



Incidental radiographic findings of thyroglossal duct cysts: Prevalence and management



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ABSTRACT

Objectives/Hypothesis: To determine the epidemiology of incidental thyroglossal duct cysts (TGDC) discovered on imaging studies obtained in the head and neck area in children and to discuss subsequent management.

Methods: A retrospective chart review was performed at Texas Children's Hospital of all computed tomography (CT) and magnetic resonance (MR) imaging studies obtained in the head and neck region between July 2011 and July 2014. Images obtained for the purpose of evaluating a neck or lingual mass were excluded from the study, as were patients with previously known TGDCs. Data including age, sex, location of TGDC, size, presence of symptoms, referral to Otolaryngology, and intervention were recorded.

Results: A total of 60,663 CT and MR studies of the head, brain, sinus, neck, and C-spine during this time period were reviewed; of these 69 (0.1%) cases contained incidental discovery of probable TGDCs with more males (40) than females (29). Ages ranged from 3 days to 17 years old, with the mean age at 5 years. Locations varied, with majority at base of tongue (83%) followed by hyoid (13%) then infrahyoid straps (4%). Sizes ranged from 2 to 28 mm with average size at 8 mm. 11 of these patients were referred to an Otolaryngologist; 9 were asymptomatic and decision was made to observe, the other two subsequently underwent surgical excision secondary to mass effect and dysphagia with histologic confirmation of diagnosis.

Conclusion: TGDCs commonly present as an anterior neck mass, however the majority of incidentally discovered TGDCs on imaging are located at the base of tongue. Management of these findings should include referral to an Otolaryngologist for further evaluation with the decision to intervene surgically based on development of clinical symptoms.

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1. Introduction

Ever since the advent of computer tomography (CT) imaging in the 1970s and magnetic resonance imaging (MRI) in the 1980s, diagnostic imaging has become an integral component of modern medicine. The utilization of advanced radiographic imaging has only continued to become more widespread over the years, with rapid expansion during the 2000s. One recently published study

quantified the increase in advanced outpatient diagnostic imaging from 64.3 to 109.1 per 1000 person years over a 10 year period from 2000 to 2009 [1]. Although that particular study was based on adults, it is not an illogical stretch to assume that the increased usage of advanced diagnostic imaging applies to the pediatric population as well.

When obtaining imaging studies in the head and neck area for reasons other than for a neck mass in the pediatric population, occasionally an incidental finding of a midline neck mass will be discovered. The differential diagnosis of midline pediatric neck masses most commonly include thyroglossal duct cysts (TGDC), reactive lymph node, ectopic thyroid, and dermoid cysts [2]. Less likely diagnoses would include thymic cyst, lymphatic

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malformation, saccular cyst, foregut duplication cyst or plunging ranula. There have been rare case reports of other pathologies presenting as a pediatric midline neck mass, including but not limited to tuberculosis [3], Castleman's disease [4], extraosseous chondroma [5], an undescended thymus [6], or even intermittent superior herniation of the thymus [7]. Of all of the above, thyroglossal duct cysts are the most common midline neck masses seen in children [8].

The vast majority of TGDC present as an anterior, painless, infrahyoid midline neck mass. It is generally much more uncommon for a TGDC to present in other areas along the duct including the base of tongue, intrathyroidal, or suprasternally [9]. Diagnosis is typically based on clinical findings with imaging modalities generally utilized as a supplemental tool either for either diagnostic or perioperative purposes. However, for incidentally discovered midline neck masses that are likely TGDCs, presumptive diagnosis must be made solely on imaging characteristics.

This study aims to define the prevalence of such incidental discoveries, discuss radiographic characteristics of TGDCs, and outline subsequent management strategies.

2. Radiographic characteristics

When pediatric patients initially present with a previously undiagnosed midline neck mass, ultrasonographic imaging is typically the initial screening tool due to its non-invasiveness, low cost, and lack of both ionizing radiation and need for iodinated contrast material. Information may be rapidly and reliably obtained regarding the size, shape, borders, location, internal consistency, and vascularity of the mass [10]. Thyroglossal duct cysts have a variable appearance on ultrasound, and can appear either as a simple well-circumscribed anechoic cyst or have a pseudosolid appearance due to intralesional proteinaceous debris or cholesterol crystals. Occasionally, thyroglossal duct cysts with previous infection or hemorrhage can present as heterogeneous complex cysts with internal echoes [11]. The accuracy of ultrasound in diagnosing thyroglossal duct cysts is limited, although it can be helpful in determining if the lesion will require surgical removal [2,12].

On CT imaging, TGDCs are typically unilocular, well-delineated cysts with hypoattenuation and thin walls. When inflamed or infected, there can be associated intra-lesional enhancement as well as a thickened wall (Fig. 1) [13]. On MR imaging TGDCs are classically hypointense on T1 and hyperintense on T2 signal without restricted diffusion. When infected, the cyst wall can appear thickened and will enhance with contrast (Fig. 2A,B) [14]. Of the three modalities, CTs have been shown to be more sensitive in diagnosing thyroglossal duct cysts compared to ultrasound and magnetic resonance images [15].

In comparison to TGDC, ectopic thyroids appear as a well-circumscribed homogenous mass that demonstrates mildly increased attenuation on CT imaging. They are typically isointense to mildly hyperintense on T1 and mildly hyperintense on T2 weighted MR imaging [14]. Dermoid cysts have lipid attenuation and appear as a unilocular mass with small globules of fat on CT, and are isointense to hyperintense on T1 based on content and heterogeneously hyperintense on T2 weighted MRI imaging.

3. Methods

A retrospective chart review was conducted through electronic medical records at Texas Children's Hospital over a three year period from 2011 to 2014. Data collection was approved through the Baylor College of Medicine institutional review board. Data was obtained utilizing iSite Enterprise Primordial Search over the above time period with additional filters including "incidental" noted in



Fig. 1. Example of an incidentally discovered suspected TGDC depicted on CT imaging. There is a well-delineated, non-enhancing, hypoattenuated bilobed cyst at the base of the tongue measuring 17 × 10 mm.

the report section, and the imaging modalities limited to CT and MR only.

From July 1, 2011 to July 1, 2014 a total of 29006 CT scans and 31657 MRIs were obtained of the brain, C-spine, head, neck, and sinus. Initially 181 studies were selected as they contained the word "thyroglossal" in the report. Of these, 102 were excluded as the reason for obtaining the imaging study was specifically for workup of a neck or lingual mass, and six were excluded as they were imaging studies obtained on patients with previously known, suspected TGDCs. Four were excluded as the final differential on the imaging report contained numerous possibilities and the diagnosis remained unclear. A final count of 69 studies was included in the final analysis of patients with truly incidental findings of a suspected TGDC.

These results were then cross-referenced with their medical record number to the main electronic medical record system and data including age, sex, reason for obtaining imaging, size and location of lesion, referral to Otolaryngology, and subsequent management were collected.

4. Results

Of a total of 60,663 CT and MRI scans combined, only 69 met the full criteria for inclusion into the study, resulting in a prevalence of 0.1%. This averages out to approximately 23 cases of incidentally discovered TGDC at our institution per year. Of the 69, 40 (58%) were male and 29 (42%) were female. Ages ranged from 3 days to 17 years old with the median age at 3 years. There was an overall decreasing trend in incidence as age increased (Fig. 3). The location of the suspected TGDC was categorized into three levels; lingual and base of tongue, at the hyoid, or infrahyoid strap muscles. The vast majority, 57 (83%) were located at the base of tongue, followed by 9 (13%) at the hyoid and 3 (3%) at the infrahyoid straps. Size of the lesions ranged from 2 to 28 mm with the median size at 7 mm (Fig. 4). There was a weak positive correlation between age and size of lesion as determined by Pearson coefficient $r = 0.32$ (Fig. 5). There was not a significant difference between sex and size of

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