Preoperative Sonography in Presumed Thyroglossal Duct Cysts

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Objective: To determine the utility of ultrasonography as a sole diagnostic study in the preoperative preparation of patients with presumed thyroglossal duct cysts.

Design: Retrospective chart review.

Settings: Children’s Memorial Hospital, Chicago, Ill.

Patients: Forty-five pediatric patients with midline masses.

Main Outcome Measure: Accuracy in the determination of a normally positioned thyroid gland excluding the presence of a solitary ectopic thyroid gland.

Results: A retrospective chart review was performed at our institution for the period February 1990 to January 1996. A total of 45 patients with midline masses were identified, 39 of whom had undergone preoperative ultrasonography as their sole diagnostic imaging study. In all 39 patients, both a cyst and a normal thyroid gland were identified. All 39 patients underwent the standard Sistrunk procedure. Thirty-seven patients had pathologically confirmed thyroglossal duct cysts. The remaining 2 had dermoid cysts. There were no cases of postoperative hypothyroidism.

Conclusions: The incidence of ectopic thyroid in the diagnosis of thyroglossal duct cysts has been reported to be as high as 1% to 2%. In our surgical and clinical experience, the actual incidence of solitary ectopic thyroid tissue is substantially lower. Nevertheless, to prevent the inadvertent removal of the only functioning thyroid tissue, with resultant postoperative hypothyroidism and possible medicolegal consequences, we advocate the routine preoperative identification of normal thyroid gland. We recommend ultrasound as an accurate, cost-effective, noninvasive imaging modality in the preoperative evaluation of all patients with neck masses suspicious for thyroglossal duct cyst. Also, it does not require sedation.


Thyroglossal duct (TGD) remnants are the most common midline neck masses seen in children. While they are usually present in the first 2 decades of life, they can be present at any age. Clinically, these lesions present as a midline mass in the vicinity of the hyoid bone, but are also found in the submental area or as low cervical masses. On physical examination, they often move with tongue protrusion or swallowing. Rarely, ectopic thyroid is seen in the same areas.

Thyroglossal duct cysts result from aberrant embryological development of the thyroid gland. During the fourth week of fetal development, the epithelium located in the floor of the pharynx invaginates to form a tubular structure known as the TGD. The thyroid anlage then descends from the base of the tongue to its final position in the neck by the seventh to eighth week of gestation. The duct then involutes. Persistence of the embryonic duct results in a TGD cyst. While some surgeons observe small TGD cysts, early surgical removal is usually recommended to avoid subsequent infection. While the presence of de novo carcinoma is less than 1%, the possibility does exist. This possibility should be considered in the counseling of patients regarding surgery.

There are many possible surgical complications resulting from the excision of TGD remnants reported in the literature, with a focus on recurrence rate. The latter has significantly decreased since Sistrunk advocated wide excision of the cyst, duct, central hyoid, and a core of the tongue base. There have been multiple reports of the inadvertent removal of an ectopic thyroid gland that was mistaken for a TGD cyst. Differentiating these 2 conditions is important, because inadvertent removal of an ectopic gland may result in...
hypothyroidism. It is the fear of the aforementioned that leads physicians to obtain preoperative imaging scans. Although the actual incidence of ectopic thyroid tissue is controversial, many investigators agree that it is between 1% and 2%.

Authors have varied in their opinions regarding preoperative evaluation in cases of suspected TGD cyst. Options can be separated into several categories. Some surgeons will obtain no preoperative studies, while others will look for the thyroid gland intraoperatively. Alternatively, some may select imaging modalities such as magnetic resonance imaging, computed tomography, ultrasonography, or thyroid scanning.

RESULTS

Thirty-nine of 45 patients underwent ultrasonography before surgical excision. In all 39 patients, a normal thyroid gland was identified in its usual anatomical location (Figure 1), along with a separate midline neck mass. Although some variability has been reported, in our experience the typical sonographic appearance of the TGD cyst has mostly been that of a cystic mass with complex areas (Figure 2).

The surgical procedures were completed without major complications. In 37 of the 39 patients, the pathologic diagnosis was consistent with TGD cyst. The remaining 2 patients had a pathologic diagnosis of dermoid cyst. This finding is consistent with the literature, in which dermoid cysts are the most common midline lesions that are misdiagnosed as TGD cysts.

There were no cases in which dominant ectopic thyroid tissue was excised, and there were no cases of postoperative hypothyroidism. The sensitivity for the identification of the thyroid gland in its normal position in the neck and separate from the midline cyst was 100%. Specificity with regard to pathologic diagnosis of TGD cysts was approximately 95%.

COMMENT

On reviewing the literature, it becomes clear that there is no consensus regarding preoperative imaging in patients with TGD cysts. In most instances, such decision making relies on common sense and on the surgeon’s previous experience. Baatenburg de Jong et al have designated ultrasonography as their study of choice. Wang and Chang perform fine-needle aspiration as a useful addition to ultrasound in patients suspected of having an ectopic thyroid gland. Lim-Dunham et al reported that identification of a normal thyroid gland by sonography in children with a TGD cyst excludes the presence of ectopic thyroid tissue and thereby obviates the need for radionuclide scanning. Although some groups recommend nuclear imaging for all patients, others advocate a more selective approach by identifying a high-risk category. There is a case report stating that the removal of the patient’s only functioning thyroid tissue was avoided based on the results of a preoperative nuclear study. However, some authors see no need for any preoperative testing in the majority of children.

PATIENTS AND METHODS

A retrospective chart review was performed at our institution for the period February 1990 to January 1996. A total of 45 pediatric patients with midline neck masses consistent with TGD cysts were identified at Children’s Memorial Hospital, Chicago, Ill.

Charts were reviewed for preoperative diagnostic workup, surgical procedure, pathologic diagnosis, and postoperative clinical outcome. The patients were followed up for a minimum of 6 weeks after surgery. In addition to a history and physical examination, preoperative evaluation included an imaging study. Our procedure of choice is ultrasonography, whereby both the midline mass and the normal thyroid gland are identified. If the patients are clinically euthyroid and a normal thyroid gland is imaged, no thyroid function tests are performed.

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The function of preoperative imaging is not only to aid in diagnosis, but also to identify a normal thyroid gland; in this regard, there are both advantages and disadvantages to each type of imaging technique. Ultrasonography is performed without radiation exposure to the patient and is also cost competitive, which is important in this era of cost containment.

<table>
<thead>
<tr>
<th>Imaging Modality</th>
<th>Price, $</th>
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<tr>
<td>Magnetic resonance imaging scan with gadolinium</td>
<td>940</td>
</tr>
<tr>
<td>Computed tomographic scan with contrast</td>
<td>970</td>
</tr>
<tr>
<td>Thyroid scan</td>
<td>200</td>
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<tr>
<td>Ultrasound</td>
<td>302</td>
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It is completely noninvasive and does not require sedation or intravenous access, all of which are significant issues in the care of children. If the ultrasound demonstrates a normal thyroid gland and the patient is clinically euthyroid, there is no need for preoperative thyroid function testing. Disadvantages of ultrasonography may include its lack of specificity in the diagnosis of the mass owing to the viscous nature of TGD cyst secretions; however, in our series, there was a false-positive rate of only 5%. Sonography also does not indicate whether a lesion is functional or nonfunctional, as in a thyroid scan, but nuclear scanning does require the injection of radioactive tracer and has a longer imaging time. Computed tomography and magnetic resonance imaging are useful for lesions that are present in unusual locations, in cases of intralaryngeal involvement, and for recurrent TGD remnants. However, they are costly and often require sedation in children.

**CONCLUSIONS**

The true incidence of solitary ectopic thyroid glands in the diagnosis of TGD cysts is unknown. However, those surgeons who operate on midline neck masses in children may wish to exclude this entity before surgery. Historically, the dilemma in routine cases of suspected TGD cysts has been whether or not to obtain preoperative imaging scans. To prevent the inadvertent removal of the only functioning thyroid tissue, we advocate the routine preoperative sonographic identification of the normal thyroid gland. This procedure avoids committing a child to lifelong thyroid supplementation and avoids the attendant medicolegal complications for the surgeon. In the event that the thyroid gland is absent and the mass represents an ectopic thyroid tissue, patients and their families may then be counseled appropriately. Based on our series, we recommend ultrasonography as an accurate, cost-effective, noninvasive preoperative study that may be used routinely in patients who present with presumed TGD cysts.

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**REFERENCES**