

Arteriovenous fistula following total thyroidectomy treated with angioembolization

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Keywords

arteriovenous fistula, thyroidectomy, embolization, interventional radiology, iatrogenic

Abstract

the development of an arteriovenous fistula as a complication following a thyroidectomy is a rare phenomenon. We report a case of a 24 year old man who developed this unusual complication post operatively. The fistula was detected during a routine follow up 3 months after the surgery when he complained of a vibration in his neck. Diagnosis of an abnormal communication between the right superior thyroid artery and the internal jugular vein was demonstrated by performing a Computed Tomography Angiography (CTA). He was successfully treated with embolization and coiling of the aneurysm.

Introduction

The development of an iatrogenic arteriovenous fistula following different types of surgical procedures have been documented multiple times throughout the years[1-2]. Thyroid surgery is a commonly performed surgical procedure with many well recognized complications. Despite the large volume of surgeries performed each year, only 15 cases of an iatrogenic arteriovenous fistula developing post thyroidectomy have been reported in English literature, dating back to the beginning of the 20th century[1-5]. All reported cases resolved after intervention, which previously mandated surgical excision of the fistula[2-3]. With the availability of modern imaging machines for diagnosis and skilled interventional radiologist, the minimally invasive approach is preferred and the fistulous communication can be successfully treated with embolization[1,5].

Case Presentation

A 24 year old man was referred to us from the Endocrine unit for surgical excision of a diffuse toxic goitre which was

causing compressive symptoms. He was diagnosed with Graves' disease 2 years earlier and was on Carbimazole 10mg daily. He complained of occasional dysphagia. Clinically he had a moderately enlarged goitre with thyroid ophthalmopathy.


the patient underwent a total thyroidectomy. Intraoperatively, the thyroid gland was enlarged with engorged veins. The recurrent laryngeal nerves and the parathyroids were identified and preserved. No difficulties were encountered during the operation. He recovered well and was discharged after 4 days. Histopathological examination of the gland confirmed a benign diffuse hyperplasia of the thyroid gland, consistent with Graves' disease.

He was seen one month after the operation in the outpatient clinic. He had recovered well and no abnormalities were noted on physical examination. However, during his second follow up 2 months later, he complained of an unusual vibration over the right side of his neck. He had noticed it during the preceding few weeks. As it was not causing him much discomfort, he did not immediately seek any medical treatment. No other symptoms were reported. On physical examination, the thyroidectomy scar had healed well and there was no neck swelling. An obvious thrill was felt over the right side of his neck just lateral to the trachea. The trachea was not deviated. There were no palpable lymph nodes. On auscultation, a bruit was heard. Distal pulses were equal. The rest of his examination was unremarkable.

The diagnosis of an iatrogenic arteriovenous fistula was suspected. An ultrasound of the neck was performed followed by a CT angiography which confirmed an abnormal communication between the right superior thyroid artery and a tributary of the right internal jugular vein (IJV), likely to be the lingular vein. The width of the fistula was 0.3cm, resulting in dilatation of the superior thyroid artery, early filling and dilatation of the IJV tributary. He underwent an angioembolization with coiling. The procedure was successful and the patient returned home the following day following a 24 hour period of observation. During his follow up one month later, he was asymptomatic and his physical examination of the neck was normal with no residual thrill or bruit.

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Received: 10-08-2021 Accepted: 24-10-2022

DOI: <http://doi.org/10.4038/sljs.v40i3.8878>



Discussion

Iatrogenic arteriovenous fistulas following a variety of surgical procedures have been reported in literature. Procedures include lumbar disc surgery, abdominal surgeries including nephrectomy, splenectomy, small and large bowel, gastrectomy and gynaecological procedures such as hysterectomy, mastectomy, surgery of the extremities and lymph node biopsies[1,2].

Despite the large volume of thyroid surgeries that are performed world wide each year, the development of an arteriovenous fistula as a complication of thyroidectomy has rarely been seen.

The development of such a phenomenon is assumed to be caused by a penetrating injury to the artery and vein which causes the abnormal communication to develop, as occurs when a suture needle is passed through the vessels for ligation or during *en masse* suture ligation of the two vessels[2]. The vessels most commonly involved are the superior thyroid artery and the adjacent superior thyroid vein, occasionally the internal jugular vein is directly affected[1,3,5].

Symptoms are usually mild due to local effects, with patients complaining of a neck mass[3-5], compressive symptoms[3,5] or a buzzing sensation felt in the neck or heard in the ears[3,4]. Some patients remain asymptomatic for years and only present decades later[4]. Only one case has been reported where a true steal phenomenon developed and the patient presented with symptoms of cardiac failure[3]. In this case, the fistula had developed between the thyrocervical trunk and the transverse cervical vein.

Diagnosis is confirmed through imaging. In our case, an ultrasound of the neck followed by a CT angiography were performed which clearly identified the abnormal communication between the vein and artery.

In the past, all cases were treated by surgical excision of the fistula[2-4]. With the advancement in interventional radiology, this condition can now be treated by embolization and unnecessary surgical intervention can be avoided. This method of treatment was successfully reported by Jensovsky in 2000 and Gonen in 2011[1,5]. Our patient underwent treatment with selective angioembolization. The risks of general anaesthesia and a repeated neck dissection were avoided. The procedure was well tolerated and caused minimal discomfort to the patient. During follow up, the patient was satisfied with the outcome and he reported complete symptom resolution.

Conclusion

The development of an arteriovenous fistula following a thyroidectomy is a rare complication of a commonly performed surgery. Prevention requires meticulous surgical technique with clear identification of the feeding vessels to the thyroid and careful ligation of each individual vessel is important. Mass ligation should be avoided. Open surgical excision has now fallen out of favor due to advances in interventional radiology, which allows both confirmation of diagnosis and definitive treatment with angioembolization. Complete resolution of symptoms has been seen in all cases with no reports of recurrences.

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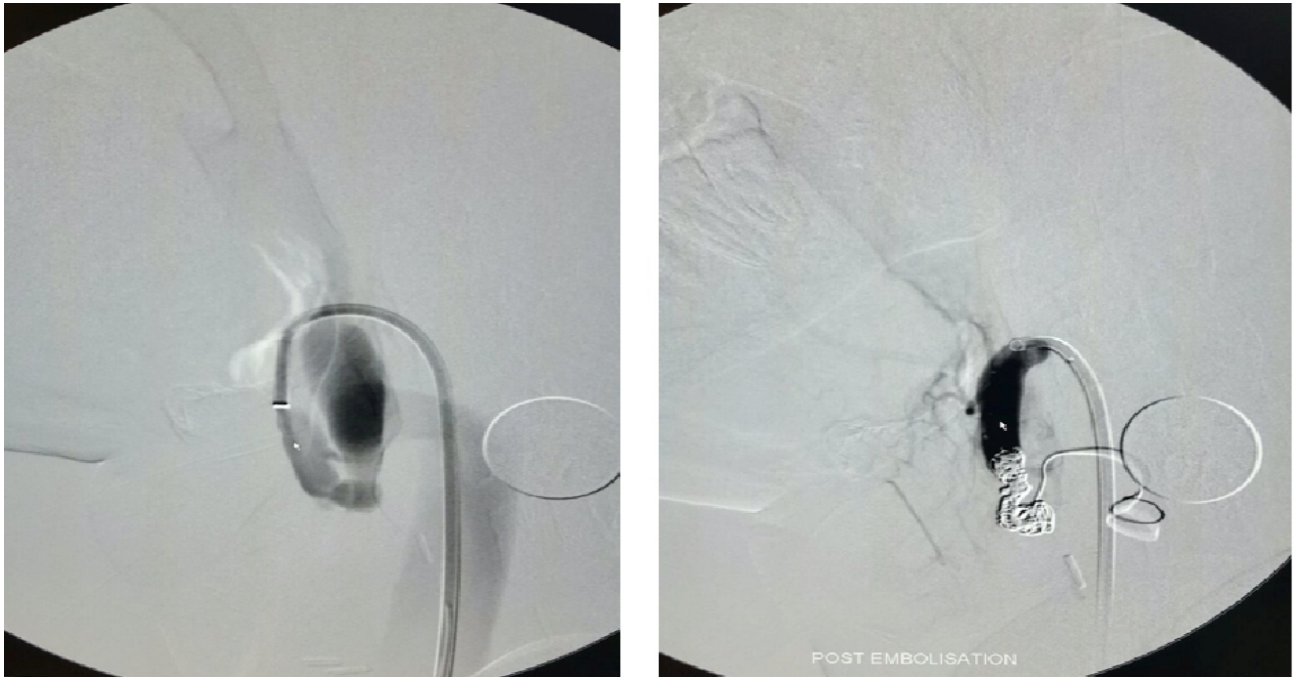


Figure 1 CTA demonstrating an abnormal communication between the right superior thyroid artery and a tributary of the right internal jugular vein

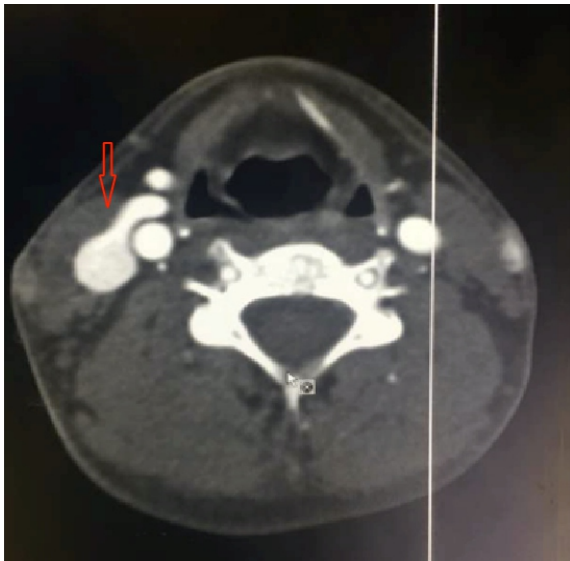


Figure 2 : Fistula between the Superior Thyroid Artery and the Internal Jugular Vein (White arrow pointing to Superior Thyroid Artery) & Post embolization : Contrast no longer visualized in the Internal Jugular Vein (white arrow)

Learning Points:

- An iatrogenic arteriovenous fistula can generally be avoided by adhering to meticulous surgical technique
- Confirmation of diagnosis can be easily achieved by non invasive methods, i.e ultrasound and CT angiography
- Interventional radiology offers a minimally invasive method to confirm diagnosis and treat this condition, and open surgery can be avoided in most cases