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Soft tissue hematoma of the neck due to thyroid rupture with unusual mechanism

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ABSTRACT

INTRODUCTION: Massive bleeding from the thyroid gland causing airway compromise secondary to indirect neck trauma is rare.
PRESENTATION OF CASE: An 89-year-old woman was transferred to our emergency department due to anterior neck pain after a traffic accident. She had been propelled forward and struck her head on the front mirror during emergency braking. Airway patency was confirmed at the first contact. Although her vital signs were stable at presentation, she gradually suffered from respiratory distress and severe dyspnea, implying airway compression, therefore requiring endotracheal intubation. Computed tomography (CT) revealed a large, encapsulated hematoma in the left thyroid gland lobe extending to the upper mediastinum. Contrast-enhanced CT demonstrated an extravasation of the contrast agent around the left superior thyroid artery. The left thyroid artery was ligated and the hematoma was removed immediately. She had a favorable course without further complications and was discharged 36 days after admission.
DISCUSSION: Airway management is the most important consideration in patients with thyroid injury. Treatment should be customized depending on the degree of respiratory distress resulting from of either involvement of the direct airway or secondary compression.
CONCLUSION: Although hemorrhage from the thyroid gland without blunt trauma is rare, emergency physicians should regard possible thyroid gland rupture in patients with swelling of the neck or acute respiratory failure after direct/indirect trauma to the neck. Observation or operative management for limited or expanding hematoma are appropriately based on fundamental neck trauma principles.

1. Introduction

Neck trauma may result in injury to the bones, muscles, nerves, vessels, and/or digestive tract. Hyperextension, hyper flexion, deceleration, rotation, and direct blow may contribute to dull neck trauma. Accordingly, most blunt neck traumas occur during motor vehicle collisions, direct blows, sport activities, or strangulation. We report a case of thyroid rupture causing serious respiratory distress, leading to urgent invasive airway management before definite diagnosis of thyroid gland injury. Although extensive soft tissue bleeding from the thyroid gland after neck trauma has rarely been reported, it can result in life-threatening injuries demanding immediate attention. Emergency physicians should keep in mind the potential involvement of the thyroid gland. This case report emphasizes that life-threatening soft tissue hematoma secondary to thyroid gland rupture with an unusual mechanism can occur.

1.1. Presentation of the case

An 89-year-old female patient suffered a road accident and complained of sustained anterior neck pain. She had no prior history of goiter, thyroid tumor, or thyroid disease. She had been wearing a seatbelt in the front passenger seat and was protected by the car's airbag, and her neck did not directly impact the front deck. However, she was propelled forward and struck her head on the front mirror during emergency braking. At initial presentation to the emergency department, the patient denied dysphagia, dyspnea, syncope, hoarseness, or posterior neck pain. The patient was awake and hemodynamically stable with a Glasgow Coma Scale score of E4V5M6, respiratory rate of 20 breaths/min, heart rate of 96 beats/min, blood pressure of 189/118 mmHg, and body temper-

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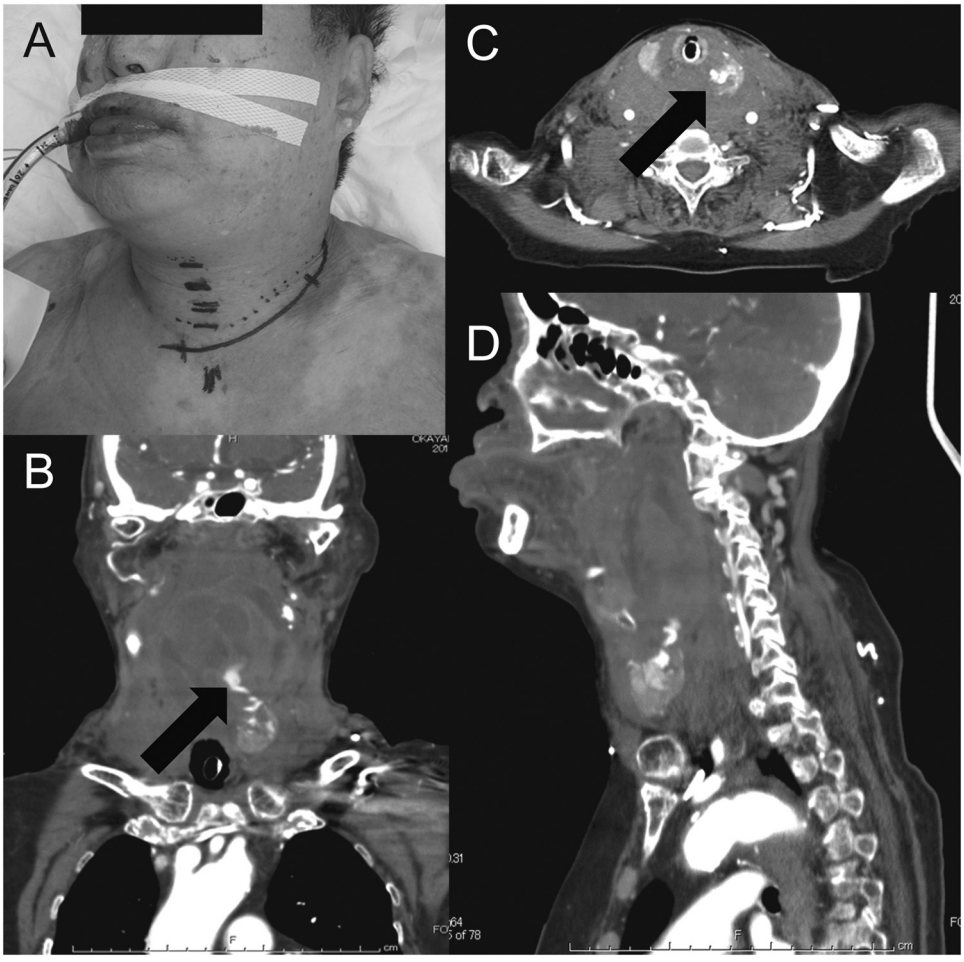

Fig. 1. Swelling in the anterior neck area prior to surgery (A). Contrast-enhanced CT demonstrated left thyroid gland lobe rupture with an extensive hematoma reaching from the thyroid to the mediastinum. An extravasation from the left thyroid artery was noted (arrow, B and C). Widening of the retropharyngeal and retrotracheal space with right deviation of trachea were noted (D).

ature of 36.7 °C. She had no neurologic deficits or limitation of neck flexion. Focused assessment with Sonography for Trauma (FAST) was implemented and showed no abnormalities; there was no sign of pneumothorax.

In the emergency room, the patient subsequently developed progressive swelling of the neck and severe dyspnea. Because a muscular and subcutaneous hematoma was suspected, a sonographic examination of the neck was performed and revealed a moderately hyperechoic, diffuse, infiltrative process, presumably a hematoma surrounding the left thyroid lobe reaching to the anterior cervical muscular strap. Soon after, the patient developed difficulty breathing and respiratory distress. She was sedated, orotracheally intubated, and immediately transferred to our emergency center.

Chest roentgenogram showed narrowing of the trachea, but no pneumothorax. Computed tomography (CT) revealed a large, encapsulated hematoma in the left thyroid gland lobe extending to the upper mediastinum. Contrast-enhanced CT showed an extravasation from the left superior thyroid artery and lacerations of the right thyroid lobe and isthmus with features suggesting massive hemorrhage. Immediately, the left thyroid artery was ligated and the hematoma was removed. There was no associated fracture of the thyroid cartilage, mandible, or bilateral first ribs. The endotracheal tube was removed 13 days later after serial imaging and softer/smaller change of neck mass. She had a favorable course without further complications and was discharged 36 days after admission and followed up on at outpatient clinics thereafter. Thyroid function tests performed one month after surgery showed results of T4 1.03 ng/dl, TSH 2.80 μU/ml, thyroglobulin 0.71 ng/ml. The patient was doing well at six-month follow-up.

2. Discussion

Thyroid injuries can result from direct or indirect trauma. Direct neck trauma can occur from either blunt trauma or penetrating injuries from car accidents, sport injuries, fights, or strangulation. The anterior neck is a site where traumatic injury often necessitates prompt surgical intervention, as it is a small anatomic area with concentrated vital structures unprotected by bone or dense musculature. Thyroid injury symptoms after blunt neck trauma include neck pain and swelling, dysphagia, respiratory distress, and voice hoarseness. The primary symptom in most cases, besides local swelling and bruising, is development of either acute or delayed dyspnea (Fig. 1).

On the other hand, thyroid hemorrhage from indirect trauma can result from muscular effort, deceleration injury, straining during defecation, or direct injuries from martial arts. Pre-existing goiter potentially makes the thyroid gland more delicate and susceptible to injury. Since adenomatous thyroid glands are more fragile, contain increased vascular flow, and lack a true capsular covering, their greater propensity for injury is easily explained. Spontaneous hemorrhage of a pre-existing thyroid cyst or nodule has also been recognized [2–4]. Our patient's anterior neck skin

did not show any abnormal signs from the secured seat belt, presumably because she had no direct contact with the front deck of the car. While the expanding airbag deployment might have contributed to hemorrhage, deceleration is more likely to have caused the shearing of the artery, leading to extravasation.

Although patients may be stable at initial presentation, life-threatening symptoms may later develop. Previously published cases reveal that patients may present with serious dyspnea 24 h after the onset of injury [1,2].

Ultrasonography is an excellent tool for initial examination of patients with suspected thyroid gland rupture. CT is an also a valuable method to help determine diagnosis, as it can show the thyroid injury and hematoma severity, as well as allow assessment of the upper digestive tract and larynx. CT angiography may be indicated when serious vascular injury is suspected. Major vessel rupture should be ruled out by arterial angiography.

In our case, early controlled oral intubation may have prevented airway compromise and allowed detailed assessment with subsequent accurate treatment of the damaged thyroid gland. Airway management may be challenging due to cervical soft tissue swelling or tracheal and laryngeal deviation. Alternative procedures such as establishment of a primary surgical airway like tracheostomy or awake fiber-optic intubation should be considered. If management of a surgical airway is required, it may obviate cricothyrotomy due to the presence of an anterior hematoma. Intubation may not be necessary in all cases, but close observation is required, as life-threatening airway compression secondary to progressive hematoma or soft tissue edema may occur later [5,6].

Since the condition is rare, management of thyroid injuries from trauma must be determined on a case-by-case basis. Treatments for direct and indirect traumas are similar and can include aspiration or evacuation of hematomas, thyroidectomy, and tracheostomy. Thyroid rupture has previously been treated either surgically or conservatively. Most published cases of traumatic thyroid hemorrhage were surgically treated by evacuating the hematoma and debriding the damaged thyroid tissue. Surgical intervention is determined based on evacuation of the rapidly extending hematoma. The retropharyngeal prevertebral space is a crucial path from the neck to the mediastinum. Deep neck infections usually follow this pathway [7–12].

If conservative therapy is chosen, close observation of the patient in the intensive care unit is recommended as long as there is a significant risk of airway compromise. Neck pressure may cause tamponade of the bleeding. Our patient was fortunately not receiving any anticoagulant therapy. Our patient's thyroid hormones were temporarily slightly destabilized. This destabilization could have been caused by sudden thyroxine release caused by thyroid gland trauma. While rare, cases of thyroid storm induced by blunt thyroid gland trauma have been reported [13].

In conclusion, once a diagnosis is finalized, if the airway is secured and vital signs remain stable, conservative treatment may be attempted unless complications from prolonged intubation are present or continuous progression of the hematoma without self-limitation is encountered. Although hemorrhage from the thyroid gland without blunt trauma is rare, emergency physicians should regard possible thyroid gland rupture in patients with swelling of the neck or acute respiratory failure after direct/indirect trauma to the neck. Airway management is the most important consideration in such patients with thyroid injury. Treatment should be customized depending on the degree of respiratory distress resulting from of either involvement of the direct airway or secondary compression. In our case, early controlled oral intubation may have prevented airway compromise and allowed detailed assessment with subsequent accurate treatment of the damaged thyroid gland.

Conflicts of interest

All authors of this manuscript declare no conflicts of interests.

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Ethical approval

This study was approved by Okayama University Hospital Ethical Committee.

Consent

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

Author contribution

Kohei Tsukahara, Keiji Sato, Tetsuya Yumoto, Atsuyoshi Iida, Nobuyuki Nosaka, Michihisa Terado, Hiromichi Naito, Mayu Sugihara and Satoko Nagao contributed to the study design, data collections, data analysis, writing and review. Yorihisa Orita, Tomoyuki Naito and Kentaro Miki performed surgery. Toyomu Ugawa and Atsunori Nakao contributed to the data collections and review.

Guarantor

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