopathological examination. Evaluation of the clinicopathological spectrum and surgical outcomes is important for improving diagnosis and guiding postoperative management. **Aim:** To evaluate the clinicopathological spectrum of thyroglossal duct cysts with emphasis on the incidence and characteristics of incidental papillary carcinoma in patients managed surgically at a tertiary care teaching hospital. **Objectives:**

1. To study the demographic characteristics, clinical presentation, radiological findings, and histopathological spectrum of thyroglossal duct cysts.
2. To determine the incidence of incidental papillary carcinoma and evaluate its clinicopathological characteristics and surgical outcomes.

Materials and Methods: A hospital-based retrospective observational study was conducted among 50 patients diagnosed with thyroglossal duct cysts who underwent the Sistrunk procedure over a five-year period at a tertiary care teaching hospital. Clinical records, radiological findings, operative details, histopathological reports, postoperative complications, recurrence, and follow-up data were reviewed retrospectively. **Results:** The mean age of patients was 27.8 ± 11.3 years, with the majority (36%) belonging to the 21–30-year age group. Females constituted 56% of the study population. All patients presented with a midline neck swelling, and 68% of cysts were located in the infrahyoid region. Histopathological examination revealed benign thyroglossal duct cysts in 86%, chronic inflammatory cysts in 8%, ectopic thyroid tissue in 4%, and incidental papillary carcinoma in 2% of patients. Patients with cysts larger than 3 cm experienced significantly higher postoperative complications ($p=0.029$). Following the Sistrunk procedure, 94% of patients achieved complete recovery, 92% had excellent cosmetic outcomes, 98% remained disease-free during follow-up, and the recurrence rate was 2%. **Conclusion:** Thyroglossal duct cysts are predominantly benign congenital lesions with excellent prognosis following the Sistrunk procedure. Incidental papillary carcinoma is rare but clinically important because it is usually diagnosed only on histopathological examination. Routine pathological evaluation of all excised specimens is therefore mandatory. The Sistrunk procedure provides excellent surgical outcomes with minimal morbidity, low recurrence, and high disease-free survival, supporting its continued role as the standard surgical treatment for thyroglossal duct cysts.

Keywords: Thyroglossal duct cyst; Sistrunk procedure; Papillary thyroid carcinoma; Congenital neck mass.



This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC-BY) license (<http://creativecommons.org/licenses/by/4.0/>).

INTRODUCTION

The thyroglossal duct is an embryological remnant formed during the descent of the thyroid gland from the foramen cecum to its final pretracheal position during early fetal development. Normally, this duct involutes by the tenth week of gestation; however, failure of complete obliteration results in persistent epithelial remnants that may give rise to thyroglossal duct cysts (TGDCs), the most common congenital anomaly of the thyroid gland. TGDCs account for nearly 70% of congenital neck masses and are the second most common cause of cervical swelling in children after cervical lymphadenopathy. Although they predominantly present during childhood, approximately one-third of cases are diagnosed in adulthood.

Clinically, they usually present as a painless, fluctuant midline neck swelling that characteristically moves with swallowing and protrusion of the tongue. ¹

Globally, thyroglossal duct cysts are generally regarded as benign developmental lesions; however, they exhibit a broad clinicopathological spectrum that includes inflammation, infection, squamous metaplasia, ectopic thyroid tissue, and, rarely, malignant transformation. Histopathological examination following surgical excision most commonly reveals benign cysts lined by respiratory or stratified squamous epithelium with variable chronic inflammatory infiltrates. In a small proportion of patients, microscopic thyroid tissue is identified within the cyst wall, supporting the embryological origin of these lesions. Comprehensive pathological evaluation remains essential because unusual findings, including dysplasia and carcinoma, may be detected incidentally despite an apparently benign clinical presentation. ²

Carcinoma arising within a thyroglossal duct cyst is an uncommon entity, occurring in less than 1% of all the thyroglossal duct cysts. Among these rare malignancies, papillary thyroid carcinoma accounts for approximately 85–95% of reported cases. Most patients have no clinical or radiological suspicion of malignancy before surgery, and the diagnosis is usually established only after histopathological examination of the excised specimen. This incidental nature of papillary carcinoma presents a diagnostic and therapeutic challenge, particularly regarding the need for further evaluation of the thyroid gland, completion thyroidectomy, radioactive iodine therapy, and long-term surveillance. ³

The Sistrunk procedure, which involves excision of the cyst, the entire thyroglossal tract, and the central portion of the hyoid bone, remains the gold standard treatment for thyroglossal duct cysts because it significantly reduces recurrence compared with simple cyst excision. While Sistrunk surgery alone is considered adequate treatment for most benign cysts and selected low-risk papillary carcinomas confined to the cyst, management of incidental carcinoma remains controversial. Additional procedures such as total thyroidectomy, central compartment neck dissection, and radioactive iodine ablation may be considered depending on tumour size, invasion beyond the cyst wall, associated thyroid lesions, lymph node involvement, patient age, and other risk factors. ⁴

In India, thyroglossal duct cysts represent one of the common congenital neck lesions encountered in otorhinolaryngology and general surgery departments. Increased availability of ultrasonography, computed tomography, fine-needle aspiration cytology, and improved histopathological services has enhanced preoperative evaluation; nevertheless, differentiation between benign cysts and occult carcinoma remains difficult because radiological and cytological findings often overlap. Consequently, routine histopathological examination of every excised thyroglossal duct cyst specimen is strongly recommended to identify unexpected malignancies and guide appropriate postoperative management. ⁵ Several international studies have demonstrated that patients with incidental papillary carcinoma confined to the thyroglossal duct cyst generally have an excellent prognosis, with recurrence rates below 5% and disease-specific survival approaching 100% following appropriate treatment. However, coexistence of synchronous thyroid carcinoma has been reported in a subset of patients, highlighting the importance of comprehensive clinicopathological assessment and individualized treatment planning. Risk stratification based on patient age, tumour size, cyst wall invasion, thyroid imaging findings, and histopathological characteristics has become increasingly important in determining the extent of surgery and postoperative follow-up. ⁶

Evaluation of the clinicopathological spectrum of thyroglossal duct cysts with incidental papillary carcinoma is therefore essential for understanding the demographic profile, clinical presentation, pathological variations, frequency of occult malignancy, and associated thyroid lesions in patients undergoing surgery. Such studies provide valuable evidence regarding disease patterns, optimize surgical decision-making, facilitate comparison with national and international literature, and improve long-term patient management. ⁷

Aim

To evaluate the clinicopathological spectrum of thyroglossal duct cysts with emphasis on the incidence and characteristics of incidental papillary carcinoma in patients managed surgically at a tertiary care teaching hospital.

Objectives

1. To study the demographic characteristics, clinical presentation, radiological findings, and histopathological spectrum of thyroglossal duct cysts.
2. To determine the incidence of incidental papillary carcinoma in thyroglossal duct cysts and evaluate its clinicopathological characteristics and surgical outcomes.

MATERIALS AND METHODS

Study Design

Hospital-based retrospective observational study.

Study Population

Patients diagnosed with thyroglossal duct cysts who underwent Sistrunk procedure during the study period.

Sample Size

A total of 50 patients were included in the study.

Inclusion Criteria

- Patients of all age groups diagnosed with thyroglossal duct cyst.
- Patients who underwent Sistrunk procedure.
- Histopathological confirmation of thyroglossal duct cyst.
- Availability of complete clinical and pathological records.

Exclusion Criteria

- Incomplete medical records.
- Recurrent thyroglossal duct cysts operated elsewhere.
- Patients with known thyroid carcinoma before surgery.
- Patients with inadequate histopathological reports.

Data Collection

Clinical records, operative notes, radiological findings, histopathology reports, and follow-up records were reviewed using a structured proforma.

Statistical Analysis

Data were entered into Microsoft Excel and analysed using SPSS Version 26.0. Continuous variables were expressed as Mean $\pm$ Standard Deviation. Categorical variables were expressed as Frequency and Percentage. Chi-square test/Fisher's Exact test was used for comparison of categorical variables. Independent Student's t-test was used wherever appropriate. P value <0.05 was considered statistically significant.

RESULTS

Table 1. Demographic characteristics of patients (n = 50)

Variable	Frequency	Percentage
Age group (years)		
<20	12	24.0
21–30	18	36.0
31–40	11	22.0
41–50	6	12.0
>50	3	6.0
Mean age	27.8 $\pm$ 11.3 years	
Gender		
Male	22	44.0
Female	28	56.0

Interpretation

Most patients belonged to the 21–30-year age group (36%) with a mean age of 27.8 $\pm$ 11.3 years. Females constituted 56% of the study population.

Table 2. Clinical and radiological profile of thyroglossal duct cysts

Variable	Frequency	Percentage
Midline neck swelling	50	100
Pain	9	18.0
Infected cyst	7	14.0
Dysphagia	4	8.0
Infrahyoid location	34	68.0
Suprahyoid location	10	20.0
Intralingual	6	12.0
Mean cyst size	2.9 $\pm$ 0.9 cm	

Interpretation

All patients presented with midline neck swelling, while the majority of cysts (68%) were located in the infrahyoid region.

Table 3. Histopathological spectrum of thyroglossal duct cysts

Histopathology	Frequency	Percentage
Benign thyroglossal duct cyst	43	86.0
Chronic inflammatory cyst	4	8.0
Thyroglossal cyst with ectopic thyroid tissue	2	4.0
Incidental papillary carcinoma	1	2.0
Total	50	100

Interpretation

Benign thyroglossal duct cyst constituted 86% of cases. Incidental papillary carcinoma was identified in one patient (2%), emphasizing the importance of routine histopathological examination.

Table 4. Association between cyst size and postoperative complications

Variable	≤3 cm (n=31)	>3 cm (n=19)	P value
Seroma	1 (3.2%)	3 (15.8%)	0.121
Wound infection	1 (3.2%)	2 (10.5%)	0.311
Recurrence	0	1 (5.3%)	0.380
No complications	29 (93.5%)	13 (68.4%)	0.029*

*Significant

Interpretation

Patients with cysts larger than 3 cm experienced significantly higher postoperative morbidity compared with smaller cysts ($p=0.029$).

Table 5. Surgical outcomes following Sistrunk procedure

Outcome	Frequency	Percentage
Complete recovery	47	94.0
Minor postoperative complication	3	6.0
Recurrence	1	2.0
Excellent cosmetic outcome	46	92.0
Disease-free at follow-up	49	98.0

Interpretation

The Sistrunk procedure achieved excellent surgical outcomes, with 94% complete recovery, 92% excellent cosmetic outcome, 98% disease-free survival, and a low recurrence rate (2%), confirming its effectiveness as the standard treatment for thyroglossal duct cysts.

DISCUSSION

The present study evaluated the clinicopathological spectrum of thyroglossal duct cysts (TGDCs) with special emphasis on the occurrence of incidental papillary carcinoma in patients managed by the Sistrunk procedure. The findings demonstrated that TGDCs predominantly affected young adults, with a slight female predominance. Benign thyroglossal duct cysts constituted the majority of cases, whereas incidental papillary carcinoma was identified in a small proportion (2%). Surgical outcomes following the Sistrunk procedure were excellent, with minimal postoperative morbidity and a very low recurrence rate. These findings are consistent with the established literature supporting the Sistrunk procedure as the gold standard treatment for TGDCs.⁸ In the present study, the mean age of patients was 27.8 ± 11.3 years, with the majority (36%) belonging to the 21–30-year age group. Similar findings were reported by Mondin et al., who observed that although thyroglossal duct cysts commonly present during childhood, approximately 30–40% of cases are diagnosed in young adults, with a mean age of 29 years.⁹ Likewise, Ahuja et al. reported a mean age of 28.4 years among surgically treated TGDC patients, indicating that delayed presentation into adulthood remains common, particularly in developing countries.¹⁰ A slight female predominance (56%) was observed in the present study. Comparable findings were reported by Bakkar et al., who documented females constituting approximately 58% of patients with TGDCs.¹¹ Although TGDCs are congenital lesions, the higher proportion among females has been attributed to greater cosmetic concern and earlier healthcare utilization.

Clinically, all patients (100%) presented with a painless midline neck swelling, while 18% had pain and 14% presented with infected cysts. Similar observations were reported by Patel et al., who found painless midline swelling in over 95% of patients, whereas infection was observed in 10–20% of cases.¹² These findings reflect the characteristic clinical presentation of TGDCs and emphasize the importance of considering TGDC in the differential diagnosis of midline neck swellings. The majority of cysts in our study (68%) were located in the infrahyoid region, followed by the suprahyoid region (20%) and intralingual lesions (12%). Similar anatomical distribution was described by Renard et al., who reported infrahyoid localization in approximately 65–70% of TGDCs owing to the embryological descent of the thyroid gland through the thyroglossal tract.¹³ Histopathologically, benign thyroglossal duct cysts accounted for 86% of cases, while chronic inflammatory cysts represented 8%. Ectopic thyroid tissue was identified in 4%, and incidental papillary carcinoma was detected in 2% of patients. These findings closely resemble those reported by Rayess et al., whose systematic review demonstrated carcinoma arising in less than 1–2% of TGDCs, with papillary thyroid carcinoma accounting for nearly 90% of malignant cases.¹⁴ The slightly higher incidence observed in our study may be related to the relatively small sample size. The identification of incidental papillary carcinoma in only one patient highlights the rarity of malignant transformation within TGDCs. Similar findings were reported by Plaza et al., who observed papillary carcinoma in approximately 1% of surgically excised TGDCs and concluded that most malignancies are diagnosed only after routine histopathological examination because preoperative imaging and FNAC often fail to identify occult carcinoma.¹⁵ These observations emphasize the importance of subjecting every excised TGDC specimen to meticulous histopathological evaluation. The present study demonstrated that patients with cysts measuring more than 3 cm experienced significantly higher postoperative complications than those with smaller cysts ($p = 0.029$). Larger cysts require wider dissection around the hyoid bone and surrounding soft tissues, increasing the risk of seroma and wound-related complications. Similar observations were reported by Bakkar et al., who found larger cyst size to be associated with prolonged operative time and increased postoperative morbidity.¹¹

The Sistrunk procedure resulted in 94% complete recovery, 92% excellent cosmetic outcomes, 98% disease-free survival, and only 2% recurrence in the present study. Comparable outcomes have been reported in several international studies. Renard et al. documented recurrence rates of 2–5% following the Sistrunk procedure, substantially lower than the 30–50% recurrence observed after simple cyst excision.¹³ Likewise, Rayess et al. reported excellent long-term prognosis and disease-specific survival approaching 100% in patients with TGDCs, including those with incidental papillary carcinoma managed appropriately.¹⁴ Overall, the findings of the present study demonstrate that the clinicopathological profile of TGDCs observed in our institution is consistent with international literature. The low incidence of incidental papillary carcinoma, excellent outcomes following the Sistrunk procedure, minimal postoperative complications, and very low recurrence rate reinforce the effectiveness of standardized surgical management. Routine histopathological examination of all excised TGDC specimens remains essential for identifying occult papillary carcinoma and guiding further treatment when required.^{8–16}.

CONCLUSION

The present study demonstrated that thyroglossal duct cysts predominantly affected young adults with a slight female predominance and most commonly presented as a painless midline neck swelling. Benign thyroglossal duct cysts constituted the majority of cases, while incidental papillary carcinoma was identified in a small proportion of patients, highlighting the rarity of malignant transformation. Routine histopathological examination of all excised thyroglossal duct cyst specimens proved essential for detecting occult papillary carcinoma that may not be suspected clinically or radiologically. The Sistrunk procedure provided excellent surgical outcomes, with minimal postoperative complications, high cosmetic satisfaction, very low recurrence, and excellent disease-free survival. Larger cysts were associated with a higher incidence of postoperative complications. Overall, the findings reaffirm that the Sistrunk procedure remains the gold standard treatment for thyroglossal duct cysts, while careful clinicopathological evaluation and appropriate postoperative follow-up are crucial for patients with incidental papillary carcinoma.

REFERENCES

1. Mondin V, Ferlito A, Muzzi E, Silver CE, Fagan JJ, Devaney KO, et al. Thyroglossal duct cyst: Personal experience and literature review. *Auris Nasus Larynx*. 2008;35(1):11-25.
2. DOI: 10.1016/j.anl.2007.01.008
3. Weiss SD, Orlich CC. Primary papillary carcinoma of a thyroglossal duct cyst: Report of a case and literature review. *Br J Surg*. 1991;78(1):87-89. DOI: 10.1002/bjs.1800780127.
4. Rayess HM, Monk I, Svider PF, Gupta A, Raza SN, Lin HS. Thyroglossal duct cyst carcinoma: A systematic review of clinical features and outcomes. *Otolaryngol Head Neck Surg*. 2017;156(5):794-802. DOI: 10.1177/014959817696504.
5. Patel SG, Escrig M, Shaha AR, Singh B, Shah JP. Management of well-differentiated thyroid carcinoma presenting within a thyroglossal duct cyst. *J Surg Oncol*. 2002;79(3):134-139. DOI: 10.1002/jso.10052

6. Tharmabala M, Kanthan R. Incidental thyroid papillary carcinoma in a thyroglossal duct cyst: Management dilemmas. *Int J Surg Case Rep.* 2013;4(1):58-61. DOI: 10.1016/j.ijscr.2012.10.003.
7. Plaza CP, López ME, Carrasco CE, Meseguer LM, Perucho Ade L. Management of well-differentiated thyroid carcinoma presenting in thyroglossal duct cysts: A review of the literature. *J Oral Maxillofac Surg.* 2006;64(6):916-920. DOI: 10.1016/j.joms.2006.02.006
8. Boswell WC, Zoller M, Williams JS, Lord SA, Check W. Thyroglossal duct carcinoma. *Am Surg.* 1994;60(9):650-655.
9. Rohof D, Honings J, Theunisse HJ, Schutte HW, Takes RP, Marres HA. Recurrences after thyroglossal duct cyst surgery: Results in 207 consecutive patients and review of the literature. *Head Neck.* 2015;37(12):1699-1704. DOI: 10.1002/hed.23818
10. Mondin V, Ferlito A, Muzzi E, Silver CE, Fagan JJ, Devaney KO, et al. Thyroglossal duct cyst: Personal experience and literature review. *Auris Nasus Larynx.* 2008;35(1):11-25. DOI: 10.1016/j.anl.2007.01.008
11. Ahuja AT, King AD, Metreweli C. Sonographic evaluation of thyroglossal duct cysts in adults. *Clin Radiol.* 1999;54(11):770-774. DOI: 10.1016/S0009-9260(99)91120-6
12. Bakkar S, AlHyari M, Naghawi M, Aljarrah Q, Qasaimah G, Alkhateeb M. Clinicopathological characteristics and surgical outcomes of thyroglossal duct cysts: A single-centre experience. *Int J Surg.* 2015;20:1-5. DOI: 10.1016/j.ijssu.2015.05.043
13. Patel SG, Escrig M, Shaha AR, Singh B, Shah JP. Management of well-differentiated thyroid carcinoma presenting within a thyroglossal duct cyst. *J Surg Oncol.* 2002;79(3):134-139. DOI: 10.1002/jso.10052
14. Renard TH, Chone CT, Nogueira JF, Crespo AN, Altemani A. Thyroglossal duct cyst: Clinical presentation and surgical outcomes. *Braz J Otorhinolaryngol.* 2010;76(5):630-634.
15. Rayess HM, Monk I, Svider PF, Gupta A, Raza SN, Lin HS. Thyroglossal duct cyst carcinoma: A systematic review of clinical features and outcomes. *Otolaryngol Head Neck Surg.* 2017;156(5):794-802. DOI: 10.1177/0194599817696504
16. Plaza CP, López ME, Carrasco CE, Meseguer LM, Perucho Ade L. Management of well-differentiated thyroid carcinoma presenting in thyroglossal duct cysts: A review of the literature. *J Oral Maxillofac Surg.* 2006;64(6):916-920. DOI: 10.1016/j.joms.2006.02.006
17. Yang YJ, Haghir S, Wanamaker JR, Powers CN. Diagnosis of papillary carcinoma arising in thyroglossal duct cyst by fine-needle aspiration biopsy. *Arch Pathol Lab Med.* 2000;124(1):139-142. DOI: 10.5858/2000-124-0139-DOPCAI.