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Anatomy-based approach to the thyroid examination

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Abstract: In this article, the authors will discuss a modified anatomy-based neck and thyroid examination that allows for a more comprehensive evaluation. It is the opinion of the authors that an organ and its function are best evaluated utilizing the following steps: anatomy-based inspection and palpation, imaging, and blood tests. Approximately half of the lateral part of the thyroid is deep to the sternocleidomastoid (SCM) and sternothyroid muscles, which makes it rather difficult to palpate the entire gland utilizing prior physical examination techniques. The goal of this modified anatomy-based thyroid examination is to minimize the number of structures between the physician's fingers and the patient's thyroid by utilizing neck flexion, side bending, and rotation. If one approaches the thyroid from behind the patient, nodules can be missed due to the muscles and transverse processes overlaying them. The incidence of thyroid cancer in the United States is drastically increasing, which demonstrates the importance of a more thorough thyroid palpation. Our anatomy-based approach may allow for earlier detection and therefore earlier treatment.

Keywords: palpation; sternocleidomastoid; thyroid; thyroid exam; thyroid nodules.

The largest endocrine gland in the body is the thyroid at approximately 25–30 g, consisting of two lateral lobes. The thyroid is anterolateral to the larynx and trachea, sitting at the level of C5-T1 [1]. Each lobe travels posteriorly until reaching the cervical transverse processes. The two lateral lobes are

connected by the isthmus, which is anterior to the second and third tracheal rings [1]. Prior thyroid palpation has been documented from a posterior as well as an anterior approach [2, 3]. The posterior approach occurs when the physician places his or her finger pads on the anterior aspect of the thyroid by standing behind the patient. The physician palpates the lateral lobes of the thyroid through the sternocleidomastoid (SCM) muscle with slight side bending toward the ipsilateral lobe to assess for any asymmetry or abnormalities. Utilizing the anterior approach, the physician stands in front of the patient and stabilizes the neck with one hand while applying gentle pressure on the trachea away from midline. The physician's opposite hand identifies the lateral lobe of the thyroid behind the SCM with the thumb on the isthmus.

Approximately half of the lateral part of the thyroid is deep to the SCM and sternothyroid muscles; therefore, it is difficult to palpate the entire gland utilizing these techniques. The goal of this modified anatomy-based thyroid examination is to minimize the number of structures between the physician's fingers and the patient's thyroid. If one approaches the thyroid from behind the patient, nodules can be missed due to the muscles and transverse processes overlaying them.

The incidence of thyroid cancer in the United States is drastically increasing relative to other cancers such as colon, breast, or prostate cancer [4]. Due to this increase, it is imperative to be thorough in patients with complaints related to the thyroid anatomy and function. Anatomical complaints include swelling, warmth, redness, pain, or nodules. Functional complaints include symptoms of hypothyroidism (cold intolerance, hair loss, weight gain, etc.) or hyperthyroidism (heat intolerance, weight loss, exophthalmos, etc.) [5]. Anatomical complaints can be addressed through palpation and imaging, whereas functional complaints can be addressed through thyroid function tests. Palpation is easy and accessible, making it an optimal initial step in care. In this article, the authors will discuss a modified anatomy-based neck and thyroid examination that allows for a comprehensive evaluation. Indications, contraindications, and next steps in care will also be included.

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Clinical summary

Inspection

Before beginning the inspection, it is important to move the patient to an area where the light is reflecting over the entire neck because this ensures a complete appreciation of the neck. First, the physician inspects the anterior, lateral, and posterior neck for any physical changes such as asymmetry, fullness, swelling, or redness.

The physician next inspects the anterior portion from the chin to the sternal notch, making sure to move beards or any other obstructions such as clothing. The inspection continues laterally across the clavicles to the acromioclavicular joint, and the physician must move any clothes that limit a view of the shoulders. The lateral neck inspection involves examining from the ear down to the acromioclavicular joint. The posterior portion involves inspecting from the first thoracic vertebra (T1) to the occiput, across the area above the spine of the scapulae, and ending at the acromioclavicular joint.

Neck palpation

If asymmetry was appreciated during inspection, it is imperative to palpate with intent. After obtaining consent to touch the patient, the physician begins palpation on the side without the abnormality appreciated to utilize as a baseline. The physician sweeps from the chin to the sternal notch and across the clavicles while stabilizing the head with one hand to assess the anterior neck. The posterior neck can be evaluated by the physician as he or she is anterior to the patient by finding the spinous processes and applying an antero-lateral sweeping force across the transverse processes.

Thyroid palpation

The physician identifies and gently palpates the thyroid cartilage of the trachea, and then moves inferiorly to identify the isthmus of the thyroid. To achieve complete exposure of the thyroid gland, the physician has the patient flex his or her neck, and side bend toward and rotate away from the side being examined (Figure 1). This produces a space between the SCM and the thyroid gland to allow the palpating hand to move deeper into the neck. By rotating the patient's head away from the side being palpated, the ipsilateral anterior aspects of the transverse processes of the cervical vertebrae

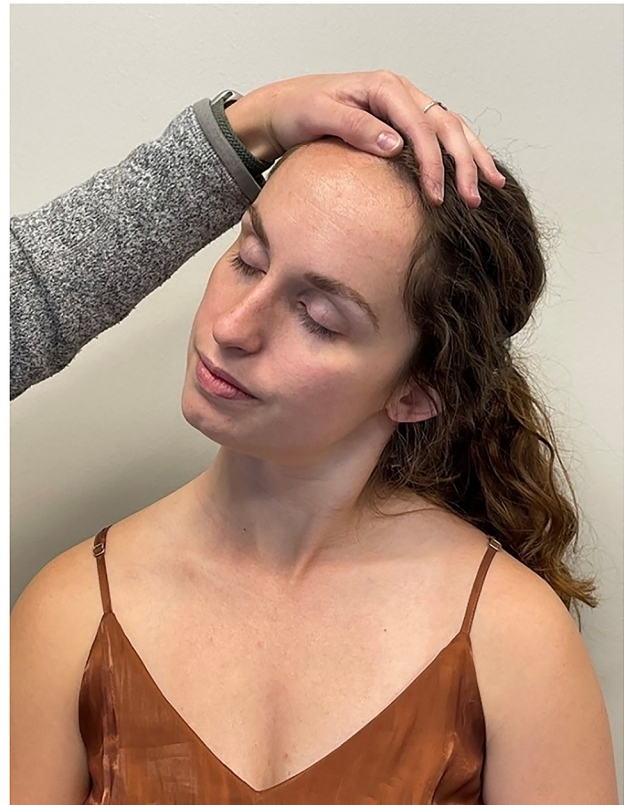


Figure 1: To access the lateral portion of the left lobe of the thyroid, the patient will flex the neck, and then side bend toward and rotate the head away from the lobe being palpated.

will bring the lateral lobe of the thyroid more anterior. The physician palpates to the level of the anterior aspects of the cervical transverse processes, which should not be tender, and sweeps up and down the lateral aspect of the thyroid gland (Figure 2). By moving the transverse processes anteriorly, the physician can achieve a more thorough palpation of the thyroid. This should not cause any pain; therefore, pain should be noted as an abnormal finding if appreciated. With the physician's hand on the patient's thyroid, the patient is asked to swallow to ensure proper hand placement. The thyroid will move superiorly and inferiorly with swallowing. Finally, the physician curves the palpating hand around to the anterior aspect of the thyroid to assess the anterior portion (Figure 3) and has the patient swallow again. The previously mentioned steps are repeated on the opposite side of the thyroid gland for comparison. The physician documents any abnormalities in the medical chart. If pathology or enlargement is suspected, a thyroid ultrasound would be ordered to confirm a mass, cyst, or nodule(s).



Figure 2: The sternocleidomastoid will become prominent, providing space for the physician's fingers to painlessly palpate the lateral portion of the left lobe. The physician will palpate until reaching the anterior portion of the cervical transverse processes, which are normally not tender. This will mark the furthest lateral anatomical border of the thyroid's location. The physician sweeps superiorly and inferiorly along the lateral border of the thyroid gland, and the patient will swallow to confirm correct hand placement.



Figure 3: The physician curves the anterior portion of the thyroid to complete the palpation of the remaining thyroid tissue. Then the physician repeats the steps of palpation on the opposite side of the thyroid.

Discussion

The benefits of utilizing this modified anatomy-based thyroid examination include a more thorough physical examination of the thyroid, which increases the physician's confidence regarding the presence or absence of palpable nodules. Anecdotally, a vast number of thyroids have been palpated in the clinical setting utilizing the anatomy-based thyroid examination with positive nodular findings that could have been missed if the previous palpation technique was utilized. Due to the simple, easy, and painless modifications, this examination can be utilized on almost all patients. The relative contraindications are neck trauma, pain with palpation, or the inability for the patient to relax or follow directions.

Even though this is a comprehensive thyroid physical examination, it is still possible to miss a nodule or another abnormality. If the nodule is located on the posterior side

of the thyroid, it may be difficult for the physician to reach. If the patient is demonstrating functional symptoms or has an anatomical abnormality, the threshold for further testing should be low [3]. The next steps would include thyroid function tests (TSH and free T4), a thyroid ultrasound, and a fine-needle aspiration if the ultrasound returns abnormal [3, 6]. Screening with isolated blood tests may be useful but may not be as sensitive as when the blood tests are combined with an anatomy based physical examination. The authors have anecdotally found that when a patient presents with thyroid-related symptoms, blood tests may be negative even in the presence of neoplasm or suspicious masses that need to be removed or followed intermittently with ultrasounds or fine-needle aspirations.

Nonthyroid-related findings may also be appreciated with this anatomy-based thyroid examination. The authors recall a specific encounter in which the thyroid examination was abnormal, but ultrasound follow-up revealed an enlarged lymph node rather than a thyroid nodule. This can be differentiated by having the patient swallow to confirm that the palpatory findings are on the thyroid, which should

move with swallowing [3]. In this specific example, the suspicious mass also moved when the patient swallowed, as confirmed by the thyroid ultrasound. Due to the thoroughness of the anatomy-based examination, it is plausible to identify abnormal findings such as lipomas, cancerous masses, abnormal lymph nodes, or vascular abnormalities [7] outside of the thyroid, which should be followed up with their respective standard of care.

Conclusions

Due to the growing incidence of thyroid cancer in the United States, it is important that physicians can perform a comprehensive thyroid examination. By utilizing this modified anatomy-based examination, the physician can minimize the number of structures between his or her fingers and the patient's thyroid. This may allow for earlier detection and, therefore, earlier treatment.

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References

1. Moore KL, Dalley AF. Neck. In: Clinically oriented anatomy, 5th ed. Philadelphia, PA: Lippincott Williams & Wilkins; 2006:1083 p.
2. Kauffman M. Neck and lymphatic. In: History and physical examination, 1st ed. Burlington, MA: Jones & Bartlett Learning, LLC; 2014:264–71 pp.
3. Suneja M, Szot JF, LeBond RF, Brown DD. The head and neck. In: DeGowin's diagnostic examination, 11th ed. China: McGraw-Hill; 2020: 159–262 pp.
4. Rahib L, Smith BD, Aizenberg R, Rosenzweig AB, Fleshman IM, Matrisian LM. Projecting cancer incidence and deaths to 2030: the unexpected burden of thyroid, liver, and pancreas cancers in the United States. *Cancer Res* 2014;74:2913–21.
5. Ball JW, Dains JE, Flynn JA, Solomon BS, Stewart RW. Head and neck. In: Seidel's guide to physical examination, 10th ed. St. Louis, MO: Elsevier; 2023:208–29 pp.
6. Hall J, editor. Neck and thyroid. In: Essentials of clinical examination handbook, 7th ed. Toronto, Ottawa, Canada: Toronto Medical Student Publications; 2013.
7. Pynnonen MA, Gillespie MB, Roman B, Rosenfeld RM, Tunkel DE, Bontempo L, et al. Clinical practice guideline: evaluation of the neck mass in adults. *Otolaryngol Head Neck Surg* 2017;157(2 Suppl):S1–30.