



Delayed infected hematoma in retrosternal area following total thyroidectomy: a case report

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Introduction and Importance: Postoperative neck hematoma (PNH), a rare complication following thyroidectomy, occurs in only 1.1–3.15% of cases and can lead to life-threatening outcomes. More rarely, delayed PNHs with atypical clinical manifestations and positions have not yet been reported. Early identification and immediate medical intervention are of utmost importance in such cases.

Case Presentation: The authors represented a patient with thyroid cancer adherent to the trachea, who underwent post-thyroidectomy, experienced delayed PNH in the retrosternal region and was infected by respiratory pathogens. Meanwhile, the patient developed recurrent laryngeal nerve (RLN) paralysis after surgery. PNH was not identified in the clinical manifestations; instead, it was detected only through successive cervical ultrasound examinations.

Clinical Discussion: Although rare, PNH can lead to serious complications, especially delayed complications or those in atypical positions, without neck swelling. When simultaneously with RLN paralysis, the hematoma may be neglected. Therefore, early diagnosis and treatment are crucial.

Conclusion: Clinicians should be vigilant of atypical PNH because neck swelling may be absent. Cervical ultrasonography is essential for diagnosis and can be performed multiple times. Cervical CT scans should be part of the routine procedure, while contrast-enhanced ultrasound can help detect active bleeding. Early postoperative antibiotics are recommended if the tumor is closely attached to the trachea.

Keywords: case report, delayed hematoma, dyspnea, posterior sternum, thyroidectomy

Introduction

Postoperative neck hematomas (PNH) are uncommon in patients who undergo thyroidectomy, manifesting in 1.1–3.15% of cases, with delayed hematomas constituting only 0.4% of all cases^{1–4}. Although rare, PNH can lead to serious complications, such as dyspnea or asphyxia, posing a life-threatening risk if not promptly treated. Risk factors for PNH include patient demographics (male sex, older age, hypertension, use of antithrombotics, and BMI > 30 kg/m²), surgical factors [previous thyroid surgery, bilateral thyroidectomy, and concurrent lymph

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HIGHLIGHTS

- Clinicians must remain alert for atypical postoperative neck hematomas (PNH), which can occur without evident neck swelling and may extend into the retrosternal area.
- The occurrence of PNH may coincide with recurrent laryngeal nerve (RLN) paralysis, which should not be overlooked.
- In cases of potential postoperative neck hematoma, repeated ultrasound evaluations, potentially performed by an experienced sonographer, are advisable as a preliminary diagnostic measure.
- Contrast-enhanced ultrasound, which offers hematoma confirmation and concurrent hemorrhage assessment, shows promise for efficient diagnosis.
- Administration of antibiotics early postsurgery might be necessary when the tumor is adherent to the trachea despite an intact tracheal structure.

node dissection (LND)], and thyroid disease-related factors (Graves' disease and chronic lymphocytic thyroiditis)^{4–6}.

Early recognition of PNH is critical to interrupt the rapid progression of airway compromise and other life-threatening complications. PNH is primarily observed through signs of hematoma formation, such as red drainage, neck swelling, respiratory distress, and dysphagia¹⁵. However, identifying delayed PNH is challenging, especially in the absence of neck swelling or when the drainage has already been evacuated.

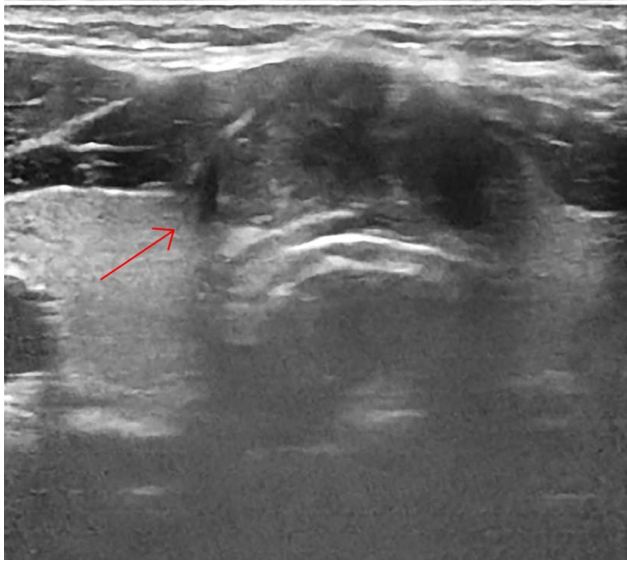


Figure 1. Papillary carcinoma of thyroid isthmus: The tumor, measuring $2.2 \times 1.5 \times 1.0$ cm, is in close adherence to the trachea (indicated by the red arrow).

The current study reported a rare case of delayed, infected PNH originating from respiratory pathogens in the retrosternal region, which was detected after repeated cervical ultrasound examinations. To the best of our knowledge, to date, there have been no reports of similar cases. This case report has been reported in line with the Surgical CAse REport (SCARE) Criteria^[7].

Presentation of case

A 53-year-old female, who underwent total thyroidectomy in our department for papillary thyroid carcinoma 6 days prior, was referred to our hospital with hoarseness and respiratory distress. There was no history of respiratory allergies or other respiratory diseases, and no respiratory infections or other dyspnea-inducing

conditions were noted during the perioperative period. In regard to the family history, the patient's elder sister was treated for thyroid cancer with a complication-free thyroid lobectomy at our center 2 years ago, in contrast to the patient's complications. No other relatives have reportedly had thyroid cancer. During the initial operation, the tumor, measuring $2.2 \text{ cm} \times 1.5 \text{ cm} \times 1.0 \text{ cm}$ in size, was in the isthmus and closely adhered to the trachea (Fig. 1). During the procedure, sharp dissection was conducted to separate the tumor from the trachea, and residual tracheal adventitia was suspected. Thus, local ablation was performed on the involved tracheal adventitia. Before the operation, a comprehensive assessment of the integrity of the tracheal structure and recurrent laryngeal nerve (RLN) was conducted and showed positive results. One day after the operation, the patient presented with hoarseness, and laryngoscopy examination revealed that the activity of the bilateral vocal cords was symmetrically limited (Fig. 2). Thus, the patient was administered methylprednisolone and sodium aescinate to relieve the inflammation and edema of the RLN. The drainage tube remained unclogged and in place, with a continual decrease in drainage volume observed over three consecutive days after surgery, measuring 30 ml, 10 ml, and 5 ml, respectively. The drainage tube was removed, and the patient was discharged on the fifth postoperative day. Throughout hospitalization, the patient did not exhibit fever, respiratory distress, or any other discomfort.

During the emergency department assessment, physical examination revealed that the physical examination revealed that the patient had a tracheal stridor, and the three concave signs were positive. The respiratory rate was 35 breaths/min and oxygen saturation was 92% on room air. The surgical wound appeared uninfected, no neck swelling was noted, and while there was an absence of fever, an elevated skin temperature over the neck was observed. Laboratory findings showed a white blood cell count of $10.95 \times 10^9/\text{l}$ (normal range: $3.5\text{--}9.5 \times 10^9/\text{l}$), with 88.7% neutrophils (normal range: 40–75%). The C-reactive protein level was 72.31 mg/l (normal range: ≤ 6 mg/l), procalcitonin was 0.109 ng/ml (normal range: 0–0.05 ng/ml), and the hemoglobin concentration was 120 g/l (normal range: 115–150 g/l). A neck ultrasound performed by a junior

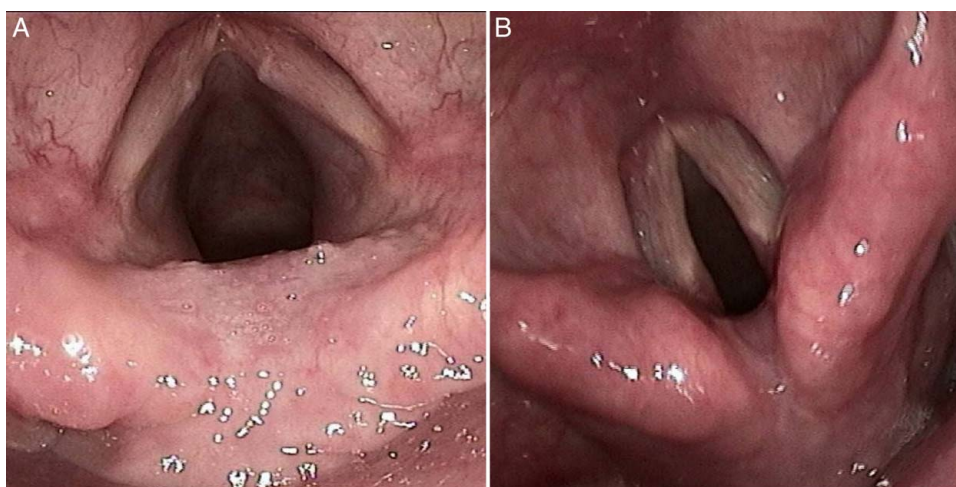


Figure 2. Vocal cord mobility assessment: A. Before surgery, bilateral vocal cord movement is within normal limits; B. After surgery, there is symmetric restriction of vocal cord mobility.

sonographer in the emergency department indicated a localized subcutaneous effusion without hematoma (Fig. 3A). Subsequent contrast-enhanced ultrasound conducted by a senior sonographer revealed a compressible and flowable high-echo area measuring $\sim 4.6 \text{ cm} \times 3.5 \text{ cm} \times 1.2 \text{ cm}$ in the space between the tracheal and sternum, with no enhancement observed post-contrast administration, which indicating a hematoma without ongoing bleeding (Fig. 3B).

After the hematoma was identified, an ultrasound-guided puncture and aspiration procedure was performed on the hematoma located in the retrosternal area, extracting 15 ml of dark red fluid and blood clots. A double lumen 7F catheter was then inserted for drainage. The patient experienced a notable improvement in symptoms after the procedure. The extracted specimen was subjected to examination, revealing negative results for the chyle test and indications of infections caused by

Klebsiella pneumoniae subspecies and *Streptococcus constellatus* in etiological cultures. The infection was initially treated empirically with piperacillin-tazobactam, and subsequent antibiotic sensitivity testing confirmed susceptibility to the antibiotics. The patient experienced complete resolution of the symptoms after 7 days of treatment.

Discussion

The rise in thyroid cancer incidence over several decades has resulted in a significant escalation of patients undergoing thyroidectomy, which ranks among the most common and safe surgeries^[8]. However, even with this safety assurance, PNH remains a concern, threatening patient safety. Prompt identification and intervention are essential for mitigating potential harm and ensure patient safety^[9].

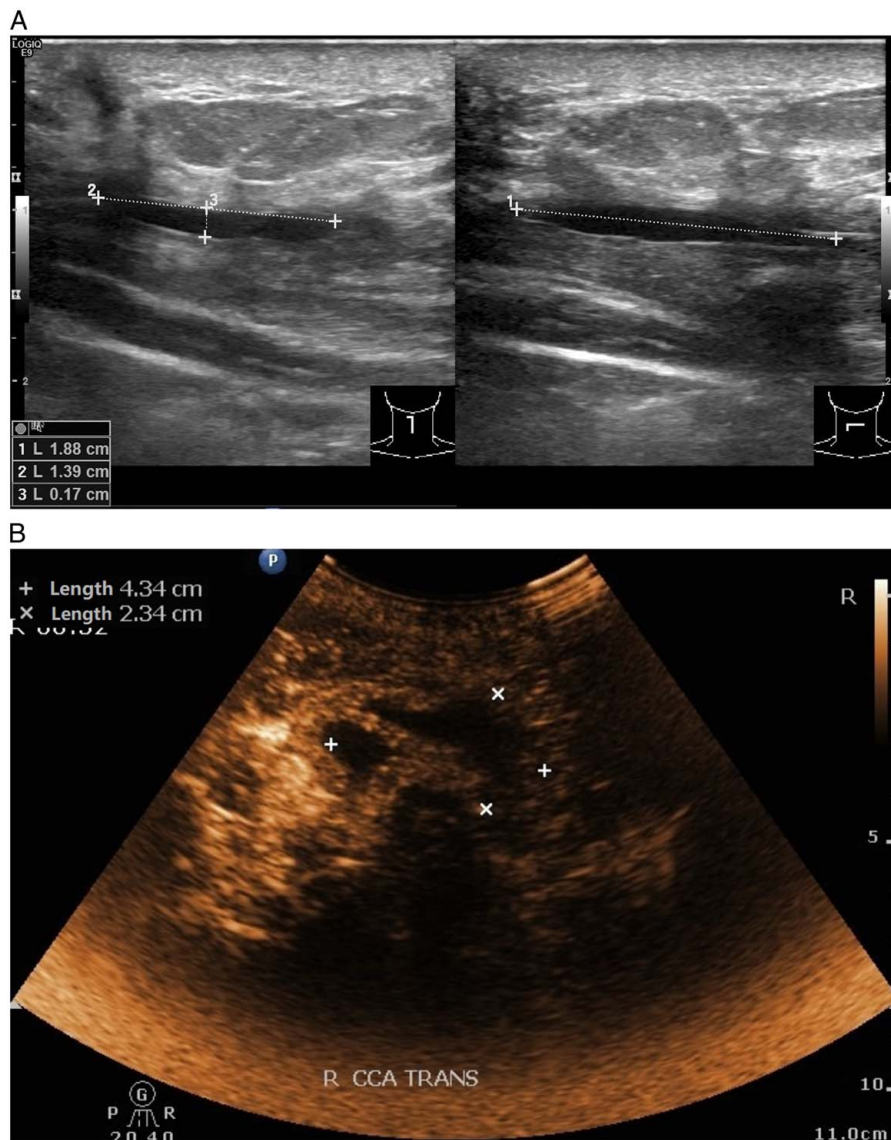


Figure 3. Cervical ultrasound assessment for PNH: A. Initial ultrasound assessment by a junior sonographer showed localized subcutaneous effusion with no evidence of hematoma formation; B. Subsequent contrast-enhanced ultrasound by an experienced senior sonographer demonstrates a compressible, flowable high-echoic region in the retrosternal area, showing no postcontrast enhancement, indicative of no active hemorrhage.

Our case presents an extremely rare instance of a patient developing delayed PNH in the retrosternal region without concurrent neck swelling. Typically, PNH is notable postsurgery, with 72.7% of cases occurring within the first 6 h, 27.3% manifesting between 6 and 24 h, and only 1.8% appearing between 24 and 48 h. Cases of PNH manifests beyond 3 days, accounting for only 0.4% of all cases^[3,5]. Upon the initial manifestation of PNH, nearly all patients exhibited noticeable red drainage, and 92.3% presented with neck swelling^[10]. However, our case shows that neck swelling is not always present and caution should be exercised against relying solely on this symptom for diagnosing PNH, especially in emergency situations. Furthermore, the case illustrates that PNH may present with RLN paralysis, necessitating careful assessment.

Ultrasound is noninvasive, can be performed repeatedly, and is recommended as the first-line imaging modality for diagnosing PNH^[9,11,12]. However, this approach is limited to operator-dependent examination^[13]. In our case, the junior sonographer did not detect a hematoma on the first examination. It was not until a senior sonographer repeated the cervical ultrasound that a hematoma in the retrosternal region was observed. Therefore, when PNH is suspected, a routine neck CT scan should be performed for a more objective assessment.

Moreover, in this case, PNH was infectious and stemmed from respiratory tract pathogens. We believe that this may be due to ablation of the suspected residual lesion in the trachea. Although the procedure did not compromise the structural integrity of the trachea, it may have breached the tracheal barrier. This breach permitted the entry of respiratory pathogens into the surgical site, leading to infection^[14]. Although thyroidectomy is a clean surgery, early postoperative antibiotics may be required to prevent infections in similar cases.

Finally, the application of contrast-enhanced ultrasound in this case not only substantiated the presence of hematoma but also concurrently checked for active bleeding, facilitating effective management of the PNH through percutaneous drainage. This method is promising for both diagnostic interpretation and therapeutic strategy formulation in cases of PNH and merits further exploration.

Conclusion

Although rare, PNH can lead to serious complications. PNH should always be considered, even if no classic symptoms of neck swelling are observed. To facilitate the early recognition of deep hematomas, when symptoms seem suspicious, ultrasound is the first-line diagnostic examination, and can be used repeatedly and by senior sonographers if necessary; the retrosternal area should also be detected. Neck CT should be a part of this routine. Contrast-enhanced ultrasound can offer hematoma confirmation and concurrent hemorrhage assessment and is promising for the efficient diagnosis of PNH. Early postoperative antibiotics are recommended if the tumor is closely attached to the trachea.

Patient perspective

During the most recent follow-up assessment, the patient exhibited no dyspnea and had full recovery of vocal function, returning to presurgical levels following rehabilitative treatment. Ultrasound of the thyroid area showed no signs of recurrence or

any other abnormalities. Additionally, after radioiodine therapy, the patient's 6-month postoperative evaluation of response to therapy was classified as an excellent response according to the 2015 American Thyroid Association Guidelines^[15].

Ethical approval

Given the nature of this case report, no ethical approval was required.

Consent

Written informed consent was obtained from the patient's family for publication of this case report and accompanying images. A copy of the written consent is available from the Editor-in-Chief of this journal on request.

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This study has received no funding.

Author contribution

H.Z.: study concept or design; J.W., T.-X.L., and P.-X.-D.H.: data collection; H.Z., X.-Y.C.: writing the paper; D.-X., D.B.-H., and A.-M.: revising the manuscript.

Conflicts of interest disclosure

The authors declare that they have no conflicts of interests.

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Not applicable.

Guarantor

Hao Zhao and Bu-He A-Min.

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Provenance and peer review

The paper was not invited.

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