Thyroglossal Duct Cysts: A Clinicosurgical Experience

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Abstract Thyroglossal cyst is the most common congenital neck mass and occurs in 7% of the population. They occur due to failure of thyroglossal duct to involute and atrophy thyroglossal duct cysts often occur in pediatric patients. Majority of them are found infrahyoid region. The purpose of the present study is to report our 5 year clinical experience of thyroglossal cysts in terms of clinical features and surgical findings with special emphasis on naked eye extend of patent thyroglossal duct when present. To the best of our knowledge this is first clinical study which has reported the extend of thyroglossal duct on naked eye. This prospective observational study was done in the Postgraduate Department of ENT, Head and Neck surgery of Government medical college, Srinagar for a period of five years from January 2011 to January 2016. Thirty patients of histopathologically confirmed thyroglossal cysts were enrolled in the study. Patients were initially diagnosed on the basis of clinical history, examination and USG findings suggestive of cyst. Clinical data and surgical data in terms of size and location of cyst, presence or absence of thyroglossal duct etc. was analyzed and formulated in tables for patients who had histopathologically confirmed cyst. Mean age was 10 years. Majority (73.3%) were less than 15 years of age. Males were 22 in number (73.3%)

while females compromised 26.7% of population. Ninety percent of patients presented with neck swelling. Erythema/redness over swelling was seen in 13.3% of patients. Majority (83.3%) of cysts were subhyoid in location. Thyroglossal ducts were seen to be patent for different lengths and areas. Majority of patients (80%) had tract arising from cyst and disappearing at superior border of hyoid body while three patients (10%) had patent thyroglossal duct from cyst to vallecular mucosa. A complete patent thyroglossal duct was seen in one patient (3.3%) from cyst to base of tongue. Complete Absent tract was seen in two patients (6.7%). Majority (70%) of cysts were having size between 1.6 and 3 cm. Intraoperative 10% of cyst got ruptured. Thyroglossal cysts are most commonly seen in pediatric males. Most of them present with visible midline neck swelling. In few cases cyst can rupture after repeated infections leading to sinus formation. Most of them are subhyoid in location. These cysts are usually of size 1.5–3 cm. Complete patent thyroglossal duct from cyst to tongue musculature is rarely seen while most of the times, a patent duct just disappears at the superior border of body of hyoid. None of our cysts had malignant features.

Keywords Thyroglossal cyst · Hyoid bone · Recurrence · Thyroglossal duct

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Introduction

Thyroglossal duct runs from the foramen caecum at the junction between the anterior two-thirds and posterior third of the tongue and the anatomical resting place of the thyroid. It usually involute after the 5th embryonal week [1]. Failure to involute and atrophy results in persistence of a thyroglossal duct remnant or cyst, which is usually found at

the level of the hyoid bone. A thyroglossal cyst may form at any point along the duct [1].

Thyroglossal cyst is the most common congenital neck mass and occurs in 7% of the population [2]. The classic presentation is a midline, non tender, palpable mass that moves with swallowing and elevates on protrusion of the tongue. Thyroglossal duct cysts are usually 2–4 cm in diameter and gradually increase in size [3]. They may enlarge rapidly after an upper respiratory tract infection.

Thyroglossal duct cysts (TDCs) often occur in pediatric patients, however, at least half are found in the second decade of life and they can also present later in adulthood [4]. Majority is benign, but 1% may be malignant [5]. Majority of them are found infrahyoid region (80%), 8% are found above the hyoid, 5% are found in the suprasternal region of the neck and only 1–2% is found at the base of the tongue [6]. Possible complications are inflammation, rupture and recurrence. The TDC which ruptures spontaneously manifests as a draining sinus, which is being erringly called a thyroglossal fistula.

The epithelial lining of thyroglossal duct cysts is of variable types. Squamous epithelium or pseudostratified ciliated epithelium may line the cysts. Occasionally, the cysts may become devoid of epithelium [7].

Investigations for the detection of TDC include USG neck, which shows a cystic lesion [8]. CT scan of a benign TGD cyst appears as a midline, fluid-attenuated mass near the level of the hyoid bone, with a thin, smooth wall [9].

Differential diagnosis includes dermoid cyst, branchial cyst, hemangioma and lymph node swelling.

Treatment consists of Sistrunk's procedures which include removal of cyst along with a tract, body of hyoid bone and core of tissue along tract up to the foramen caecum [10].

Recurrence rates with Sistrunk's procedure, when properly performed, are less than 3%, and usually present within one year following excision [10].

The purpose of the present study is to report our 5 year clinical experience of thyroglossal cysts in terms of clinical features and surgical findings with special emphasis on naked eye extend of patent thyroglossal duct when present.

Materials and Methods

This is a prospective observational study which was done in the Postgraduate Department of ENT, Head and Neck surgery of Government medical college, Srinagar for a period of five years from January 2011 to January 2016. Thirty patients of thyroglossal cyst were enrolled in the study.

Patients were diagnosed on the basis of clinical history, examination, FNAC findings and USG findings suggestive of cyst.

The Inclusion criteria were: *Fresh cases, Normal thyroid on USG, Histopathology results confirming a thyroglossal cyst. FNAC suggestive of cyst. The exclusion criteria were:* *H/O previous surgery in neck, Any other congenital anomaly*

All patients were taken up for a modified Sistrunk's operation where cyst along with body of hyoid and tract (whatsoever length present) was removed. Cuff of tissue of base of tongue was removed only if tract was seen attaching it.

Surgical findings were noted in terms of size and location of cyst, presence or absence of thyroglossal tract etc.

Cyst were sent for Histopathologic examination.

Clinical data, surgical data of Histopathology positive for thyroglossal cyst was analyzed and formulated in tables.

Results and Observation

Mean age was 10 years. Majority (73.3%) were less than 15 years of age. Twenty percent patients were seen in the age group 16–30. Males were 22 in number (73.3%) while females comprised 26.7% of population (Table 1).

Ninety percent of patients presented with neck swelling. Erythema/redness over swelling was seen in 13.3% of patients and same had Tenderness. Painful swelling and deglutination was seen in 13.3% of patients at presentation. Movement with protrusion of tongue and with swallowing was seen in 100% of patients. 16.6% of patients gave history of recurrent swelling in neck in the past two years while 10% presented with only recurrent discharge from midline neck (Table 2).

Cysts were seen to be located at different places. Majority (83.3%) of cysts were subhyoid in location (Fig. 1) followed by suprahyoid in 10% and suprasternal and overhyoid in 3.35%. Most of the cysts (9.7%) were midline while one was seen towards left side (Table 3).

Thyroglossal ducts were seen to be patent for different lengths and areas. Majority of patients (80%) had tract arising from cyst and disappearing at superior border of hyoid body (Fig. 2) while 3 patients (10%) had patent thyroglossal duct from cyst to vallecular mucosa (Fig. 3). A complete patent thyroglossal duct was seen in one patient (3.3%) from cyst to base of tongue. Complete Absent tract was seen in two patients (6.7%) (Fig. 4).

Table 1 Age/sex distribution of patients

Age group	No of patients	Percentage	Males	Females
0–15	22	73.3	18	4
16–30	6	20	4	2
31–45	2	6.7	x	2
>45	0	x	x	x

Table 2 Signs and symptoms of patients (at presentation)

Sign/symptom	No of patients	Percentage
Painless neck swelling	27	90
Tenderness	4	13.3
Erythema/redness over swelling	4	13.3
Painful swelling	4	13.3
Painful deglutination	4	13.3
Movement with protrusion of tongue	30	100
Movement with swallowing	30	100
Recurrent swelling (in past 2 years)	5	16.6
Recurrent Discharge from cyst (in past 2 years)	3	10

Fig. 1 Intraoperative picture showing cyst (arrow) below the hyoid bone (arrow head). The surface on which is arrow head is seen is anterior surface of body of hyoid**Table 3** Cyst location at surgical exploration

Location	No of patients	Percentage
Suprathyroid	3	10
Subhyoid (thyrohyoid)	25	83.3
Suprasternal	1	3.35
Overhyoid	1	3.35
Midline	29	96.7
Towards left	1	3.3
Towards right		

Patent duct went under the hyoid body in 26 patients (86.6%) while in two patients each the patent duct went either through or over the hyoid bone (Table 4).

Cyst size varied in our study. Majority (70%) of cysts were having size between 1.6 and 3 cm followed by 16.6%

Fig. 2 Thyroglossal cyst with attached body of hyoid (white star) with duct seen up to superior border of hyoid body (arrow) **Fig. 3** Thyroglossal cyst (arrow) with attached body (white star) and a patent thyroglossal duct (arrowhead) which was going into vallecular mucosa

in size range 0–1.5 cm. Only one cyst was seen with size greater than 4.6 cm. Intraoperative 10% of cyst got ruptured (Fig. 5). Most of the cysts (66.7%) were firm on palpation while 10% were soft cysts (Table 5).

Fig. 4 Cyst with body of hyoid with completely absent thyroglossal duct

Table 4 Persistent thyroglossal duct and its course on surgical exploration

Extend		
From cyst to base of tongue	1	3.3
From cyst to Vallecular mucosa	3	10
Absent tract	2	6.7
From cyst and disappearing on superior border of hyoid	24	80
Location		
Going under the hyoid	26	86.6
Going over the hyoid bone	2	6.7
Going through the hyoid bone	2	6.7

Fig. 5 An interior of ruptured (thyroglossal cyst. arrow). Artery forcep on the right side seen holding a patent duct at superior border of hyoid

Table 5 Surgical findings in patients

Findings	No of patients	Percentage
1. Size of cyst		
0–1.5 cm	5	16.6
1.6–3 cm	21	70
3.1–4.5 cm	3	10
>4.6 cm	1	3.4
2. Rupture during surgery		
	3	10
3. Consistency		
Cystic/soft	10	33.3
Firm	20	66.7

We did not encounter any patient having concomitant malignancy.

Discussion

The primordium of the thyroid gland is combined with the tongue by a narrow tubular structure called the thyroglossal duct. From foramen caecum of tongue it extends caudally in the midline and ventral to the primordium of the hyoid bone. The thyroglossal duct cysts usually atrophy and disappear during the eighth and tenth weeks of gestation. Failure to involute and atrophy results in persistence of a thyroglossal duct as a fibrous cord or as a minute epithelial tube [11] or if the duct persists, regarding repeated local infection or inflammation, secretion from the epithelial lining may accumulate, triggering Thyroglossal cyst formation [12]. Thyroglossal duct cysts (TDCs) are the most common congenital neck mass.

There were 22 boys (73.3%) and 8 girls (26.7%) in our study, which shows male predominance. This male predominance is in accordance with literature [13]. Majority (73.3%) of our patients were less than 15 years of age while 20% patients were seen in the age group 16–30. This is also in accordance with literature [11, 13].

The mean age of clinical presentation in our cases was 10 years. This is similar to a study by Kepertis et al. [13] who found the mean age of the 33 patients with TDC at the time of surgery as 6.125 years. In contrast, in other studies the mean age was quite high as compared to our study. The mean age was 16.7 and 21 years in a study by Asmat et al. [14] and Ubayasiri et al. [15] respectively.

It is clear from our and other studies that Thyroglossal duct cysts (TDCs) are more common in pediatric patients followed by patients in their second decade of life. The probable reason being the thinning of adipose tissue during this period of childhood. It is rare in the elderly patients with a reported incidence of approximately 0.6% in the 6th decade [16].

It is expected that most of these patients are asymptomatic but in contrary all of our patients were symptomatic. Ninety percent of our patients presented with painless neck swelling. Moorthy et al. [17] in their study found typical painless swelling only in about 41.6% of the patients diagnosed of TDC while one more study by Kepertis et al. [13] found 63.6% had palpable midline cystic mass.

Thyroglossal duct cysts usually present clinically as congenital cysts, infected cysts or sinuses. Atypical presentations include acute airway obstruction, as a thyroid nodule in the lateral neck, presence in the floor of the mouth, intralaryngeal extension, cutaneous extrusion, cutaneous blisters, as a retro/parapharyngeal abscess and in the mediastinum [18]. Sometimes patients give history of repeated midline neck swelling which resolve completely with conservative measures. 16.6% of our patients gave history of recurrent swelling in neck in the past two years. A retrospective review by Josephson et al. [19], report that 65.7% of the patients presented with a mass or recurrent mass.

Erythema/redness over swelling was seen in 13.3% of our patients and same had Tenderness. Painful swelling and deglutination was seen in 13.3% of patients at presentation while 10% presented with only recurrent discharge from midline neck. Kepertis et al. [13] in their study found (24.2%) with typical glairy discharge and (12.12%) with serious cervical infection at the midline requiring preoperative drainage and antimicrobial therapy.

Because of its relationship to both the hyoid bone and foramen cecum, the cyst typically moves cranially with swallowing and protrusion of the tongue. These manoeuvres may be difficult to elicit in small children. We found movement with protrusion of tongue and with swallowing in 100% of patients.

Thyroglossal duct cysts have been seen to be located at different sites. We found majority (83.3%) of cysts were subhyoid in location followed by suprahyoid in 10% and suprasternal and overhyoid in 3.35%. Most of the cysts (9.7%) were midline while one was seen towards left side. This predominance of subhyoid location has been reported in most studies [11, 18, 20]. In a meta-analysis, Allard [11] collected 381 cases of well-documented TDCs and reported the following locations: 2.1% lingual, 24.1% suprahyoid, 60.9% thyrohyoid and 12.9% suprasternal. *In contrast to our and other studies where subhyoid location is commonest, a study by Ali et al. [11] found suprahyoid the most common location. In their study on 32 cysts, 7 (53%) of the cysts were found above the hyoid bone, 6 (18.8%) were observed at the level of hyoid bone and 9 (28.1%) were located below the hyoid bone.*

Although we did not find any rare location of cyst but rare locations have been reported in literature like

suprasternal [11], lingual (foramen caecum) [21], *mediastinum* [17], *intrahyoid* [17], intrathyroidal [22].

We tried to see on naked eye the remnants and patent thyroglossal ducts at the time of surgical exploration and we found some interesting results. We found that thyroglossal duct was patent for different lengths and areas in different patients. In majority of patients (80%) a duct was seen coming out of thyroglossal cyst and disappearing at superior border of body of hyoid while 3 patients (10%) had patent thyroglossal duct from cyst to vallecular mucosa. A complete patent thyroglossal duct was seen in one patient (3.3%) from cyst and entering base of tongue. *Complete Absent tract* was seen in two patients (6.7%). *To the best of our knowledge this naked eye surgical extend of ducts has never been reported in literature.*

The reason for not seeing whole patent duct in majority of cases is the fact that the thyroglossal duct frequently branches and forms duplications around the hyoid bone without the surgeon having chance to recognize all of them. A few histological studies have been performed to characterize the common routes of the thyroglossal duct around the hyoid bone. It has been shown that in the majority of cases the duct 'aborises', and there are many branches and duplications of the duct around the bone [15].

In our study Patent duct went under the hyoid body in 26 patients (86.6%) while in two patients each the patent duct went either through or over the hyoid bone. In contrary one article [23] mentions that when main duct is found it has a position anterior to the hyoid in 72% of cases and posterior to the hyoid in 28% of cases.

From our surgical naked eye observation we conclude that complete patent thyroglossal duct is *rarely seen* and surgeon should remember this fact while operating a patient of thyroglossal duct cyst.

Removing hyoid body is necessary to significantly reduce recurrence. Using classical Sistrunk's technique, Marshall and Becker [1] described a recurrence rate of just 1.3% in their series of 310 cases.

Nevertheless, the current published data give a recurrence rate of over 4% [24] because nowadays a modified Sistrunk's operation is done where coring out suprahyoid tissue up to base of tongue is not done. Instead, it is common practice to simply follow the tract above the hyoid until it breaks off or disappears. As a result surgeon can leave tissue that could contain remnant ducts or branches that are not visible to naked eye and so there are bit higher chances of recurrence.

In light of our observation in majority of cases, removal of cyst with hyoid bone and thyroglossal duct up to superior body of hyoid is sufficient. We personally did not find any recurrence so far with this procedure but at the same time we believe classical Sistrunk's operation is still the procedure with least recurrence. Some authors do claim

that central neck dissection [15] in addition to removal of hyoid body decreases the recurrence to about zero but this is yet to be universally accepted.

Thyroglossal duct cysts are usually 2–4 cm in diameter and gradually increase in size as per one standard textbook [3] and we are also of same opinion as Majority (70%) of cysts were having size between 1.6 and 3 cm followed by 16.6% in size range 0–1.5 cm. We did not encounter any giant thyroglossal cyst but there are reports of giant cysts in literature [25]. We did not encounter any study in literature review where cysts sizes have been evaluated. Most of the cysts (66.7%) were firm on palpation while 10% were soft cysts. Intraoperatively three (10%) of our cysts got ruptured while in a series by Ubayasiri et al. [15] (19%) got ruptured. This highlights their delicate and soft nature.

We did not encounter malignant change in any of our patients. It is estimated that only about 1% of the patients with TDC show malignant changes, the most common being papillary thyroid carcinoma [17].

Conclusion

Thyroglossal duct cyst is the most common congenital cervical anomaly. There is maximum clustering of cases in pediatric males. Most of them present with visible midline neck swelling which moves with deglutination and swallowing. In few cases cyst can rupture after repeated infections leading to sinus formation. Most of them are subhyoid in location. These cysts are usually of size 1.5–3 cm.

Complete patent duct from cyst to tongue musculature is rarely seen while most of the times, a patent duct just disappears at the superior border of body of hyoid. These cysts can rupture on surgical exploration. None of our cysts had malignant features.

Compliance with Ethical Standards

Conflict of interest There is no conflict of interest between the authors.

Ethical Standards No ethical clearance was required as this was purely an observational study.

Informed Consent Patients were informed that their data may be used and they agreed to it with a note that face of patient should not be published.

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