

# Common carotid artery surprise during percutaneous dilatational tracheostomy – A near miss, confirmed with ultrasound

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## ABSTRACT

The practice of percutaneous dilatational tracheostomy (PDT) has gained popularity and acceptance due to the ease in acquiring its skill and low probability of complications. Nevertheless, PDT is associated with a few complications, some really life-threatening. We present a case of an abnormally located common carotid artery encountered during PDT in our intensive care unit. The procedure was electively posted, in an old patient chronically ventilated after a revived cardiac arrest. While identifying the landmarks on palpation pulsation was felt similar to arterial pulsation. This was confirmed using bedside portable ultrasonography and found to be the right common carotid artery forming a loop anterior to the trachea at the level of the third and fourth tracheal rings. The patient had a past history of thyroidectomy and this was suspected to be the primary reason for the altered course of the right common carotid artery.

**Key words:** *Percutaneous dilatational tracheostomy, ultrasound*

## INTRODUCTION

Percutaneous dilatational tracheostomy (PDT) is invariably being done as a bedside procedure in almost all intensive care units (ICUs) around the world. The use of a fiberoptic bronchoscope and ultrasound in PDT is already known.<sup>[3,7]</sup> We present a case where the common carotid artery had altered its course to lie anterior to the trachea which was confirmed with ultrasound.

## CASE REPORT

An 80-year-old woman with a history of collapse at home was admitted to Emergency when she had a cardiac arrest and was successfully resuscitated and intubated. She also had diabetes mellitus, hypertension, and atrial fibrillation. She had a past history of total thyroidectomy.

While she was ventilated in the ICU she developed pneumonia, was treated and extubated. She had another episode of respiratory distress and needed re-intubation, was ventilated and shifted to our hospital.

On admission she had an episode of upper gastrointestinal bleeding which was treated endoscopically. She got infected with acinetobacter in the sputum, had bilateral pleural effusion and was unweanable from the ventilator. Considering the status of the patient a decision was taken to do the PDT electively. This was expected to facilitate the weaning from the ventilator or as a therapeutic measure considering the uncertainty of duration of the ventilator support.

Her past history of thyroidectomy was considered in expecting an altered anatomy and difficulty in identifying the landmarks during PDT. The patient was positioned for PDT and prepared and draped. On identification of landmarks with palpation, a pulse was felt which is unusual at the midline of the trachea at the level of the third and fourth tracheal rings. The pulse was rhythmic with the monitor which confirmed the presence of an artery. The artery was traced superiorly and inferiorly and it was seen that it became lateral to the trachea on the right side.

The confirmation of this distortion was done by ultrasound guidance (sonosite M turbo - USA) with a high-frequency

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linear probe. The sonoanatomy revealed that the right common carotid artery after emerging in the neck ascended in the neck very close to the trachea and formed a loop anterior to the trachea at the level of the third and fourth rings and ascended laterally further before dividing into the external and internal carotid arteries [Figure 1]. There were no other abnormalities seen in the vasculature either on the right side or left side. The procedure was abandoned citing the abnormal anatomy and expected difficulties in the PDT. The case was referred to thoracic surgery for surgical tracheostomy and the findings on ultrasound were confirmed during surgical tracheostomy [Figure 2]. There was presence of fibrous tissue lateral to the trachea on both sides, on the right the common carotid artery was found adherent to the tracheal wall and forming a loop anterior to the trachea. The surgical tracheostomy was done successfully.

## DISCUSSION

Many procedures are being done in the ICUs at the bedside. These include minimally invasive procedures like PDT, percutaneous endoscopic gastrostomy (PEG), and inferior vena cava (IVC) filter placement.<sup>[1]</sup> Ciagli and colleagues first described PDT in 1985. It gained popularity in the last two decades. PDT is being practiced anticipating ease in acquiring skills, low probability of complications and cost-effectiveness. What made PDT more promising was the difference in blood loss which was minimal, both perioperatively and postoperatively.

Although PDT started relying on surface markings for the correct site of placement, tracheal endoscopy and ultrasound guidance added later, enhanced the safety of the procedure. The endoscopy helped in correct placement of the seeker needle in the midline and also in avoiding extratracheal insertion which can result in hypoxia,

subcutaneous emphysema, esophageal puncture and hemothorax. The use of ultrasound helped in identifying the landmarks on the skin. Moreover the ultrasound also guided in identifying the thyroid isthmus and blood vessels and prevented the puncture of abnormally located vessel.<sup>[3]</sup> The ultrasound guidance for PDT is also known to be feasible in patients who are morbidly obese and who need to have cervical spine precautions.<sup>[4]</sup> Major bleeding requiring surgical intervention and or transfusion occurred in 5% of cases. These were all from venous causes. Minor bleeding like ooze requiring pressure control occurred in 20% cases.<sup>[2,6,7]</sup> There are reports of fatal arterial bleeding during and after PDT.<sup>[5,6]</sup>

Schlugman and colleagues reported subclavian arterial bleeding leading to death during PDT.<sup>[5]</sup> Their patient also had a previous history of thyroid surgery leading to alteration in the course of the subclavian artery. Hatfield and colleagues found that the common carotid artery lay in the immediate paratracheal position in two out of 30 patients and half of them had anterior jugular veins.<sup>[8]</sup> Muhammad and colleagues reviewed 497 PDT procedures and found that in none of the cases the left brachiocephalic vein crossed the trachea.<sup>[9]</sup> There is evidence of a subclavian artery crossing the trachea anteriorly, only if it is anomalous, where it is termed as the aberrant right subclavian artery (ARSA).<sup>[10]</sup> Similarly, an anomalous innominate artery crossing anterior to the trachea below the thyroid isthmus and then dividing into the right and left common carotid arteries has also been reported.<sup>[11]</sup>

In addition to these anomalies, a past history of partial or total thyroidectomy causing fibrosis and leading to tethering of vessels to the trachea and causing loops or bends has also been reported.<sup>[5]</sup> Our patient had a past history of thyroidectomy. This might have caused fibrosis and tethering of the right common carotid artery, to alter

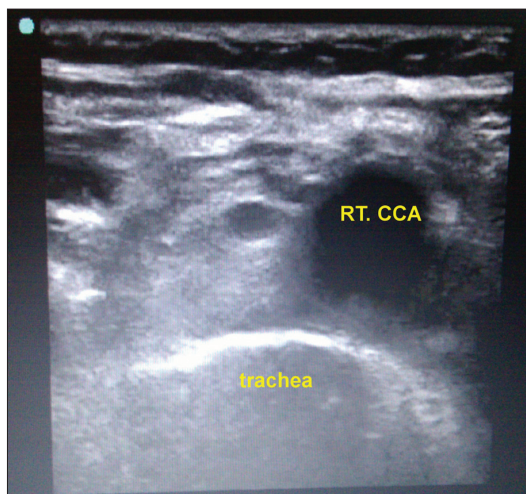


Figure 1: Ultrasound image

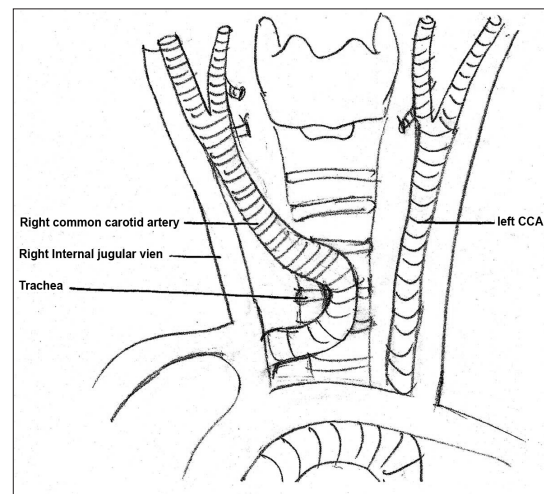


Figure 2: Course of the artery

its course as far as making the artery anterior to the trachea at a point.

We feel that proper positioning of the patient, landmark identification and palpation before starting the procedure helped us in identifying the pulsation which was later confirmed with the ultrasound. A fatal catastrophe would have occurred if PDT had gone through, which was avoided in this patient.

We conclude by recommending that the use of ultrasound guidance should become routine in performing PDT.

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