




Case Report

Successful interventional management of mediastinal hematoma caused by thyroid ima artery injury

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Background: The thyroid ima artery (ThIA) is a rare anatomical anomaly, commonly branching from the brachiocephalic artery. Thyroid ima artery injury can cause severe mediastinal hematoma because its descending branch extends into the mediastinum.

Case presentation: A 91-year-old man presented with syncope after a motor vehicle accident. A bruise on the chest was evident. Contrast-enhanced computed tomography revealed a massive mediastinal hematoma with signs of active hemorrhage. Injury to a descending branch of the ThIA was indicated. Transcatheter arterial embolization (TAE) was successful in stopping the bleeding.

Conclusions: Although a ThIA injury is rare, it can cause serious mediastinal hematoma. Thyroid ima artery injury should be considered as a cause of traumatic mediastinal hematoma. Transcatheter arterial embolization for traumatic ThIA injury is considered a safe and effective treatment.

Key words: Inferior thyroid artery, mediastinal hematoma, thyroid ima artery (ThIA), transcatheter embolization (TAE), trauma

INTRODUCTION

THE THYROID IMA artery (ThIA) is a rare vascular variation, running in front of the trachea. Often originating from the brachiocephalic artery, the ThIA provides an auxiliary blood supply to the inferior thyroid and thymus.¹ It has a branch extending into the mediastinum that can be damaged by chest trauma and can lead to mediastinal hematoma. Although aortic injury, internal thoracic artery injury, or sternum fracture are often responsible for traumatic mediastinal hematomas, ThIA injury can also cause hemorrhage into the mediastinal cavity. Here, we report a unique case of massive mediastinal hematoma resulting from ThIA injury after blunt chest trauma, which was successfully treated with angioembolization.

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CASE REPORT

THE PATIENT WAS a 91-year-old man with a medical history of chronic obstructive pulmonary disease and benign prostatic hyperplasia.

While driving, he accidentally stepped on the accelerator pedal instead of the brake and he crashed into a wall. His car's airbag deployed but it was not clear whether he had been wearing a seatbelt. After the accident the patient visited a nearby orthopedic surgeon. He was discharged with a diagnosis of rib fracture, but 6 h later he fainted at home and was admitted to our hospital. His vital signs at that time were: heart rate, 145 b.p.m.; blood pressure, 123/86 mmHg; respiratory rate, 26 breaths/min; body temperature, 36.1°C; and Glasgow Coma Scale 15. Paradoxical breathing was apparent. Physical findings showed a bruise on the upper part of the sternum and depressed chest on the left lower side of the sternum. No symptoms related to shock, such as pale or clammy skin, were evident.

A chest X-ray showed an enlargement of the upper mediastinum. Arterial phase of contrast-enhanced computed tomography (CT) revealed a mediastinal hematoma with active arterial hemorrhage (Fig. 1A). In addition, a sternum fracture, multiple rib fractures, and a bilateral hemothorax were observed. Based upon the arterial phase of contrast-

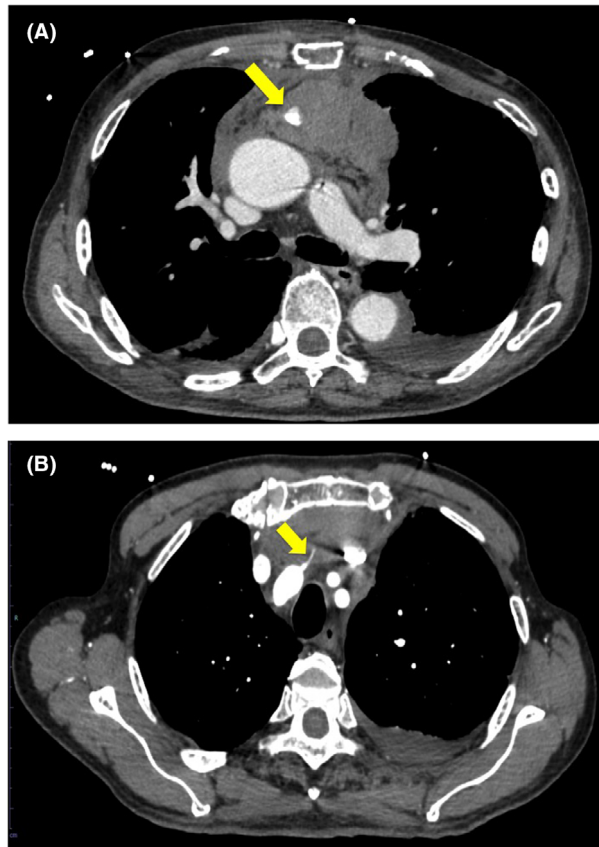


Fig. 1. Computed tomography (CT) scans of a 91-year-old man with thyroid ima artery injury. A, Arterial phase of contrast-enhanced CT showing a mediastinal hematoma with active arterial hemorrhage (arrow). B, Arterial phase of contrast-enhanced CT showing the thyroid ima artery originating from the brachiocephalic artery (arrow).

enhanced CT, injury to the descending branch of the ThIA, which possibly originated from the brachiocephalic artery (Fig 1B), was suspected.

We undertook transcatheter arterial embolization (TAE) because the mediastinal hematoma was large enough to result in exacerbation of obstructive and/or hemorrhagic shock. Angiography showed that the ThIA did indeed originate from the brachiocephalic artery (Fig. 2). To carry out TAE, the brachiocephalic artery was selected with 5-Fr catheterization (Headhunter catheter; Medikit, Tokyo, Japan) and then the ThIA branch was selected with a 2-Fr microcatheter (LIGHTHOUSE; Piolax, Yokohama, Japan). Extravasation was imaged (Fig. 2). Transcatheter arterial embolization of the descending branch of the ThIA was carried out with a gelatin sponge and two micrometal coils (2 mm × 4 cm and 2.5 mm × 6 cm). Hemostasis was

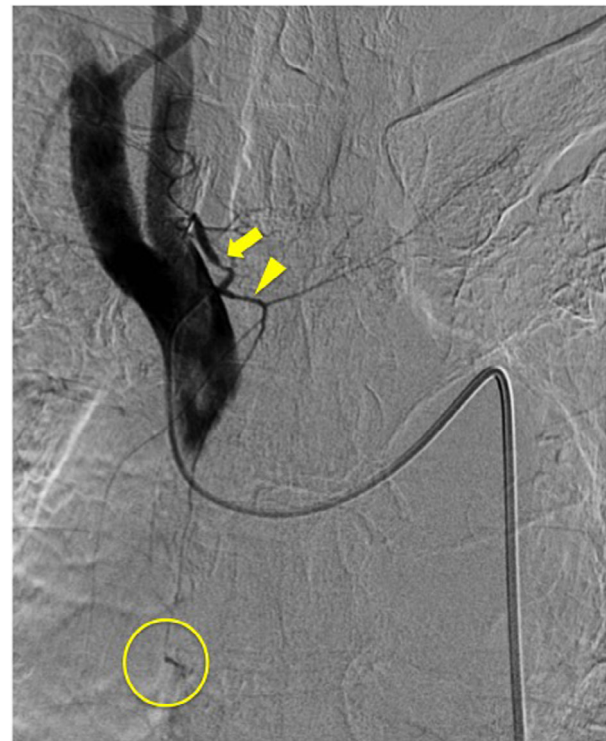


Fig. 2. Angiography of a 91-year-old man showing the thyroid ima artery originating from the brachiocephalic artery and extending to the thyroid gland (arrow) and mediastinum (arrow-head). Extravasation was observed from the branch toward the mediastinum (circle).

successful and the patient's heart rate decreased to 87 b.p.m. No complications related to the catheterization procedure arose. However, the next day, the patient required ventilator support. Although surgery for flail chest was undertaken on the 8th day of hospitalization, tracheostomy was ultimately required due to prolonged ventilator dependence. Subsequently, the patient was transferred to a different hospital for rehabilitation.

DISCUSSION

THE PREVALENCE OF ThIA in the population varies from 0.4% to 12.2% according to different reports.² Sannomiya *et al.*³ reported that the ThIA most often branches from the brachiocephalic artery (74–100%) with branches from the common carotid artery (0–14.3%), internal thoracic artery (0–7.4%), and aortic arch (0–6.7%) also seen. Given its origin from arteries under high pressure, injury to the ThIA can induce severe hemorrhage and blood loss unless prompt hemostasis is achieved.

Table 1. Review of transcatheter arterial embolization (TAE) of thyroid artery for traumatic injury

Author	Age (years)	Sex	Trauma	Symptoms	Other trauma	Therapy	Bleeding vessels
Suzuki <i>et al.</i> , 2020 ⁶	40s	Female	Traffic accident	Cervical swelling, dysphagia, chest pain, severe fatigue	None	TAE + Ope	Right inferior thyroid artery
Wang <i>et al.</i> , 2015 ⁷	16	Female	Stabbed	Pulsatile mass	N/A	TAE	Superior thyroid artery
Wang <i>et al.</i> , 2015 ⁷	28	Female	Stabbed	Pulsatile mass	N/A	TAE	Superior thyroid artery
Calogero <i>et al.</i> , 2015 ⁸	80	Male	Fall at same level	Dysphagia	Head bruise	TAE	Left inferior thyroid artery
Glykeria <i>et al.</i> , 2010 ⁹	72	Male	Traffic accident	Neck swelling, airway obstruction	None	TAE	Right inferior thyroid artery
Sharma <i>et al.</i> , 1994 ¹⁰	19	Male	Metal fragment	Slowly growing thyroid mass	None	TAE + Ope	Left superior thyroid artery
This case	91	Male	Traffic accident	Syncope	Multiple rib fractures, sternum fracture	TAE	Thyroid ima artery

Hemostasis was successful in all cases except one, reported by Suzuki *et al.*,⁶ and there were no complications. N/A, not applicable; Ope, surgical operation.

The inferior thyroid artery often originates from the thyrocervical trunk artery,⁴ with no reports of it originating from the brachiocephalic artery.

We considered the embolized artery was a ThIA because it originated from the brachiocephalic artery and branched into the thyroid gland and thymic region.

Mediastinal hematomas can result from a variety of causes, including trauma, ruptured aneurysms, tumors, and increased intrathoracic pressure.⁵ They are often treated conservatively, but surgery could be required if the mediastinal hematoma enlarges sufficiently to compress the heart.⁶ Transcatheter arterial embolization is another active hemostasis technique that is less invasive than surgery and could be effective in treating traumatic mediastinal hematoma with arterial bleeding.

Injury to the thyroid artery is a rare trauma; searching for “thyroid artery” and “embolization” using PubMed revealed only six cases of TAE for a traumatic injury to the thyroid artery (Table 1). Hemostasis was obtained in five of these six cases, and there were no complications. In the case reported by Suzuki *et al.*, surgery was carried out following TAE, which had the purpose of removing the hematoma in addition to achieving hemostasis. Although surgery is more invasive than TAE, it can not only stop bleeding but also

provide drainage. Whether to perform surgical hemostasis or TAE should be decided by considering the advantages and disadvantages of each. Although undertaken in only a limited number of cases, TAE for a thyroid artery injury is considered to be an effective and safe treatment.

When extravasation is imaged in the thyroid area, damage to the superior thyroid artery or inferior thyroid artery is easily conceivable. In addition, when extravasation is observed in the mediastinal region, internal thoracic artery injury is likely. Thyroid ima artery is a rare vascular variation that is difficult to identify but can be a source of bleeding in both areas. Emergency care physicians should be aware that mediastinal hematomas can be caused by ThIA injuries, and that the ThIA often originates from the brachiocephalic artery.

CONCLUSIONS

THE THIA IS a rare cervical vascular variation originating from the brachiocephalic artery. Emergency care physicians should recognize that injury to the ThIA could be responsible for massive mediastinal hematoma after blunt chest trauma. Selective embolization of ThIA can be safe and sufficient to resolve shock.

DISCLOSURES

Approval of the research protocol: N/A.

Informed consent: Written informed consent was obtained from the patient for publication of this case report and accompanying images.

Registry and registration no. of the study/trial: N/A.

Animal studies: N/A.

Conflict of interest: None.

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