Innominate Artery Injury: A Catastrophic Complication of Tracheostomy in a Trauma Patient, Operative Procedure Revisited

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Tracheostomy is a routine life-saving operative procedure in the event of airway obstruction especially in faciomaxillary injuries. Bleeding is the most common complications of tracheostomy, innominate artery (IA) of normal width reaching second tracheal ring is very rare, and injury to IA can be a catastrophic complication. We reported a case of 40-year-old male presented with profuse bleeding from oral and nasal cavity following road traffic injury. During tracheostomy, there was a sudden forceful gush of blood coming out of incision site, warning a major vessel injury. Right-sided trap door thoracotomy procedure was performed, and the avulsed right IA was repaired as a life-saving procedure.

Keywords: Innominate artery, Tracheostomy, Vascular abnormality

INTRODUCTION

Tracheostomy is generally considered to be a life-saving airway procedure in critically injured patients with impending airway compromise.¹ Most surgeons perform this procedure routinely and without ascertaining the exact anatomy of the neck vasculature. Uncommon anatomical aberrations of the neck vessels can be sometimes catastrophic and may compromise patient’s life.² We hereby present a case of a 40-year-old male, who presented with profuse oronasal bleed following road traffic injury and had a compromised airway. He was planned for tracheostomy, but during the procedure catastrophic bleeding was encountered which could not be controlled by conventional surgical techniques. On exploration, it was found that the bleeding was from an aberrant innominate artery (IA) in the suprasternal notch, which was thereafter repaired. The case highlights the importance of being aware of the presence of IA in the neck and possible strategies, which surgeons can employ pre-operatively to avoid such catastrophic event.

CASE REPORT

A 40-year-old male presented with profuse bleeding from oral and nasal cavity following road traffic injury. During tracheostomy, there was a sudden forceful gush of blood coming out of incision site, warning a major vessel injury. Blood loss could not be stopped in spite of packing. Hemostatic artery forceps were applied; the saturation in right upper limb was absent. A diagnosis of IA injury was made. In the event of saving the life of the individual, right-sided trap door thoracotomy procedure was performed and the avulsed right IA repaired (Figure 1).

Patient was then shifted to Intensive Care Unit for further resuscitation in view of hemorrhagic shock. His pre-tracheostomy computed tomography scans had anatomical variations in the course of great vessels (Figures 2 and 3), which were not given due cognizance as they were not separately reported. IA may incline to the midline rising in front of the trachea above the sternum, and complicate procedures performed in Zone 1 and 2 of the neck, as it happened in our case. Early recognition of such a catastrophic complication and repairing in time can save the life. Our patient survived for 2 weeks post-operatively with maintained hemodynamic stability. After which he suddenly bled through tracheostomy tube, due to the tube eroding the trachea and injuring the abnormally coursing IA. He died suddenly on 14th postoperative day due to aspiration and sudden apnea.

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DISCUSSION

Tracheostomy is a routine life-saving operative procedure in the event of airway obstruction especially in threatened/impending airway obstruction in severe maxillofacial trauma. It is rarely required as an emergency procedure unless associated with post-traumatic laryngeal injury compromising airway, as cricothyroidotomy has least complications and is more easily done than tracheostomy.\textsuperscript{3} Bleeding is the most common complications of tracheostomy, which may occur during or after the surgery due to vascular wall erosion.\textsuperscript{4} IA of normal width reaching suprasternal region is not rare; a high bifurcation of the IA at the level of the second tracheal ring has been described by Racic \textit{et al.}, 2005\textsuperscript{5} and at the level of fourth to fifth tracheal ring has been described by Bertram \textit{et al.}, 1995.\textsuperscript{6} It ascends obliquely when it is dividing at superior margin of thyroid cartilage.\textsuperscript{7} IA positioned at a higher level over the second to fifth tracheal ring increases the risk of injury during percutaneous procedure or open surgical procedures (tracheostomy, mediastinoscopy, and thyroidectomy).\textsuperscript{8} Fatal tracheal hemorrhage is due to erosion or rupture of the great vessels like IA in over 75\% of cases, the peak incidence is between the 1\textsuperscript{st} and 2\textsuperscript{nd} post-operative weeks.\textsuperscript{9} As trauma residents are often experienced in doing focused assessment by sono\textit{graph}y in trauma routinely in the emergency department and are acquainted with the sono\textit{graph}y equipment, a quick neck sono\textit{graph}y just before doing a tracheotomy can be done to detect the possibility of vascular abnormality in the neck, thus avoiding injuries.\textsuperscript{10} Early recognition of injury, repair of the injured vessel, and early decannulation can save the life.

\textbf{Suggested Procedure}

Presence of prominent pulsations in the suprasternal fossa in patients with neck extension should warn us the possibility vascular abnormality in the neck. A shoulder roll placed should normally provide a moderate extension of the neck. Overextension of the neck leads to narrowing of the airway and low placement of the tracheotomy. Tracheostomy typically begins with a horizontal skin incision placed about 2 cm above suprasternal notch often in the operating room with a good source of light. A vertical skin incision has the advantage of less bleeding due to few vessels traversing the incision site. Inferior extension of vertical incision should be done with great caution as the margin of error is least in retrosternal and suprasternal region, especially in the presence of abnormal coursing large vessels. Retract the strap musculature laterally and upwards. A finger test should be done routinely prior to retraction of strap muscles by palpating the inferior aspect of the wound bed to rule out the possibility of high riding IA. If abnormal course of the vessels is suspected then a separate skin incision is placed at cricoid cartilage, and thyroid is then pulled up holding the isthmus of the gland in midline by dissecting it in the plane posterior to pre-tracheal fascia, thereafter tracheostomy can be done at second or third tracheal rings with a separate skin incision under vision.
CONCLUSION

Tracheostomy is generally considered to be a life-saving airway procedure in case of faciomaxillary trauma. Surgeons should be aware of the presence of IA in the neck. Pre-operative use of focused assessment by sonography of the neck and intraoperative finger test done after incising platysma can help to prevent catastrophic event due to rupture of this major vessel during the procedure.

REFERENCES


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