

*Case Report*

Tracheostomy in a Gunshot Wound Neck: A Case Report

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ABSTRACT

Penetrating neck injuries including gunshot wounds of neck pose a threat to airway. Either endotracheal intubation or emergency tracheostomy is the common modality used for securing the airway. Tracheostomy in these patients can be challenging especially when wound lies in the field of surgery and time available to secure airway always a limiting factor. We hereby present a case of self inflicted gunshot wound neck where entry wound was 2cm above suprasternal notch, which required tracheostomy to secure airway. We highlight the importance of finding anatomical landmarks to perform tracheostomy and modifications of standard surgical technique used in this case.

Keywords: Difficult Tracheostomy, Gunshot wound, Cervical spine injury.

INTRODUCTION

Penetrating neck injuries sum up to 5 to 10 % of all trauma cases and being potentially dangerous, require immediate attention and management. ^[1] Gunshot injuries of the head and neck vary in extent and significance, ranging from trivial to life threatening injuries. The head and neck has many vital structures confined to a small area of body, and hence trauma to this region has a great potential of being fatal. ^[2] The tissue damage in gunshot wound ranges from small wounds to large gaping one depending upon the type of weapon, mass and velocity of the missile, and the distance from which it is fired. The vital structures of concern here include the great vessels of neck (Carotid arteries and Jugular veins),

nerves, airway, pharynx, spinal cord and bony tissues. ^[2]

Airway injuries can lead to a fatal outcome in no time and form potential life-threatening complication in patients with gunshot wounds. However, the optimal approach to management for penetrating neck injuries remains controversial. ^[3] Airway management is of prime importance and demands securing airway by least invasive method possible. Tracheostomy is usually required in laryngotracheal injuries to secure airway prior to their definitive management. Severe trauma to the airway or to surrounding structures can complicate the resuscitative management and definitive intubation of the penetrating neck trauma patients. Besides direct injury, edema or swelling of the adjacent structures due to

emphysema or haematoma can further narrow the remaining airway. Patients who sustain neck trauma may require intubation and mechanical ventilation for several reasons. Upper airway obstruction secondary to severe facial or laryngeal trauma, airway access in patients with cervical spine injury, management of retained airway secretions, maintenance of patent airway and airway access for prolonged mechanical ventilation are among the common indications. [3]

We present a case of tracheostomy in GSW neck where entry wound was exactly at the site of potential tracheostomy. We would highlight the surgical technique with importance of identifying surgical landmarks in a retrograde manner rather than

CASE REPORT

A 48 years old male was brought to the emergency room in our tertiary care centre with alleged history of self inflicted close range gunshot injury to the neck. Primary survey revealed GCS of 5/15, tachycardia, tachypnoea, hypotension and SpO₂ of 84% with no cyanosis. On secondary survey, the entry wound was 2.5 cm above suprasternal notch in the midline. (Fig 1) The exit wound was located 2 cm above and to left of spinous process of C7 vertebra. (Fig 2) There was no active bleeding from the entry wound with no associated haematoma or surgical emphysema. There was no air leak or salivary leakage from the wound. He was immediately shifted to operation theatre for resuscitation and further assessment. On evaluation, there were no other injuries elsewhere in the body. Airway was secured by endotracheal intubation and patient was stabilised and shifted to ICU. As there were no signs of digestive tract or vascular injury with secured airway, no surgical intervention was contemplated at this

juncture. He was placed on ventilatory support. An X-ray of cervical spine revealed a burst fracture of body of C6 vertebra. NCCT head and cervical spine revealed sub arachnoid hemorrhage in parietal and frontal lobe, intraventricular hemorrhage in occipital horns of both ventricles and comminuted, displaced fracture of C4-7 vertebrae. In magnetic resonance angiography, the left vertebral artery was not seen from its origin till C3 level. However, there was no injury to the trachea.

In view of anticipated prolonged ventilation an elective tracheostomy was planned on the 5th day of admission. Many difficulties were encountered in performing tracheostomy in the patient which primarily included no neck extension in view of cervical spine injury. Incision site had entry wound with flash burns around (Fig 3). Wound track was going through the area of interest making identification of anatomical landmarks extremely difficult. Following measures were taken to overcome above difficulties. A transverse incision for tracheostomy was given incorporating the entry wound with the intention of avoiding two simultaneous neck wounds. Bullet track was not followed with cognisance of the fact and anatomy will be distorted and also surrounding burnt tissue will make dissection difficult. Midline dissection was done but anatomical landmarks were difficult to identify. Therefore, dissection was extended superiorly in non traumatised tissue to locate thyroid cartilage and thereafter cricoid and trachea were identified by extended dissection inferiorly. This itself was difficult because of extensive charring of the tissue. Thyroid isthmus was identified, split and tracheal rings were visualised. A tracheostome was created over 2nd and 3rd tracheal rings. Size 8, non metallic cuffed single lumen Tracheostomy tube was placed and airway secured. Post operatively patient was ventilated for five

more days post tracheostomy. Thereafter, patient succumbed to the complications of

injury which primarily included sepsis and thereafter multi organ failure.



Figure-1



Figure-2



Figure-3

Fig 1. Entry wound 2.5 cm above suprasternal notch in the midline

Fig 2. Exit wound 2 cm above and to left of spinous process of C7 vertebra.

Fig 3. Transverse tracheostomy incision incorporating the entry wound which had flash burns surrounding it.

DISCUSSION

Tracheostomy is a common procedure performed by most otolaryngologists worldwide but many a times become a demanding procedure which can surprise the surgeon and present a challenge. Prior anticipation of these difficulties demands experience as well as astuteness of the surgeon. Our case was definitely one of them.

Gunshot injuries are always known to cause severe morbidity and mortality when head and neck are involved. They vary in morbidity and significance, forming a spectrum from trivial to life-threatening conditions which can occur in both military and civilian surroundings. [4] In a gunshot injury, bullet at first, crushes structures along its track, causing temporary cavitation, shearing and compression. The tissues recoil and hot gases dissipate, following which soft tissue collapses inwards forming a permanent cavity. Kinetic energy transfer occurs during bullet retardation, many times causing damage outside the tract. Efficiency of kinetic energy transfer is influenced by the kinetic energy of a body, proportional to mass and velocity, projectile's deformation and

fragmentation, entrance profile and path travelled through the body and biological characteristics of the transit tissues. [5] Based on the range the gunshot injuries are classified into three types. Type 1 (long range, over 7 yards) penetrates subcutaneous tissue and fascia, type 2 (3-7 yards) penetrates cavities, type 3 (blast injuries, less than 3 yards). Type 2 and 3 injuries cause extensive tissue damage, contusions, and fracture of bones. Based on the tract that is formed by the bullet in gunshot victims, they are classified into four categories: (1) through and through (2) graze (i.e., tangential without any entry or exit wound). (3) retained in body with bullet palpable under skin (4) retained in body with bullet not palpable under skin. [6-8] Our case here had Type 2 injury with category 1 tract which accounts to potentially dangerous injury but surprisingly neither aerodigestive tract nor great vessels were injured however spine was injured.

Dolin et al reported that 35% of patients with facial gunshot wounds required urgent airway control in emergency department. [9] Resuscitation forms the treatment, but airway management should be given immense weightage. Tracheostomy is

performed for various reasons such as complications including bleeding, pneumomediastinum and pneumothorax, anatomic injury, infection, subcutaneous emphysema, and displacement and blockage of the tracheostomy tube. [10] In these patients, tracheostomy is difficult because of bleeding and distortion of facial structures or subsequent swelling. Our case was also similar requiring emergency airway management and later difficult tracheostomy.

In 2002, Sims and Berger recommended that early tracheostomy should be considered in patients with cervical spine injury. Also, surgical procedures might be required in cases of comminuted fracture of cervical vertebra, with foreign bodies embedded within prevertebral soft tissue. Here the surgical exposure would be compromised if the endotracheal tube is in situ.

Our case was unique because of the fact that entry wound was right at the site where incision for tracheostomy is given, surgical route to the trachea was extensively damaged by the gun shot making dissection and identification of surgical landmarks extremely difficult. This problem was superadded by the fact that neck extension could not be given because of the cervical spine injury leading to reduced operating space and making cervical trachea small. Key to performing successful tracheostomy was rerouting the identification of surgical landmarks from superior to inferior rather than head on as in conventional technique. The aim of reporting this case is the rarity of performing a tracheostomy in gunshot wound neck and that too where operative field is distorted by the injury itself through the entry wound in a case of gunshot wound neck and to highlight the problems in its management.

CONCLUSION

Performing tracheostomy in gunshot wound of neck can be a challenging task. It requires patience and unique surgical innovations based of case to case basis. The key to performing surgery is identification of landmarks, avoid following bullet tract as it has surrounding tissue damage and may have delicate and vital structures nearby which in such scenario will be difficult to identify.

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