

Original Article

# Traumatic superior thyroid artery pseudoaneurysm treated with transarterial embolization

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Traumatic aneurysms or pseudoaneurysms of the thyroid artery are rare but potentially life-threatening conditions. We report a case of a 61-year-old man who visited the emergency department due to left side neck hematoma and respiratory distress after blunt neck trauma. Endotracheal intubation was performed to secure the airway and avoid tracheostomy. A computed tomography scan of the neck with active contrast extravasation revealed a pseudoaneurysm over the left neck and tracheal deviation to the right side. Emergency angiography with embolization of the superior thyroid artery pseudoaneurysm was performed. We discuss the rarity of this condition, the etiologies of pseudoaneurysms of the thyroid arteries, and treatment options. In addition, we report that trans-arterial embolization (TAE) is a viable alternative to surgical intervention for managing pseudoaneurysms of the thyroid arteries.

**Keywords:** pseudoaneurysms; blunt neck trauma; transarterial embolization

## Introduction

Although aneurysms or pseudoaneurysms of the superior thyroid artery are rare, they may become life-threatening surgical conditions depending on their etiology and location.<sup>1</sup> The etiologies of aneurysms or pseudoaneurysms of the superior or inferior thyroid artery include

trauma, previous surgery, iatrogenic causes (e.g., vascular cannulation or radiotherapy), and infectious diseases.<sup>2</sup> Complications of neck trauma include neck mass with or without pulsation and hematoma with mass effect resulting in respiratory failure, dysphagia, and hoarseness.<sup>3</sup> Treatments for aneurysm or pseudoaneurysm include open surgery, endovascular stent graft, and observation, depending on symptoms, etiology, and location.<sup>4</sup>

We report a severe case of superior thyroid artery pseudoaneurysm with tracheal deviation to the right side caused by blunt neck trauma. The pseudoaneurysm was managed with transarterial embolization (TAE) therapy after securing the patient's airway by endotracheal intubation. The patient recovered well with early extubation and

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was discharged on the fifth day after admission. Twelve weeks of follow-up were uneventful. TAE was an effective and successful treatment for our patient, providing airway protection with minimal morbidity, namely left vocal cord palsy.

## Case Report

A 61-year-old man was brought to the emergency department (ED) due to shortness of breath and difficulty swallowing after a traffic accident. He had a history of hypertension that was not controlled with medication. He denied usage of anticoagulant agents, as well as previous coagulopathy or vasculopathy. Examination revealed blunt neck trauma with a swollen mass or hematoma (5 × 5 cm) over the left neck. His initial vital signs were: body temperature 35.4°C, heart rate 75 beats/minute, respiratory rate 24 breaths/minute, and blood pressure 169/97 mmHg. An X-ray of the neck revealed deviation of the trachea to the right side (Figure 1). Oxygen supplementation at 6 L/minute was administered through a simple mask. His respiratory rate decreased to 12 breaths/minutes after initial resuscitation. After his vital signs had stabilized, serial examinations, including physical examination and computed tomography (CT) of the neck with contrast enhancement, were arranged. The CT scan revealed a pseudoaneurysm



Figure 1. X-ray of the neck shows deviation of the trachea to the right side.

with active contrast extravasation over the left neck and tracheal deviation to the right side. A pseudoaneurysm arising from the left superior thyroid artery was diagnosed (Figure 2). An anesthesiologist was consulted for emergency intubation. The patient was given fluid resuscitation with 1500 mL of 0.9% normal saline and two units of packed red blood cells.

An otolaryngologist was consulted to evaluate the patient. However, an emergency physician decided to perform angiography first to determine the location and extent of the pseudoaneurysm. Therefore, digital subtraction angiography of the left distal common carotid artery was conducted. In addition, a microcatheter was advanced to the left superior thyroid artery, where there was pseudoaneurysm formation and contrast extravasation from the distal branch (Figure 3). The pseudoaneurysm was embolized with a 25% n-butyl cyanoacrylate injection. The patient was stabilized in the ED and then admitted to the surgical intensive care unit for further observation and management. The patient recovered well after conservative treatment. The endotracheal tube was removed on the second day after the procedure. He was discharged on the fifth day

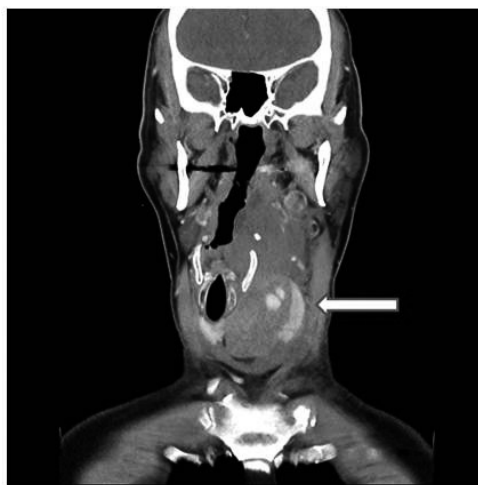


Figure 2. Contrast-enhanced computed tomography scan of the neck reveals a hematoma and pseudoaneurysm with active contrast extravasation over the left neck with tracheal deviation (arrow) in the reformatted coronal view (arrow).

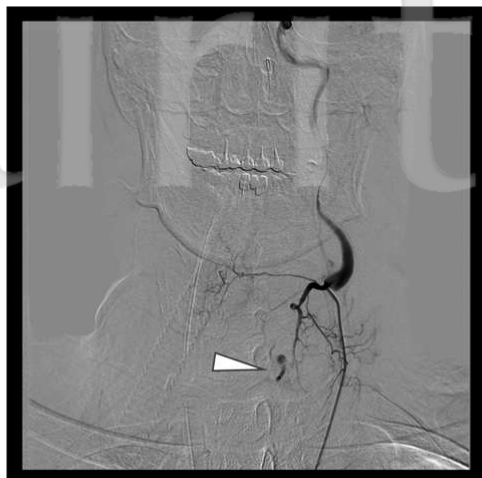


Figure 3. Angiography of the left superior thyroid artery reveals pseudoaneurysm formation and contrast extravasation from the distal branch of the left superior thyroid artery.

after admission. He received regular follow-up at the otolaryngology department for 12 weeks. Subsequent laryngoscopies revealed resolution of echymosis over the left pyriform sinus with left vocal cord palsy.

## Discussion

The presence of an aneurysm or pseudoaneurysm in the thyroid artery is extremely rare.<sup>1</sup> However, according to the relevant literature, aneurysms and pseudoaneurysms of the inferior thyroid artery are more common than those of the superior thyroid artery. More than 15 cases of aneurysm or pseudoaneurysm of the inferior thyroid artery have been reported.<sup>5</sup> The causes of aneurysm include atherosclerosis, blunt neck trauma, iatrogenic causes (e.g., venous catheterization, needle biopsy of adjacent organ, or radiotherapy), invasion of head or neck tumor, and spontaneous rupture.<sup>4,6</sup> Cases of aneurysm of the superior thyroid artery are less common. In all, eight cases of aneurysm or pseudoaneurysm of the superior thyroid artery have been reported.<sup>1,7-9</sup> Most have been due to iatrogenic causes including arterial lesions after ultrasound-guided chemical parathyroidectomy, central venous catheterization, radiotherapy, and revision of tracheostomy. This is the first reported

case of a pseudoaneurysm of the superior thyroid artery after blunt neck trauma and has no similarity to previous cases.

Symptoms of aneurysm include neck mass, hematoma with mass effect resulting in respiratory failure, dysphagia, and hoarseness. Brightness-mode sonography and color imaging, CT angiography (CTA), and magnetic resonance imaging are used to diagnose aneurysms and pseudoaneurysms. In the ED, the most frequently used diagnostic method for aneurysms or pseudoaneurysms of the thyroid artery is CTA.<sup>3</sup> CTA not only determines the location and extent of the lesion, but also whether a hematoma is present or absent. Treatments for aneurysms or pseudoaneurysms of the neck include conservative compression and packing,<sup>8</sup> surgical repair or ligation,<sup>5</sup> endovascular therapy including embolization and the use of a sclerosing agent,<sup>4,5</sup> and combinations of these techniques.<sup>2,10-11</sup> Kieu et al. reported the case of a spontaneous rupture of a superior thyroid artery aneurysm that was managed conservatively after failed embolization.<sup>8</sup> Surgical repair of aneurysms was frequently reported between 1970 and 1980.<sup>5</sup> Surgical exploration enables the direct removal of hematoma, direct repair of lesions, and definitive diagnosis according to pathology. Stenner et al. reported a case of a spontaneous rupture of the superior thyroid artery that was managed with embolization followed by surgical exploration.<sup>2</sup> In addition, Pop et al. reported a case of an inferior thyroid artery aneurysm treated with TAE followed by surgical excision. The pathology report revealed medullary carcinoma.<sup>10</sup> However, open surgery can result in complications such as difficulty controlling bleeding, injury to the recurrent laryngeal or phrenic nerve, and infection of the wound site.<sup>4,10</sup>

Endovascular treatments are safer and less invasive than open surgery and can be promptly performed using therapeutic procedures such as coil embolization or sclerosing agent injection. These treatments have been reported to be more effective for both diagnosis and treatment.<sup>2,4</sup> Ernemann et al. reported the case of a ruptured pseudoaneurysm of the superior thyroid artery due to radiation vasculopathy in hypopharyngeal cancer managed with embolization.<sup>6</sup> Lee et al. reported the case of

an inferior thyroid artery aneurysm successfully managed using embolization.<sup>4</sup> Neurological and vascular complications can result from TAE.<sup>1, 12</sup> Neurological complications include transient ischemic attack or ischemic stroke due to decreased blood flow.<sup>1</sup> Varetto et al. reported a patient with pseudoaneurysm over the superior thyroid artery who developed transient ischemic attack during TAE. The procedure was terminated. Two days later, the patient successfully received surgical exploration under local anesthesia.<sup>1</sup> Vascular complications include dissection, non-target-organ embolization, and iatrogenic aneurysms.<sup>12</sup>

Endovascular therapy has some limitations. In cases of intractable hemorrhage or recurrent aneurysms, surgical repair remains the preferred treatment. Hasegawa et al. reported a case of an enlarged aneurysm over the right subclavian artery that was managed surgically 10 days after successful embolization (11). Prompt surgical consultation should always be considered in cases of failed embolization or in recurrent cases. Furthermore, hematomas resolve more slowly after embolization than after direct surgical removal, which might lead to delayed extubation (5). A traumatic pseudoaneurysm of the inferior thyroid artery has been reported (6). However, there have been no reports of trauma-induced pseudoaneurysm of the superior thyroid artery. Our patient represents the first reported case of a superior thyroid pseudoaneurysm after blunt neck trauma. His pseudoaneurysm was managed successfully with embolization. His hospital course was short and the morbidity, left vocal cord palsy, was minimal. Our study provides an alternative treatment for patients with aneurysm or pseudoaneurysm of the superior artery.

## Conclusions

Pseudoaneurysms of the superior thyroid artery are extremely uncommon. However, they are potentially life-threatening conditions. In the ED setting, CTA is the most common diagnostic modality. Angiography is both a diagnostic modality and an alternative therapeutic method. Depending on the imaging findings, anatomical location, and patient

risk, catheter intervention provides a safe and effective treatment option and is a recommended alternative for managing pseudoaneurysms or aneurysms of thyroid artery.

## Conflicts of interest

The authors declare that they have no conflicts of interest.

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