

Damage to the superior thyroid artery as a complication of Central venous catheterisation – An infrequent occurrence

K Senevirathne¹, H Ganegedara², A Jayasinghe³, K B Galketiya⁴, V Pinto⁵, A H Abayasinghe⁶

¹ Registrar in Emergency Medicine, Teaching Hospital Peradeniya

² Senior Registrar in Anaesthesia, Teaching Hospital Peradeniya

³ Registrar in Anaesthesia, Teaching Hospital Peradeniya

⁴ Consultant Surgeon, Teaching Hospital Peradeniya

⁵ Consultant Anaesthetist, Teaching Hospital Peradeniya

⁶ Temporary Lecturer, Department of Anaesthesiology

Abstract- Haemorrhagic complications of central venous catheterization (CVC) are well recognized. Accidental damage to carotid artery during CVC is frequently documented with accepted management guidelines. Acute respiratory distress due to complications of CVC is less frequent. However arterial damage causing acute life threatening respiratory distress with stridor is more infrequent. This causes a diagnostic challenge and difficulties in management due to the distortion of the anatomy of the larynx due to bleeding in to the anterior compartment of the neck. There are few reports of damage to thyroid arteries following CVC insertion. We report infrequent occurrence of the damage to superior thyroid artery and thyroid gland which caused acute stridor due to airway compromise. Our initial diagnosis was the more frequent damage to common carotid artery which was managed conventionally until the rapid onset of stridor and hypoxia. It necessitated immediate intubation using a narrow gauge endotracheal tube to overcome acute airway obstruction followed by surgical repair of the superior thyroid artery and evacuation of haematoma.

Index Terms- Central venous catheters, Superior thyroid artery, Thyroid

I. INTRODUCTION

With an estimated 2.1 million central venous catheters (CVCs) being inserted annually, it is likely that unreported complications would occur rarely. Relevant extensive literature have revealed the nature and frequent causes of complications, varying from experience of operator, unsafe manipulation of dilators to patient factors such as severe dehydration and morbid obesity.¹⁻⁵ Associated morbidity and mortality due to infections, mechanical and thrombotic complications remain major concerns. Haemorrhagic complications following damage to the carotid artery continues to be the commonest complication reported.⁴⁻⁶ The use of ultrasonography or Doppler guidance, though often lacking in many hospitals in developing countries has considerably decreased this occurrence.⁷ However, severe respiratory distress may cause diagnostic dilemmas though reported following a pneumothorax, haemothorax and a mediastinal haematoma after CVC cannulation.³ We report puncture of the superior thyroid artery and right lobe of thyroid

gland resulting in a large haematoma causing severe respiratory distress. The rapid onset of airway compromise due to distortion of the upper respiratory tract, presenting as a life threatening complication was novel to us as we were unable to identify this cause from the literature available to us.

II. CASE REPORT

A 65 year old male with a history of hypertensive heart disease of 10 years duration and dyslipidaemia diabetes mellitus and chronic renal failure for 6 years. He was admitted to our hospital with right lower limb cellulitis and increasing blood urea (39.9 mg/dl), serum creatinine (1056 µmol/l) and serum potassium (6.5 mmol/l). Treatment for cellulitis was initiated and haemodialysis was planned using a 12Fr 17cm gauge double lumen CVC. Patient's clotting profile was normal and the neck examination was normal except short neck. Insertion was carried out by the surface marking and palpation technique, by an experienced medical officer using a higher approach for the right internal jugular vein, venepuncture was assumed following the evidence of "venous" blood. A progressively enlarging swelling of the neck was observed followed by the guide wire and dilatation. Procedure was abandoned, cannula was withdrawn and continuous firm pressure applied for 10 minutes. Patient experienced a respiratory distress with stridor (respiratory rate of 35/min and SpO₂ 94% with 60% via venture mask) during the following 20 minutes. The patient was immediately transferred to the operating theatre and airway was secured with endotracheal intubation Laryngoscopy revealed distortion of laryngeal anatomy and a Comark and Lehane grade IV and a difficult intubation was successful only with size 6 tube.

The initial diagnosis of carotid haematoma was evaluated by ultrasound scan which revealed pseudo-aneurysm probably arising from the right common carotid artery and thrombosis at the distal end and a large haematoma displacing the larynx and trachea.

Clotting profile revealed a platelet count of 316 x 10⁹, and an INR of 1.16 seconds, Bleeding time 3.5 min and

The patient was transferred to the ICU and ventilated a clotting time of 9.5 min. Thromboelastography revealed absence of any coagulation defects.

As the serum potassium had risen to 7.4mmol/l due to his renal failure, a decision was made to dialyse the patient to normalize the serum potassium prior to surgical exploration. A femoral vascular catheter was inserted for dialysis. Use of heparin became contentious as expansion of the haematoma was feared and dialysis was carried out without use of heparin. After a single cycle of dialysis, neck exploration was carried out which revealed a large haematoma but acute bleeding and intact right common carotid artery eliminating the diagnosis of the pseudo aneurism. The surgical dissection was extended and punctures of the superior thyroid artery and upper pole of the right lobe of the thyroid gland were detected. With a Subclinical enlargement of the thyroid gland. The artery was repaired and the haematoma was evacuated. Following close observation, the patient was extubated 24 hours after surgery and transferred to the ward.

III. DISCUSSION

In this patient, ultrasonographic guidance would have prevented the infrequent complication of puncture of the superior thyroid artery and the right lobe of the thyroid gland. Frequency of carotid artery puncture ranges from 6% to 25% often associated with bleeding and a large Other vessels reported to be perforated during insertion of central venous catheters include the subclavian artery (0.1%– 1%), innominate artery (2 40%) and vertebral artery (0.2%).^{5 6 8} Puncture of a lobe of the thyroid gland has not been reported to the best of our knowledge. However, excessive rotation and extension of the head is known to increase the likelihood of puncture of adjacent structures.^{4 9}

This patient developed stridor within few minutes of cannulation. An expanding haematoma due to the puncture of superior thyroid artery and the thyroid gland which closely surrounds the larynx and trachea would Have caused the early onset of stridor Diagnosing this condition early is important as this would cause difficulty during endotracheal intubation due to laryngeal oedema and the anatomical displacement of the upper airway due to the haematoma challenging the management.

IV. CONCLUSION

If rapidly expanding haematoma occurs following insertion of a CVC with sudden onset of respiratory distress, the possibility of puncture of a superior thyroid artery or thyroid gland should be suspected. Subclinical enlargement of the thyroid gland is a risk factor for an accidental puncture during

CVC insertion. This complication necessitates close monitoring of respiratory and cardiovascular parameters to detect early signs of airway obstruction to enable quick intervention.

Declaration of interest: none

REFERENCES

- [1] Pauline M. Accidental carotid artery catheterization during attempted central venous catheter placement: a case report. *AANA Journal*. August 2012; 80(4):251-255
- [2] Bowdle A. Vascular Complications of Central Venous Catheter Placement.
- [3] Evidence-Based Methods for Prevention and Treatment. *J of Cardiothoracic and Vascular Anesthesia*. 2014; 28: 358–68
- [4] Rajinikanth J, Stephan E, Agarwal S. Complications of central venous cannulation. *Can J Surg*. Oct 2008; 51(5): 113-4
- [5] Schummer W, Schummer C, Frober R. Internal jugular vein and anatomic relationship at the root of neck. *Anasth Analg*. 2003; 96:1540.
- [6] Oliver WC, Nuttall GA, Beynen FM, et al. The incidence of artery punctures with central venous cannulation. *J Cardiothorac Vasc Anaesth* 1997; 11:851-5. May be reference No 2
- [7] Ali AM, Ahmad A, et al. A Rare Central Venous Catheter Malposition: A Case Report. *Anaes and Pain Med*. 4(1):e 16049
- [8] Hameeteman M, Bode AS, Peppelenbosch AG, et al: Ultrasound-guided central venous catheter placement by surgical trainees: A safe procedure?. *J Vasc Access* 11:288-292, 2010
- [9] Trujillo MH, Arai K. Hydrothorax after inadvertent placement of a central venous catheter in the left pericardiophrenic vein. *J Intensive care Med*.1994; 9:257
- [10] Bailey PL, Whitaker EE, Palmer LS, Glance LS. The accuracy of central landmark used for central venous catheterization of the internal jugular vein. *Anaes Analg*. 2006; 102(5):1327-1332.

AUTHORS

First Author – K Senevirathne, Registrar in Emergency Medicine, Teaching Hospital Peradeniya

Second Author – H Ganegedara, Senior Registrar in Anaesthesia, Teaching Hospital Peradeniya

Third Author – A Jayasinghe, Registrar in Anaesthesia, Teaching Hospital Peradeniya

Fourth Author – K B Galketiya, Consultant Surgeon, Teaching Hospital Peradeniya

Fifth Author – V Pinto, Consultant Anaesthetist, Teaching Hospital Peradeniya

Sixth Author – A H Abayasinghe, Temporary Lecturer, Department of Anaesthesiology