

What's up with my neck? Ultrasound and surgical findings in cervical midline tumors

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ABSTRACT

Objective. Evaluate ultrasound (US) sensitivity and specificity in suspected thyroglossal duct cysts (TGDC) undergoing surgery in our hospital, and their correlation with surgical findings.

Materials and methods. Retrospective study of 150 patients undergoing surgery for midline neck mass suggestive of TGDC (2008-2018). We analyzed epidemiological variables and compared the correlation between diagnostic ultrasound imaging and surgical findings, considering previous episodes of local infection.

Results. Mean age at surgery was 3.96 years (0.75-12.58 years). Of the 150 patients, 81 were male and 69 were female. Following ultrasound examination, 110 were suspected to have TGDC, and diagnosis was confirmed after surgery in 80 cases. Of the remaining 40 cases without TGDC-compatible US examination, TGDC was confirmed in 15 cases. The rest were diagnosed with dermoid cyst (49), lymphadenopathy (4), and vascular malformation (2). US sensitivity was 84%, while specificity was 45%, with a positive predictive value of 73%, and a negative predictive value of 62%. In 62.1% (59) of TGDCs, a previous infection episode had been described, with 16.7% of cases requiring surgical drainage. 13.6% had recurrence after Sistrunk technique. There was no statistically significant relationship between previous infection episodes and postsurgical recurrence, or between surgical or spontaneous drainage and cyst recurrence.

Conclusions. Even though US role in eutopic thyroid gland identification cannot be doubted, it provides with low specificity in the study of midline neck masses. Therefore, the physician's opinion should be prioritized.

KEY WORDS: Thyroglossal duct cyst; Ultrasound; Thyroglossal duct cyst infection; Thyroglossal duct cyst recurrence.

¿QUÉ TENGO EN EL CUELLO? HALLAZGOS ECOGRÁFICOS Y QUIRÚRGICOS EN TUMORACIONES DE LÍNEA MEDIA CERVICAL

RESUMEN

Objetivo. Evaluar la sensibilidad y especificidad de la ecografía en las sospechas de quistes del conducto tirogloso (QCT) intervenidas en nuestro centro y su correlación con los hallazgos quirúrgicos.

Material y métodos. Estudio retrospectivo de 150 pacientes intervenidos por nódulo en línea media cervical sugestivo de QCT (2008-2018). Recogida de variables epidemiológicas y comparación de la correlación de imagen ecográfica con hallazgos quirúrgicos, considerando la presencia de episodios de sobreinfección previos.

Resultados. La edad media de intervención fue de 3,96 años (0,75-12,58 años), siendo 69 mujeres y 81 hombres. De 150 pacientes, 110 presentaron ecografía compatible con QCT, confirmando el diagnóstico por anatomía patológica en 80 casos. De los 40 pacientes con ecografía no compatible, en 15 se confirmó diagnóstico de QCT. En 95 pacientes del total se identificó QCT. El resto fueron diagnosticados de quiste dermoide (49), adenopatía (4) y malformación vascular (2). La sensibilidad ecográfica fue del 84% y la especificidad del 45%, el valor predictivo positivo del 73% y valor predictivo negativo del 62%. El 62,1% (59) de los QCT tuvo episodio de sobreinfección, precisando drenaje quirúrgico 16,7%. El 13,6% presentó recidiva tras técnica de Sistrunk. No se encontró relación estadísticamente significativa entre episodios previos de infección y recidiva postquirúrgica, ni entre drenaje (espontáneo o quirúrgico) y recidiva del quiste.

Conclusiones. A pesar de la importancia de la ecografía para valorar tiroides eutópico en sospechas de QCT, su resultado en el estudio de quistes cervicales tiene baja especificidad, debiendo primar el criterio del facultativo.

PALABRAS CLAVE: Quiste de conducto tirogloso; Recidiva quiste tirogloso; Ecografía; Fistulización quiste tirogloso; Sobreinfección quiste tirogloso.

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INTRODUCTION

Thyroglossal duct cysts (TGDC) are the most prevalent congenital malformations in the cervical midline, with an incidence of up to 7% in the population^(1,2). Owing to an involutional failure of the thyroglossal duct between

Table 1. Correlation between ultrasound and surgical findings in the study patients.

	<i>TGDC surgical findings</i>	<i>Non-TGDC surgical findings</i>	<i>Total</i>
Compatible ultrasound examination	80	30	110
Non-compatible ultrasound examination	15	25	40
Total	95	55	150

Sensitivity (SE) 84%; specificity (SP) 45%; positive predictive value (PPV) 73%; negative predictive value (NPV) 62%.

gestational weeks 5 and 8, they may be placed anywhere between the foramen cecum and the sternal notch. Due to their location and prevalence in children, differential diagnosis with dermoid cyst and local and regional cervical lymphadenopathies is carried out⁽³⁻⁶⁾.

When thyroglossal duct cyst is suspected, a cervical ultrasound examination should be carried out before surgery to determine the presence of eutopic thyroid gland – the only functional thyroid remnant may be the cyst itself or ectopic thyroid⁽⁷⁾. Ultrasound examination only has a guiding value in the study of cervical midline masses, since ultrasound findings will not always be confirmed at surgery⁽⁸⁾. TGDC's gold standard treatment is Sistrunk procedure⁽⁹⁻¹⁰⁾, where the cyst and the hyoid body are removed, and the posterior fistula is ligated. Other symptomatic treatments such as surgical drainage in superinfection episodes can prove useful before cyst removal⁽¹¹⁾, but they may alter findings during the healing surgical process as compared to those TGDCs where no drainage or previous superinfection episodes have occurred.

The objectives of this study are to determine cervical ultrasound examination's specificity and sensitivity in thyroglossal cyst diagnosis in our healthcare facility, and to find out whether infected TGDC drainage and subsequent postsurgical recurrence are associated in any manner.

MATERIALS AND METHODS

A retrospective study including all patients aged 0-14 with cervical midline tumors suggestive of thyroglossal duct cyst undergoing surgery in our healthcare facility from 2008 to 2018 was carried out. A cervical ultrasound examination was performed in all patients to determine the presence of eutopic thyroid prior to surgery.

Patients with a cervical tumor not persisting over time, patients with cervical ultrasound examination from other facilities as the only imaging study at surgery, and patients with postsurgical follow-up under 3 months were excluded.

The demographic and clinic variables collected included sex, personal history and comorbidities, age at diagnosis, age at surgery, previous superinfection episodes, skin fistulization – spontaneous or surgical – during infec-

tions, type of procedure, recurrence, recurrence treatment, ultrasound findings at diagnosis, and surgical findings.

The correlation between patients with and without previous superinfection episodes and subsequent postsurgical recurrence was analyzed using the Chi-squared test. The correlation between cysts undergoing superinfection and drainage – spontaneous or surgical – and subsequent postsurgical recurrence was also assessed.

Diagnostic ultrasound examination's specificity, sensitivity, and predictive positive and negative values in cervical midline tumors suggestive of TGDC undergoing surgery in our healthcare facility were determined, correlating imaging findings with surgical findings.

RESULTS

Mean age at surgery was 3.96 years (0.75-12.58 years). Of the 150 patients included in the study, 81 were male and 69 were female. Following anatomical pathology, 95 were diagnosed with TGDC. Of the 110 patients with a TGDC-compatible ultrasound image prior to surgery, diagnosis was confirmed at surgery in 80 cases (72.7%) (Table 1). The remaining 40 patients with clinical suspicion of TGDC did not have ultrasound examination suggestive of such. However, TGDC diagnosis was confirmed in 15 patients (37.5%) during surgery, the other ones being diagnosed with dermoid cyst (49), lymphadenopathy (4), and vascular malformation (2).

Therefore, cervical ultrasound examination's sensitivity for TGDC diagnostic purposes in our healthcare facility was 84%, and specificity was 45%, with a positive predictive value of 73%, and a negative predictive value of 62%.

62.1% (59) of patients where TGDC was confirmed had had at least one previous infection episode. All cases were initially treated with oral antibiotics, but 16.7% required surgical drainage through cervicotomy. 13.6% (13) of patients diagnosed with TGDC presented recurrence following Sistrunk technique, 8 of whom had had a previous superinfection episode (Table 2). 6 (46.1%) recurrence cases were resolved following various cauterization sessions with local silver nitrate (3-8) (Table 3). The remaining cases required a new surgical procedure for resolution purposes.

Table 2. Correlation between previous infections and TGDC recurrence.

		Recurrence		Total
		Yes	No	
Previous infection	Yes	8	51	59
	No	5	31	36
Total		13	82	95

Table 4. Association between TGDC recurrence and previous infection and fistulization episodes.

	Recurrence	Pearson's chi-squared test	p value
Superinfection	8	0.59	0.44
Fistulization	4	2.17	0.33

No statistically significant relationship was found between previous infection episodes and postsurgical recurrence ($p=0.44$), or between drainage or skin fistulization and subsequent TGDC recurrence ($p=0.33$) (Table 4).

DISCUSSION

Even though cervical ultrasound examination is required to determine the presence of eutopic thyroid before surgery^(1,2), its low specificity in our environment for TGDC diagnostic purposes does not allow diagnosis to be excluded when facing a non-compatible result in case of clinical suspicion. Therefore, it should not have higher diagnostic significance than the physician's opinion, and it should only be regarded as an additional tool. If appropriate, other imaging techniques such as MRI could be considered in order to extend the pre-surgical study in certain cases⁽⁵⁾. Despite having undergone ultrasound examination at their center of reference, cervical ultrasound examination should be considered for all patients with suspicion of TGDC referred to our healthcare facility so as to assess result modifications in case of increased sample size.

Specific ultrasound findings suggestive of TGDC and their correlation with subsequent diagnostic confirmation in surgical findings should also be determined.

Although other studies describe the association with recurrence following TGDC surgery in patients presenting superinfection episodes⁽¹²⁻¹⁴⁾, with more recurrence cases following previous superinfection episodes in our population (8) than in those who had not had them (5), a statistically significant association could not be found. However, according to surgical records, the surgical pro-

Table 3. Response to topic silver nitrate application in TGDC recurrence.

	No. of applications	Resolved
Case 1	6	Yes
Case 2	3	Yes
Case 3	4	No
Case 4	6	Yes
Case 5	8	Yes
Case 6	3	Yes
Case 7	4	Yes
Case 8	3	No

cedure tends to be more difficult, with higher surrounding tissue involvement, even if surgery is postponed for various weeks following the complete resolution of the superinfection episode. Skin fistulization, both spontaneous and surgical, did not have a higher recurrence incidence in our patients either, but it involved a more complex surgical approach. According to recent works, skin fistulization does not imply an increase in TGDC recurrence as compared to previous non-fistulized infections⁽¹⁵⁾.

Local silver nitrate application allowed 6 of our recurrences to be resolved, so it proved to be an easy and, in our experience, effective therapeutic measure. However, it requires a high number of applications, which involves a long follow-up period and, in turn, sometimes makes patients' families refuse it.

As a final conclusion, it could be said that ultrasound examination is key to determine the presence of eutopic thyroid prior to TGDC surgical removal, but it has a poor specificity for TGDC. In addition, no statistically significant association between TGDC recurrence and superinfection or skin fistulization was found. A longer follow-up period would allow the absence of long-term recurrence to be confirmed.

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