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Original Research Article

Nosology and Management of Lingual thyroid: A prospective study of a 17 cases with review of literature

Bhargav PRK[1], Sabaretnam M[2], Raja reddy A[3], Vimala Devi N[4]
[1]Consultant Endocrine and Metabolic Surgeon, Ex-Associate Professor of Surgical Endocrinology, Endocare Hospital, Vijayawada, AP, India
[2]Assistant Professor of Endocrine Surgery, SGPGI, Lucknow, UP
[3]Senior resident of Urology, Osmania Medical College, Hyderabad
[4]Research scholar and Physician Assistant, Endocare Hospital, Vijayawada

***Corresponding author**
Dr. PRK Bhargav
Email: endoanswers@gmail.com

Abstract: Lingual thyroid is a rare endocrine anamoly presenting incidentally in most of the cases. Literature is very scarce on the comprehensive management of lingual thyroid. This prospective study was conducted in the Endocrine and Metabolic surgery department of a tertiary care hospital in South India. The cohort included 17 cases of LT managed between July 2012 to June 2015 (36 months) in our department. Proforma based documentation of clinico-pathological, radiological and a management detail was performed. The average age of the cohort was 13.6 ± 5.7 years (6 - 27). The follow-up duration was 21.5±7.2 months (12- 36). Functionally, 47 % of patients were euthyroid at presentation and rest were hypothyroid. 6/17 (35%) required surgical excision due to severe symptoms. 2/3rd patients were placed on conservative management with Thyroxine replacement for hypothyroid subjects. LT is a rare endocrine anamoly with surgical excision indicated only in severely symptomatic cases. Institutional Algorithm based management is recommended in LT.
Keywords: Lingual thyroid; hypothyroid; thyroxine; excision; endocrine anamoly; sleep apnoea.

INTRODUCTION:

Ectopic thyroid (ET) is a rare endocrine disorder defined as the presence of thyroid tissue at a site other than the conventional pre-tracheal area [1, 2]. The etiology of ET is aberrant embryonic migration. In most cases, ET is located along the embryologic path of descent. Lingual thyroid (LT) is the most common type accounting for 90% of cases, while sublingual types are infrequent. Lingual thyroid is a rare embryological aberration with incidence of 1:100,000 and mostly occurs in women [3, 4]. In majority of cases, LT is asymptomatic or presents with hypothyroidism and undergoes unnoticed resulting in late presentation in adolescence or early adulthood. Only 1: 100 cases present with overt symptoms. The diagnosis is based on the clinical features, fine needle aspiration biopsy, laboratory tests and radiographic imaging studies [4]. Treatment modalities include surgical removal, transplantation, radio-iodine I-131 therapy and conservative management with thyroid replacement [2]. Identification of LT is of great significance, since in 50% of cases it may constitute the only functional thyroid tissue in the body. We found inadequate description of clinical picture and management options for LT in clinical series as literature is mostly limited to case reports and reviews. With this knowledge, we decided to evaluate our experience in past 3 years.

MATERIAL AND METHODS:

This study was conducted in the Endocrine and Metabolic surgery department of a tertiary care hospital in South India. The cohort included 17 cases of LT managed between July 2012 to June 2015 (36 months) in our department. Proforma based documentation of clinico-pathological, radiological and management details were done.

The operative steps used in this trans-suprahyoid neck approach are:- 1) Neck in extended thyroidectomy position; 2) Trans nasal intubation for general inhalational anaesthesia; 3) Transverse neck incision in submental triangle above hyoid; 4) After incising deep cervical fascia, mylohyoid is split at linea alba; 5) Floor of mouth is opened at gloss epiglottic fold near base of tongue; 6) The tongue is everted and pushed in to neck incision with finger in oropharynx by assistant, enough to expose and facilitate easier dissection of lingual thyroid mass at base of tongue; 7)

The lingual thyroid mass is excised with use of bipolar cautery; 8) After excision and hemostasis, floor of oropharynx is repaired with intermittent 2-0 vicryl sutures; 9) Suction drain is placed in wound cavity between mylohyoid and floor of oropharynx, followed by closure of wound; 10) Naso-gastric tube is placed for feeding and prevent aspiration for 4 - 5 days. This manoeuvre of pushing the mass into wound with a finger in mouth is also helpful in checking the integrity of closure and adequacy of mass resection towards the end of procedure. Figs 1 to 3 illustrate clinical and operative details.

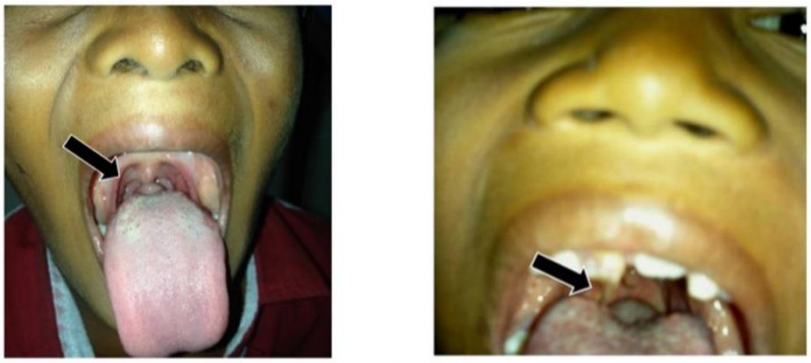

Figure 1: Clinical Photographs of a Lingual thyroid on examination (arrow)

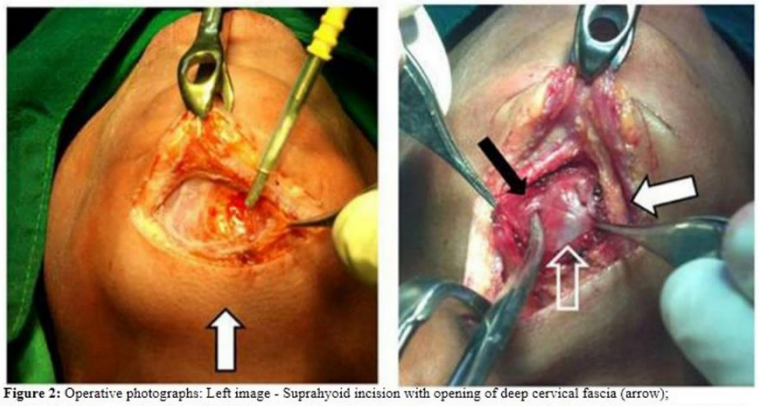

Figure 2: Operative photographs: Left image - Suprahyoid incision with opening of deep cervical fascia (arrow);
Right side image – split mylohyoid (white arrow), floor of oropharynx opened (black arrow), lingual thyroid mass at base of tongue (hollow arrow)

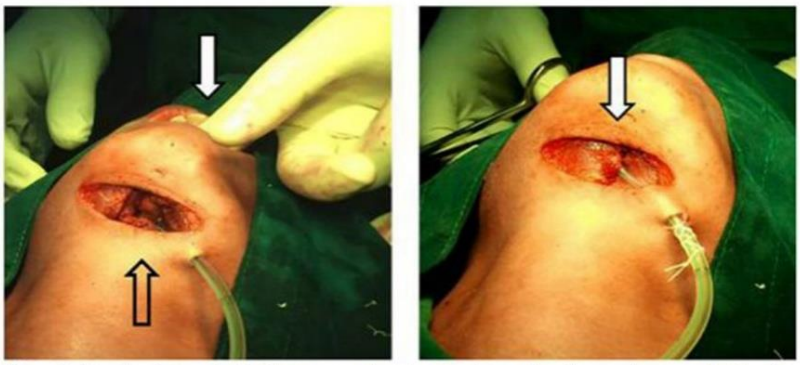

Figure 3: Operative photographs: Left image - wound cavity after closure of oropharyngeal mucosa, checking the integrity of closure and removal of mass with assistant's finger in mouth (white arrow);
Right image – mylohyoid (arrow) and wound closed with suction drain

Our study design was retrospective study of a cohort of 17 case series. This study complied with international ethical norms according to Helsinki Declaration – Ethical Principles for Medical Research Involving Human Subjects, 2004 [5] and informed consent was sought from all the patients. Statistical analysis was done with SPSS software 16.0 version. For statistical description of data – we utilised standards such as ratio, mean, standard deviation, range for continous variables; frequencies and proportions for categorical variables.

RESULTS:

As expected with most of thyroid disorders LT was predominant in women compared to men with the ratio of 13:4. The average age of the cohort was 13.6 ± 5.7 years (6 – 27). The follow-up duration was 21.5±7.2 months (12- 36). Functionally, almost half (47 %) of them were euthyroid at presentation and rest were hypothyroid. Hypothyroid symptoms included weight gain, fatiguability, behavioural changes, menstrual disturbances, cold intolerance and nocturnal muscle cramps. 4/9 (44 %) had subclinical hypothyroidism without any overt symptoms. Within the follow-up period, 2/8 euthyroid patients became hypothyroid. Sonography has given added information on embryology of LT and thyroid topographical anatomy. The eutopic thyroid was normal, a genetic and hemiagenetic in 9, 5 and 3 subjects respectively. 2/3 (66 %) of thyroid hemiagenetic and 4/5 (80 %) of thyroid a genetic individuals were hypothyroid, suggesting that most of LTs have subnormal function due dyshormonogenetic machinery at sub-cellular level apart from ectopic location.

Based on our experience, we categorised the clinically significant symptoms warranting surgical indications in to four types - A = Obstructive dysphagia, B = Recurrent Sore throat, C = Recurrent upper respiratory tract infection, D = Sleep apnoea. These formed the basic indications for surgery. Table 1 elaborates on surgical approach and conservative management along with follow-up period in each case. The only surgical approach used in our cases was trans-suprahyoid neck approach. Table 1 also highlights the frequency distribution of surgical indications in operated cases. There was no recurrence or morbid sequelae in operated cases within our follow-up period. Mild symptoms subsided with thyroxine replacement in hypothyroid patients.

Table 1: Management, surgical indications and follow-up

Case No.	Surgical treatment *	Conservative treatment **	Follow-up (in months)	Surgical indications ***
1	NoS	Obs	36	N/a
2	NoS	LT4 R	32	N/a
3	NoS	LT4 R	30	N/a
4	TSHE	Obs	28	A; B
5	TSHE	LT4 R	26	C; D
6	NoS	Obs	24	N/a
7	NoS	Obs	24	N/a
8	NoS	Obs	22	N/a
9	TSHE	LT4 R	21	B; C
10	TSHE	Obs	19	B: C
11	NoS	Obs	18	N/a
12	TSHE	LT4 R	16	A; B; C; D
13	NoS	LT4 R	16	N/a
14	NoS	LT4 R	15	N/a
15	TSHE	Obs	14	B; C
16	NoS	LT4 R	12	N/a
17	NoS	LT4 R	12	N/a

* NoS = No Surgery was performed; TSHE = Trans-supra hyoid excision

** Obs = Observation; LT4 R = Levothyroxine replacement

Case 4 became hypothyroid and needed LT4R 3 months after surgery

*** Cases 4, 5, 9, 10, 12, 15 were severely symptomatic pre-operatively

A = Obstructive dysphagia, B = Recurrent Sore throat, C = Recurrent upper respiratory tract infection, D= Sleep apnoea; N/A = Not applicable

DISCUSSION:

Probably, the first literature evidence of LT was reported in 1866 as a tumour in posterior third of tongue and a case report of LT in 1869 [4,6]. Since then about 400 cases have been reported in literature. LT is a rare congential thyroid anomaly usually affecting females. It is mostly located in the midline and at base of the tongue [7]. Thyroid gland is the first of the body's endocrine glands to develop, at approximately the 24th day of gestation. At the seventh week of gestation the thyroid gland is an endodermal pouch in the foramen cecum, which is the remnant of thyroglossal tract. Normally thyroid gland descends along a path from foramen cecum in the tongue to the final position in front of trachea, over the thyroid cartilage.

The failure of migration of thyroid tissue along the path from ventral floor of the pharynx to its normal location and sequestration within the tongue substance

leads to the development of LT. Although, the exact etiopathogenesis is elusive, theories such as epithelial tissue of non-obliterated thyroglossal duct and inadequate migration are widely held as causes [7,8]. It is postulated that maternal antithyroid antibodies may arrest the gland's descent and predispose the patient to poor thyroid function later in life [9, 10] The incidence of thyroid disease among family members of patients with lingual thyroid is higher than among the population at large.11studies have shown that mutations in regulatory genes expressed in the developing thyroid could be responsible (1). Genetic research has shown that the gene transcription factors TITF-1(Nkx2-1), *Foxe1* (TITF-2) and PAX-8 are essential for thyroid morphogenesis and differentiation. Mutation in these genes may be involved in abnormal migration of the thyroid [11, 12].

LT occurs more frequently in women compared to men with a ratio ranging from 4:1 to 7:1 [13, 14]. Similarly, in our series too, it was more common in women with the ratio of 3.25:1. LT usually increases in size and thus becoming symptomatic during physiological hormonal fluctuations such as puberty, pregnancy and menstruation [3, 14, 15]. The classical clinical presentation of LT can be classified into two groups – asymptomatic and symptomatic. The first group consists of infants and children who had the abnormality found during routine screening or parental finding. Patients with dysphagia and oropharyngeal obstructive symptoms during or before the puberty constitute the second group [2, 3]. In LT, clinical manifestations usually peaks at a mean age of 40 years with two statistical peaks at the ages of 12.5 and 50 years [3] Though, in our experience, the mean age was 15 years in symptomatic group. The most common symptoms reported in LT include – dysphagia, dysphonia, bleeding from the mass, sleep apnoea, hypothyroidism and rarely dyspnoea and thyrotoxicosis [13-16]. On the contrary, the commonest symptoms in our series were recurrent sore throat and upper respiratory tract infection apart from dysphagia and sleep apnoea. More frequently, the symptoms were multiple. Recurrent infection is expected as it is located at the gateway of gut and airway, thus constantly exposed to environmental offenders and microbes. We presume that, this clinical feature is less emphasized in literature and probably will form the commonest indication for surgery in LT if proven in more studies. Large masses can present with airway obstruction and stridor in children, while a third of patients have evidence of hypothyroidism. [3] We had no upper airway emergencies. 5/12 (42%) cases had hypothyroidism, amongst whom one developed it metachronously after initial euthyroidism. Hypothyroidism is usually precipitated by increased physiologic demands [3, 17].

Hyperthyroidism arising from ectopic thyroid tissue is very rare compared to hypothyroidism and reported especially in adult and elderly patients [16, 18, 19] Rarely, cancer can occur in LT, which is most commonly papillary type. We had no LT carcinoma in our series. The differential diagnosis of LT include thyroglossal duct cyst, epidermal cyst, lymphadenopathy, lipoma, lymphangioma, sebaceous cyst, cystic hygroma, dermoid cyst, midline branchial cyst and neoplasms [1,20]. The diagnostic process can be summarised as triple assessment - clinical, biochemical and radiological. 1) The first and most crucial step in diagnosis is clinical oro- pharyngeal examination with tongue depression to assess location, size, oropharyngeal anatomy, any inflammatory, hyperaemic or infection signs. General and systemic signs of hypothyroidism are mandatorily evaluated. 2) Second most important evaluation is biochemical – serum thyroid stimulating hormone (TSH) to assess if LT is hypothyroid or euthyroid or rarely hyperthyroid. 3) Thirdly – high resolution ultrasonography of neck to assess the structural anatomy, topography and anamolies of thyroid gland. Only 53 % had normally sized eutopic thyroid gland. The radionuclide testing and perchlorate discharge testing to assess dyshormonogenesis is useful, but we are unable to comment on it through this series, as it was not performed in all cases. Nevertheless, the information is adequately compensated by combined use of sonographic and biochemical evaluation. We opine that it is not a mandatory investigation. Cross sectional imaging like computerised tomography or magnetic resonance imaging are rarely needed except for large lesions and suspected malignancy. Fine needle aspiration cytology (FNAC) is rarely indicated in suspected malignancy and routine FNAC can cause bleeding due to excess vascularity [13, 20]. We have not performed FNAC in any of our cases.

There is neither universal consensus nor uniform policy for treatment of LT even within most of the institutions, due to rarity of disease. This is also due to scarcity of clinical series descriptions in literature, which is largely restricted to reviews and case reports. Most of LT cases can be managed conservatively and rarely warrant surgical removal. Though in our series, 35% required surgical intervention due to severe symptoms, it cannot be extrapolated to community. Nevertheless, large numbers of asymptomatic cases go unnoticed or un-reported as they may be considered as normal anatomical variation and only symptomatic LT should be considered as a disease condition.

Based on our experience, we propose this algorithm (Chart 1) to encompass management of all clinical presentations of LT. Irrespective of symptomatic status, all LT cases require triple assessment (clinical, radiological, biochemical), which

forms an anchor for further line of management. In asymptomatic euthyroid cases, observation with periodic (3 – 6 months) follow-up and in hypothyroid cases, thyroxine replacement with observation appears to be optimal. Symptomatic hypothyroid cases dichotomised to mild and severe symptom groups. Mild cases responded well to observation with general measures such as good oral hygiene and deep breathing exercises. 3/ 11 cases in conservative group had mild symptoms – throat discomfort, feeling of a lump in throat, dry irritant cough, and globus. Severe symptoms, whether functionally hypothyroid or euthyroid required surgery. None of the 11 cases in conservative group required surgery within the follow-up duration. Various surgical approaches such as Trans-oral, trans-mandibular, trans-lingual, lateral pharyngo Tomy, suprahyoid midline, sub-mental transverse access routes have been use in practice and reported in literature. Trans-oral method is the most frequently used approach as reported in literature [15, 21-24]. Smaller LT are better accessed by trans-oral and larger ones require alternative routes. But, as learnt from our experience, trans-suprahyoid excision is safe and effective for all sizes. Due to limited global experience, we recommend that ideal approach depends on surgeon's preference, experience and departmental policy. There have been anecdotal reports of lugol's iodine treatment, laser ablation, radio-frequency and radioiodine ablation [25-27], but not replicated elsewhere.

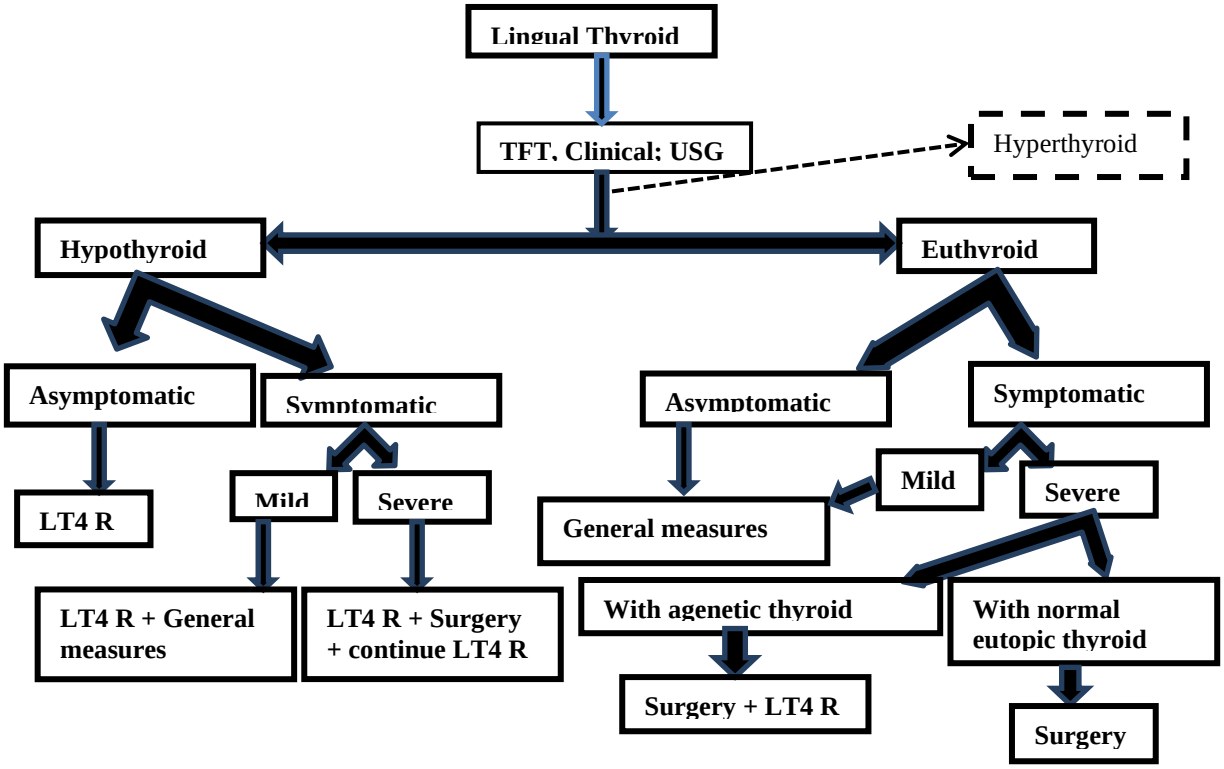

Chart 1: Algorithm of Management for LT

TFT = Thyroid profile (T3, T4, TSH); USG = Ultrasonography; LT4 R = thyroxine replacement

General measures = 6 months to 1 yearly clinico-biochemical followup + maintain oral hygiene + Warm water gargling Hyperthyroid LT not detailed due to anectodal reasons and lack of experience in this series

The strengths of this study are longer follow-up, prospectively recorded data, gradation of symptomatology and practical algorithm encompassing all clinical presentations of LT. According to us, the weaknesses include retrospective design, no intra-study comparision of various surgical routes and smaller sample size (though it is relatively larger in reported literature). Probably multi-institutional studies with larger follow-up and uniform protocols are needed for rare disease such as LT and other ectopic thyroids.

CONCLUSIONS:

1) LT is a rare endocrine anamoly with incidental presentation in most of cases
2) Surgical excision is indicated only in severely symptomatic LT
3) Conservative treatment with thyroxine replacement is optimal in majority of cases
4) Institutional protocol with treatment tailored to an individual case is recommended

Disclaimer:

We authors (all the four authors) hereby declare that there are no hidden conflicts of interests either financial or plagiarism related or any other related to the clinical content and work of this manuscript

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