

# Right thyroid lobed cyst in a middle-aged woman: A case report

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**ABSTRACT****Background**

Thyroidal ultrasound has been used to detect neck lesions and nodules for decades. However, cystic thyroid disease is rare with few reported series. Different consensus exists concerning availability of medical treatment and the limited role of surgical management.

**Case presentation**

We present a 31-year-old female with obvious neck swelling and dysphagia. Ultrasound diagnosed a suspected colloidal thyroid cyst in the right lobe. The hypoechoic cystic mass measures 3.2 cm x 3.6 cm on frozen sonogram, with evidence of bilateral (cervical) lymphadenopathy. Thyroid cystic nodule viewed via sonar corresponds to detected mass finding on observation and palpitation. Researchers have recently standardized Thyroid-Imaging- Reporting and Data System (TIRADS), mostly in the United States.

**Conclusion**

If Fine Needle Aspiration (FNA) and hormone therapy fail, cysts larger than >2.8cm may require surgical intervention, especially when there is a danger of great-vessel compression.

**Keywords**

Fine Needle Aspiration (FNA), lymphadenopathy, neck, nodules, thyroid cyst, ultrasound

## Background

Thyroglossal cyst (congenital or acquired) are masses occurring around the cervical region. The thyroid gland develops embryologically at day 17 from the base of the pharynx, with contributing strands from the pharyngeal pouches [1]. According to a Turkish research, occurrence of Echinococcus cyst in the thyroid is about 0.5% of all cases [2]. Embryogenesis of the thyroid gland is important for understanding the remote causes of thyroglossal duct cyst. The primordial membrane of the thyroid gland unites with the tongue by a streak known as the thyroglossal duct with an epithelial link in the base of the buccal cavity by the foramen cecum [3]. It has been documented that malignancy is rarely encountered in the neck region (with an occurrence rate of <2% in patients with thyroidal carcinoma [3]. There are some reports of *Echinococcus granulosus* embedded in the thyroid gland in parts of Africa, South America, and Russia. Thyroid cysts are ubiquitous in animals and humans [4].

The etiologies of differential thyroid pathologies must be taken to account [5]. Solitary nodules have the same risk of malignancy with multinodular goiters [6, 7]. Ultrasound evaluation of the neck medial to the great vessels in cancerous cases is recommended [8] when Thyroid Stimulating Hormone (TSH) –stimulated thyroglobulin is not detected. Female gender, old-age, radiation exposure, and iodine deficiency in the diet are associated with thyroid cysts [9]. Some complex forms of thyroglossal/intrathyroid duct cysts in adults are rarer, and surgical decision making will depend on an excellent diagnostic judgment.

## Case presentation

A 31-year-old African woman with a neck lump presented to the ENT outpatients' department (of Crystal Specialist Hospital, Akowonjo–Dopemu, Lagos) before referral to the radiological unit. She noticed the swelling six months before presentation with a subsequent increase in size. A Thyroid Function Test (TFT) was recommended, with free tri-iodo-thyroxine (T3) toxicosis: for TSH =7.2 pmol/I (Normal range 2.5-6.0); and free T4 / Thyroxine was 16.01 pmol/I (Normal range 8-22). Thyroid hormonal levels were monitored after ultrasound by physicians before, during, and after treatment. Past medical history from records was not alarming, apart from slight blood pressure increase. She had a good appetite with average weight. The patient had no past event of irradiation to the neck or head.

On patient palpitation, a semi-tender lump at the RT anterior lobe region measuring around 3.9 x 4.2cm was observed lateral to the midline. A 7.0 -10 MHz linear transducer (General Electric, Pro Logic 3- made in USA) was used to scan. A 32mm x 36mm solitary cystic mass filled with fluid and striations was noted. Internal echoes and strands of cystic- striation was observed in-situ. Further abdominal evaluation with ultrasound appeared normal. It presented as a protrusion in the RT anterior lateral region with mobility on swallowing, profuse sweating, and non-

prominent bulging of the tongue. High blood pressure of 160/88, feeling of anxiety, and cervical lymphadenopathy was also observed, however, there was no evidence of thyrotoxicosis. The size of the thyroid cyst should not be an ultimate indicator of malignancy and benignity.

## Diagnostic Ultrasound Assessment



Figure 1 – Sonogram of the neck mass shows a hypoechoic nodule in the RT thyroid lobe, note the ‘halo’ sign observed in the striated fluid-filled cyst [C]: 32mm x 36mm. Non-neoplastic benign nodule. Transverse ultrasound view of a large, predominantly cystic nodule. Note tracheal gas shadow at the midline; TG= Thyroid gland, T= Trachea.

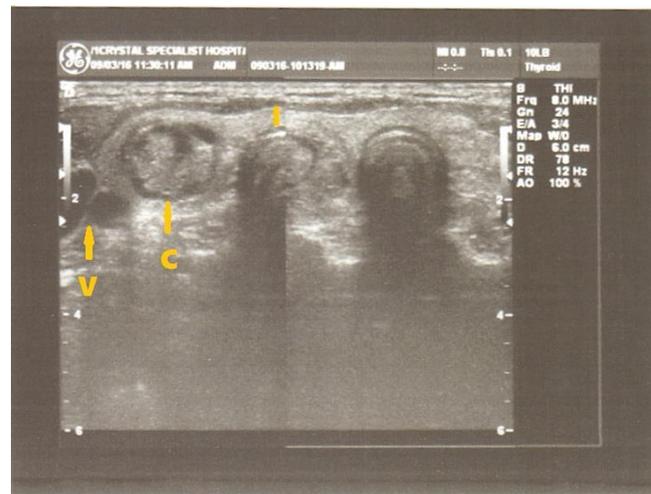


Figure 2 – [Split B-mode image] Thick-walled cystic mass [C] anterio-lateral to the thyroid gland. Midline Isthmus [I], Blood vessels (vasculature) [V]. See sonolucent ring at the border with the possible absence of internal blood flow consistent with a benign finding.

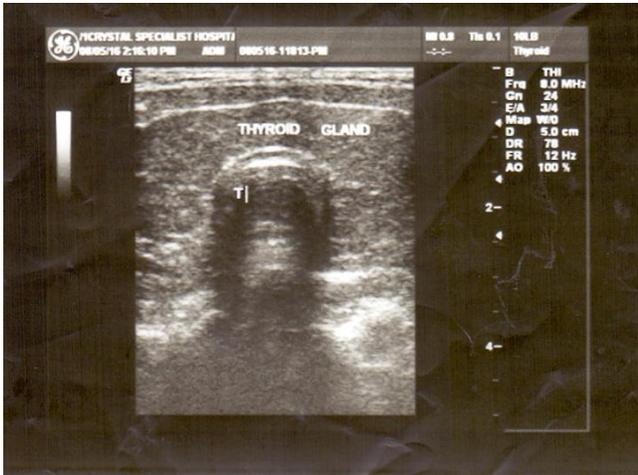


Figure 3: [Control/Normal] Ultrasound image of the homogenous thyroid gland with normo-echoic contours. Note the dispersed internal echoes and external smooth wall presentation, dense/sonopenic acoustic shadow arising from the cervical vertebrae. Note hyperechoic reverberation lateral to the isthmus.

An endocrinologist gave Albendazole 15/mg/kg/day divided in three doses orally for systemic treatment. An unanticipated event is the problematic observation of slight variation in cystic size. In our patient it varied with a few mm, depending on angle of (anterior) triangular neck contact and the type of transducer used (curvilinear or transverse probe). Thus, to prevent adverse inconsistent diagnosis; a greater ratio of AP diameter to horizontal diameter in the transverse plane was the established protocol used. Report reached us the patient was later tested for BRAF V600E gene mutation by immunohistochemistry and PCR sequencing at an Indian hospital.

## Discussion

Rare complex thyroid cyst may be associated with a variety of factors such as increased blood flow and bacterial infection of the thyroid [10]. Subsequently, in our case (Figure 1), the cyst was embedded anteriorly within the RT lateral aspect of the thyroid gland (Figure 2). Although detailed pathogenesis of its cause remains unknown, there was little evidence of cervical lymphadenopathy. In agreement with Gharib and Papini [11], the observatory value of viewing thyroid cysts is generally limited by low sonar sensitivity. No evidence of thyroid hemiagenesis was seen in either lobe. Thyroid ultrasound demonstrated a left lobe with micro specs of calcification as incidental findings. The distinction as to whether neck nodules are (generally benign) fetal remnants or malignant disease from the thyroid is difficult and can be challenging. If left untreated (simple/ non-hemorrhagic cyst) can lead to massive compression of the thyroid gland and result in hypothyroidism. Though debated, dyshormonogenesis may eventually lead to cyst collapse and atrophy.

Our case observation (Figure 1) is in agreement with a 2002 report [12]; since benign thyroid, cysts present with an anechoic pattern on sonar, while carcinogenic and adenoma cysts show a mural nodule. Neck ultrasound to evaluate thyroid bed cysts is recommended every six months after initial discovery [13]. There seems to be a female preponderance of this ailment (thyroid cysts); thereby, seeking more clinical intervention if the occurrence is in males. Furthermore, it is understandable that the patient developed a large cyst since some types of thyroid cysts are a result of solid nodular degeneration [14]. Hyperplastic thyroid nodules were slightly displaced laterally with very minimal aberration from neck para-tracheal lymph nodes. Rupture of a cyst in the neck (Figure 2) region may cause infections and anaphylactic shock in extreme cases. In this cystic case and others, molecular markers can help evaluate the carcinogenic potential of thyroid tissue [15] if malignancy is suspected.

## Etiology and Demographics

Two studies reported all benign nodules contained 40-53% cystic components [16]. Breakdown of a retrospective study of 6,219 patients with cystic thyroid nodules revealed 1,983 cystic make-up and 4,236 solid neck masses [17]. After FNAC examination, 11.9% (506) of the patients underwent surgical operation, compared to 7.2% (143) of cystic thyroid masses. Post-surgical data showed about 0.65% of cystic thyroid lesions were diagnosed as malignant. Out of the 649 nodules excised, 151 out of 506 (29.8%) and 13 out of (143) 9.1% were malignant in the solid and cystic groups [18]. An accurate estimate of the precise incidence of malignancy in cystic thyroid changes is difficult as sparse available data on surgical management of parathyroid cystic lesions account for an estimated 3% of neck cysts [19].

Colloid cysts, nodules, and thyroiditis account for over 80% of thyroid nodules, with benign neoplasms at about 13% and thyroid carcinoma accounting for 5% 20. In thyro-cystic malignancy, papillary thyroid cancer is the commonest (70%) followed by follicular 10-15%, medullary 12% and anaplastic (5 – 15%) [21].

## Clinical and Imaging Findings

The presence of certain features is manifest through ultrasound, such as regular cystic margin, a hypervascular chaotic arrangement of blood vessels by color Doppler scan. No evidence of micro-calcifications or specific sonographic punctate echogenicity seen (Figures 1-2). Histologically (excluded in this report), thyroid cysts may show colloid or follicular adenoma and colloid degeneration. Other contents such as hemorrhagic exudate, gelatinous content, murky reddish-brown fluid or errand “colorless” liquid in-situ [22].

Sonar scan of the neck showed a heterogenous thyroid gland with multiple normoechoic local lesions and low echo fluid regions in the RT lobe with the nodule approximately 3.56cm x 2.00cm.

### Treatment and Prognosis

For 'exponential' thyroid cysts and benign enlargement of thyroid nodules, levothyroxine (which suppresses TSH to  $<0.3\text{mIU/L}$ ) was used for treatment in the past, however, its efficacy is controversial at best [23]. Increased chances of atrial fibrillation [24], low bone density [25] are side effects correlating with TSH suppression therapy. Clinical (in)experience alone may be inaccurate concerning thyroid cysts and may lead to under-treatment or over-treatment in these patients. Thyroid nodules from literature revealed 4-8% in adults detected by palpitation, 41% by ultrasonography and 50% morbid/pathologic examination in autopsies [26].

Surgery is usually recommended for cysts  $>3.2\text{ cm}$ ; continuous growth and inconclusive FNAC interpretation [27]. No history of neck irradiation or paralysis of the vocal cords was experienced. However, symptoms of (acute) dysphagia, dysphonia, and gradually 'crept up.' Past family records were negative for thyroid disorders and showed no evidence of radiation therapy. Because most lumps are benign lesions, they do not normally receive surgical attention.

### Differential Diagnosis

A reliable FNA method yielded benign cytology. Depending on its medical definition, greater than 33% of all isolated thyroid nodules are cystic [28]. General improvement in ultrasound resolution allows for the identification of cysts less than  $<6\text{ mm}$  in diameter. Fine Needle Aspiration Cytology (FNAC) is a reliable distinctive procedure for classifying malignant or benign thyroid nodules. A combination with grey-scale ultrasound is widely recognized by clinicians; however, in solid neck masses, the distinction is less clear.

Even though cystic diagnosis by ultrasound and manual palpitation can be subjective, the general incidence of pre-operative diagnosed malignancy is low thyroid cysts following FNAC [29]. Diagnostic competence of FNAC in thyroid cysts seems lower to results obtained from the same in neck masses with simultaneous specificity and sensitivity at about 52 and 88% [18].

Pathogenesis of thyroid cysts is unclear and murky, with suggested leading cause to be hemorrhaging and clustering of thyroid follicle. Therapy for this case report could include the following: laser photocoagulation [30], thyroid hormone therapy [31], and repeated aspiration [32], an attempt to return it to normal size (Figure 3). Modern imaging techniques will allow for diagnostic improvements in identifying cysts larger than  $12\text{cm}$  ( $120\text{mm}$ ) in diameter for reliable exploration in high-risk populations. No recommendation was made for surgery (thyroidectomy) [33]; sclerosing therapy [34-36] will soothe, ameliorate, and reduce the cyst for cosmetic reasons.

### Conclusion

Studies demonstrating patient demographics, size of the tumor, sex, prognosis, and etiology of cysts should be compared and analyzed by pathologists. To prevent further complications, we advised frequent follow-up. The use of aspiration cytology in cases of thyroid nodules is debatable among medics as dissemination may occur combined with technical difficulties. Neck biopsy/ultrasound guided FNAC could help avoid needless surgeries on neck masses. If the cyst occurs proximal to the trachea or posterior thyroid capsule, the inflammatory changes observe it should be classed as a differential diagnosis. Part of the thyroid-case-report challenge is to properly reassure patients with benign disease and properly diagnose the minority with malignant tendencies.

### Learning points

1. Biochemical assay levels of thyroid hormones: thyroxin-binding globulin, thyroglobulin, and triiodothyronine may NOT distinguish malignancy from benignity.
2. Total reliance on one diagnostic or therapeutic modality could be misleading; a multidisciplinary approach (ultrasound, cytology/FNAC) should be used.
3. Sistrunk surgical procedure may be used for correction if the thyroid is normal (radiologically), but with the cystic thyroglossal duct.

### Abbreviations

Anterior-Posterior (AP), Fine Needle Aspiration (FNA), Fine Needle Aspiration Cyst (FNAC), Human Thyrotropin (HT), Papillary Thyroid Cancer (PTC), Thyroid Function Test (TFT), Thyroid Imaging Reporting, and Data System (TIRADS), Thyroid Stimulating Hormone (TSH).

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### Authors' contribution

- a. Study planning: AAM, QKK, OAO, BAA
- b. Case report: AAM, EED, OSG
- c. Follow up: AAM, OAA, OS, EED
- d. Interpretation: AAM, QKK, BAA
- e. Manuscript writing: AAM, OAO, EED
- f. Manuscript revision: AAM, OSG, OS
- g. Final approval: AAM, QKK, OAA, OAO, EED, BAA, OSG, OS
- h. Agreement to be accountable for all aspects of the work: AAM, QKK, OAA, OAO, BAA, EED, OSG

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### Availability of data and materials

Figures of this case report are available as part of the article, and no additional image files are required.

### Consent for publication

In line with the 1975 Helsinki Declaration on patient right's consent was sought and obtained from the patient, and ethical approval was granted by the committee of Crystal Specialist Hospital. No patient name-tag or any form of confidential personal information is compromised in this manuscript; a copy of the approval letter is available on demand by the editor. The subject was later referred to an endocrinologist for assessment on goiter profiling.

### Competing interests

None, declared.

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### References

- Leger J, Marinovic D, Garel C, Bonaiti-Pellie C, Polak M, Czernichow P. Thyroid developmental anomalies in first degree relatives of children with congenital hypothyroidism. *J Clin Endocrinol Metab*; 87:575-80.
- Yerci O, Filiz G, Ozuysal S, Erol O. Ekinokokkozis olgularin retrospektif incelenmesi (193 olgu) *Turkiye Ekopato Derg*. 29(3-4): 83-87, 1996.
- Mondin V, Fertilo A, Muzzi E, Silver CE, Fagan JJ, Davaney KO and Rinaldo A - Thyroglossal duct cyst: personal experience and literature review. *Auris Nasus Larynx* 2008; 35: 11-25.  
<https://doi.org/10.1016/j.anl.2007.06.001>
- Cowan DF, Tajima Y. The thyroid gland in bottlenose dolphins (*Tursiops truncatus*) from the Texas coast of the Gulf of Mexico: normal structure and pathological changes *J Comp Pathol* 2006; 135: 217-25.  
<https://doi.org/10.1016/j.jcpa.2006.07.003>
- Versaci A, Macri A, Terranova M, Galipò S, Barbera A, Speciale G, et al. Primary echinococcosis of the thyroid gland: Apropos of a case. *G Chir*. 1997;18:427-431.
- Maqusee E, Benson CB, Frates MC, Doubilet PM, Larsen PR, Cibas ES, et al. Usefulness of ultrasonography in the management of nodular thyroid disease *Ann Intern Med* 2000; 133:696 - 700  
<https://doi.org/10.7326/0003-4819-133-9-200011070-00011>
- Papini E, Guglielmi R, Bianchini A, Crescenzi A, Taccogna S, Nardi F. Risk of malignancy in non -palpable thyroid nodules: predictive value of ultrasound and color-doppler features. *J Clin Endocrinol Metab* 2002; 87: 1941-6.  
<https://doi.org/10.1210/jcem.87.5.8504>
- David A, Blotta A, Rossi R, Zatelli M, Bondanelli M, Roti E. Clinical value of different responses of serum thyroglobulin to recombinant human thyrotropin in the follow-up of patients with differentiated thyroid carcinoma. *Thyroid* 2005;15: 267-73.  
<https://doi.org/10.1089/thy.2005.15.267>
- AACE/AME Task force of Thyroid Nodules. American Association of Clinical Endocrinologists and Associazione Medici Endocrinologi medical guidelines for clinical practice for the diagnosis and management of thyroid nodules. *Endocr Pract* 2006; 12:63-102.  
<https://doi.org/10.4158/EP.12.1.63>
- Pandit AA, Joshi AS, Ogale SB and Sheode JH. "Tuberculosis of thyroid gland", *Indian Journal of Tuberculosis* vol 44, p205, 1997.
- Gharib H, Papini E. Thyroid nodules: Clinical Importance, Assessment and Treatment.

- Endocrinol Metab Clin North Am 2007; 36: 707-35  
<https://doi.org/10.1016/j.ecl.2007.04.009>
12. Cignarelli M, Ambrosi A, Marino A, Lamacchia O, Campo M, Picca G, et al. Three cases of papillary carcinoma and three of adenoma in thyroglossal duct cysts: clinical-diagnostic comparison with benign thyroglossal duct cysts. *J Endocrinol Invest* 2002; 25: 947-54.  
<https://doi.org/10.1007/BF03344066>
  13. Cooper DS, Doherty GM, Haugen BR, Kloos RT, Lee SL, Mandel SJ. The American Thyroid Association Guidelines Task force. Management guidelines for patients with thyroid nodules and differentiated thyroid cancer. *Thyroid* 2006; 16: 109- 42.  
<https://doi.org/10.1089/thy.2006.16.109>
  14. Krohn K, Fuhrer D, Bayer Y, Eszilinger M, Brauer V, Neumann S, et al. Molecular pathogenesis of euthyroid and toxic multinodular goiter. *Endocr Rev.* 2005; 6(4):504-24.  
<https://doi.org/10.1210/er.2004-0005>
  15. Kim MI and Alexander EK. Diagnostic use of molecular markers in the evaluation of thyroid nodules. *Endocrine Practice* 2012; 18,796-802.  
<https://doi.org/10.4158/EP12183.RA>
  16. Frates MC, Benson CB, Doubilet PM, Cibas ES, Marqusee E. Can color Doppler sonography aid in the prediction of malignancy of thyroid nodules? *J Ultrasound Med.* 2003;22:127-131.  
<https://doi.org/10.7863/jum.2003.22.2.127>
  17. Lin JD, Hsueh C, Chen JY, Liou MJ, Chao CT. Cystic change in thyroid cancers. *ANZ J Surg* 2007;77:450-4.  
<https://doi.org/10.1111/j.1445-2197.2007.04093.x>
  18. de los Santos ET, Keyhani-Rofagha S, Cunningham JJ, et al. Cystic thyroid nodules. The dilemma of malignant lesions. *Arch Intern Med* 1990;150:1422-7,  
<https://doi.org/10.1001/archinte.150.7.1422>
  19. Lerud KS, Tabbara SO, Del Vecchio DM, Frost AR. Cytomorphology of cystic parathyroid lesions: report of four cases evaluated preoperatively by fine-needle aspiration. *Diagn Cytopathol* 1996;15:306-11.  
[https://doi.org/10.1002/\(SICI\)1097-0339\(199611\)15:4<306::AID-DC11>3.0.CO;2-S](https://doi.org/10.1002/(SICI)1097-0339(199611)15:4<306::AID-DC11>3.0.CO;2-S)
  20. Hegedus L. Clinical practice. The thyroid nodule. *N Engl J Med* 2004;35:1764-71.  
<https://doi.org/10.1056/NEJMc031436>
  21. Gharib H, Goellner JR. Fine-needle aspiration biopsy of thyroid nodules. *Endocr Pract* 1995;1:410-7.  
<https://doi.org/10.4158/EP.1.6.410>
  22. Rauhofer U, Prager G, Hormann M, Auer H, Kaserer K, Niederle B. Cystic echinococcosis of the thyroid gland in children and adults. *Thyroid* 2003;13:497-502.  
<https://doi.org/10.1089/105072503322021179>
  23. Castro MR, Caraballo PJ, Morris JC. Effectiveness of thyroid hormone suppressive therapy in benign solitary thyroid nodules: a meta-analysis. *J Clin Endocrinol Metab* 2002;87:4154-9.  
<https://doi.org/10.1210/jc.2001-011762>
  24. Surks MI, Ortiz E, Daniels GH, Sawin CT, Col NF, Cobin RH, Frankly JA, Hershmann JM. Subclinical thyroid disease: scientific review and guidelines for diagnosis and management. *JAMA* 2004;291:228-38.  
<https://doi.org/10.1001/jama.291.2.228>
  25. Uzzan B, Campos J, Cucherat M, Nony P, Boissel JP, Perret GY. Effects on bone mass of long-term treatment with thyroid hormones: a meta-analysis. *J Clin Endocrinol Metab* 1996;8:4278-89.  
<https://doi.org/10.1210/jc.81.12.4278>
  26. Horlocker T, Hay I. Prevalence of incidental nodular thyroid disease detected during high-resolution parathyroid sonography. In: Medeiros Neto G, Gaitan E, eds. *Frontiers in Thyroidology*. Vol. 2. New York: Plenum Medical; 1985:1309-1312.
  27. Lin JD, Chao TC, Huang BY. Thyroid cancer in the thyroid nodules evaluated by ultrasonography and fine-needle aspiration cytology. *Thyroid* 2005;15: 708-17.  
<https://doi.org/10.1089/thy.2005.15.708>
  28. Cusick EL, McIntosh CA, Krukowski ZH, Matheson NA. Cystic change and neoplasia in isolated thyroid swellings. *Br J Surg* 1988;75:982-3.  
<https://doi.org/10.1002/bjs.1800751013>
  29. Bellantone R, Lombardi CP, Raffaelli M, Boscherini M, De Crea C, Traini E. Management of cystic or predominantly cystic thyroid nodules: the role of ultrasound-guided fine-needle aspiration biopsy. *Thyroid* 2004;14:43-7  
<https://doi.org/10.1089/105072504322783830>
  30. Zubor AD. The Treatment of Thyroid Gland Cyst using ND-YAG Laser - *Klin Khir* 2000; 5: 28 - 30.

31. Mc Cowen KD, Reed JW, Fariss BL. The role of thyroid therapy in patients with thyroid cysts. *Am J Med* 1980; 68: 853 - 5.  
[https://doi.org/10.1016/0002-9343\(80\)90205-3](https://doi.org/10.1016/0002-9343(80)90205-3)
32. Jensen F, Rasmussen SN. The treatment of thyroid cysts by ultrasonically guided fine needle aspiration. *Acta Chir Scand*, 1976; 142: 209 -11.
33. Abbas G, Heller KS, Khoynezhad A, Dubuer S, Szynter LA. The incidence of carcinoma in cytologically benign thyroid cysts. *Surgery* 2001; 130: 135-8.  
<https://doi.org/10.1067/msy.2001.118387>
34. Kim JH, Lee HK, Lee JH. Efficacy of sonographically guided percutaneous ethanol injection for treatment of thyroid cysts versus solid thyroid nodules. *AJR Am J Roentgenol* 2003; 180:1723-6.  
<https://doi.org/10.2214/ajr.180.6.1801723>
35. Chu CH, Chuang MJ, Wang MC, Lam HC, Lu CC, Lee JK. Sclerotherapy of thyroid cystic nodules. *J Formos Med Assoc* 2003;102: 625-30.
36. Bennedbaek FN Hegedus L. Treatment of recurrent thyroid cysts with ethanol: a randomised double - blind controlled trial. *J Clin Endocrinol Metab* 2003; 88: 5773 -7.  
<https://doi.org/10.1210/jc.2003-031000>