

Anaesthetic Challenges In Gunshot Injury To The Neck

M.B. Adegboye, K.A. Adegboye

Department of Anaesthesia, University of Ilorin Teaching Hospital, Nigeria

Abstract

A 25 year old man presented at emergency room (ER) of our hospital with bleeding from the neck and inability to talk about 45 minutes following gunshot injury. He was shot by a policeman who took him for an armed robber.

He was resuscitated and on examination, he was conscious, aphasic, and pale. His pulse was 81 beats/min (regular, normal volume), Respiratory rate – 26 breath/min, Blood Pressure – 100/54 mmHg, and oxygen saturation – 96%.

Tracheal was completely transected, exposing the thyroid cartilage.

Patient had wound exploration 5 hours after injury under general anaesthesia with anticipated difficult airway. Tracheotomy was done by the ENT surgeon with size 8 cuffed tracheostomy tube.

External wound measured 10cm by 12cm. Intraoperative findings were fractured thyroid cartilage, oesophageal tear with epiglottis. No large blood vessels injury. Oesophageal rent was repaired, and he was transfused with two pint of whole blood intraoperatively.

About 15hrs postoperatively, he was pain free, no respiratory difficulty and vital signs remain stable.

The tracheostomy tube was removed on the 23rd day postoperatively. He developed postoperative hoarseness of voice and opinion of Speech therapist was sought for speech rehabilitation. Oral feeding was commenced on 154th day post operatively without choking and finally discharged to clinic for further follow up.

Timing is essential in the management of this patient. Our case demonstrated one of the possible ways of managing penetrating neck injury in a low resource country.

Keywords: Penetrating neck injury, difficult airway, airway management.

Introduction

Penetrating neck injury is a potentially life threatening condition that requires urgent intervention. There could be damage to major aero digestive and vascular organs in the neck. Knowledge of the physical properties of the penetrating object or weapon can help determine the treatment plan and predict the risk of injury. All tracheal and esophageal injuries should be repaired primarily.¹

Gunshot injury is a surgical emergency and a form of penetrating injury. Most military rifles have a jacket of strong metal, usually copper that surrounds a lead projectile and because of lack of deformation these military bullets create a clean hold with a through and through wound without a lead track to follow,² the extent of the damage is dependent on a number of factors, such as: magnitude of energy transferred, distance travelled by the missile, type of bullet, and the structures encountered before and on penetration. In general, high-energy transfer gun shots fired at close range inflict the most damage.³ Missile injuries are broadly described as penetrating (25%), perforating (38%) and avulsing (37%).³ The ideal time and method of treatment remains a debate.^{4,5} Several surgeons argue that because of the mechanism of injury, early aggressive primary reconstruction might not be ideal. It is with this perspective that a universal consensus regarding the management of gunshot injury to the face and neck was reached and steps taken include securing the airway which could be challenging even with the most skilled anaesthetist. Therefore, familiarity with multiple approaches to securing a definitive airway is required because success is not guaranteed with any single technique. Others include controlling hemorrhage; identifying other injuries and preventing additional injury; and repair and/or reconstruction of traumatic deformities.⁶

Case Presentation

A 25 year old man who was co-managed by Otorhinolaryngologist and the Anaesthetist as a case of gunshot injury to the neck. He presented at emergency room (ER) of our hospital with bleeding from the neck and inability to talk of about 45min following gunshot

Correspondence to:

Dr M.B Adegboye,
Department of Anaesthesia,
University of Ilorin Teaching Hospital,
PMB 1459, Ilorin, Nigeria.
E-mail address: jidodedoc2000@yahoo.com
Tel: +234 8030681607

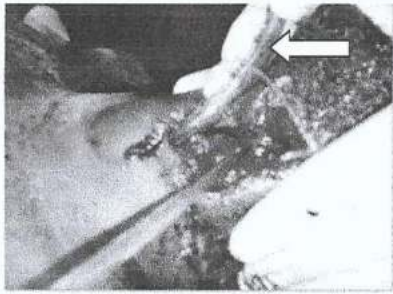


Fig 1: Direct insertion of ETT into the tracheal



Fig 2: ETT held with Anaesthetist hand



Fig 3: Tracheostomy insitu

injury to the neck. He was shot by a policeman who took him as an armed robber.

He presented with bleeding from the neck, and inability to phonate. Patient was resuscitated at ER with I.V fluids (normal saline), four unit of blood was crossmatch.

On examination, he was conscious, aphasic, and pale. His pulse was 81beat/min (regular, normal volume), Respiratory rate – 26breath/min, Blood Pressure – 100/54mmHg, and oxygen saturation – 96%.

Tracheal was completely transected, exposing the thyroid cartilage.

Patient had wound exploration 5hours after injury under general anaesthesia with anticipated difficult airway.

Anaesthesia was co-induced with I.V ketamine 100mg, I.V fentanyl 100ug and 10mg I.V diazepam.

Size 8.5 cuffed endotracheal tube (ETT) was passed through the tracheal opening, cuff inflated, (figure 1) and correct tube placement confirmed with capnograph and equal air entry bilaterally on auscultation of the chest (figure 2). Neuromuscular paralysis was induced with I.V pancuronium 0.1mg/kg. Anaesthesia maintained with Isofluranc and oxygen.

Tracheotomy was done by the ENT surgeon with size 8 cuffed tracheostomy tube while the ETT was held with hand during the procedure because it cannot be secured (figure 2). Anaesthesia circuit was connected to tracheostomy tube after confirmation of correct placement and ETT was removed completely (figure 3).

External wound measured 10cm by 12cm. intraoperative findings were fractured thyroid cartilage, oesophageal tear with epiglottis. No large blood vessels injury. Oesophageal rent was repaired, and he was transfused with two pint of whole blood intraoperatively.

At the end of the surgery, inhalational agent was cut off, and residual neuromuscular paralysis was reversed using atropine at 0.02mg/kg with neostigmin 0.05mg/kg. Patient was transferred to recovery room after he regains full consciousness.

About 15hrs postoperatively, he was pain free, no respiratory difficulty and vital signs remain stable.

Video Laryngoscopy shows normal tongue base and

valleculae but the epiglottis appeared amputated at the tip. The right vocal cord has ragged edge, while the left vocal cord is absent with the right vocal cord crossing the midline.

The tracheostomy tube was removed on the 23rd day postoperatively. He developed postoperative hoarseness of voice and opinion of Speech therapist was sought for speech rehabilitation. Oral feeding was commenced on 15th POD without choking and finally discharged to clinic for further follows up.

Discussion

Our case demonstrates a situation involving direct high-energy transfer injury. It also represents a penetrating form of gunshot injury to the neck resulting in fractured thyroid cartilage and esophageal tear. It is important to note that airway management is crucial to the successful management of penetrating neck injuries. Orotracheal intubation is the initial method of choice however, no single method is 100% successful at all times. In this case, the endotracheal tube was passed directly through the tracheal opening, cuff was inflated and correct placement confirmed with the capnograph. The time for laryngoscopy was eliminated and airway was secured through the fastest and safest means.

The mortality of penetrating neck injuries until World War II remained about 15%. It was reduced generally to 4% - 7% by the end of the Vietnam War. This improvement occurred through mandatory exploration of all wounds penetrating the platysma. The idea of mandatory exploration was advocated in World War II by Fogelman and Steward in 1956 for civilian injuries.⁷

Presentation range from patients who have no symptoms to those who have life-threatening airway compromise or profound shock. Patients may also present with dyspnea, hoarseness, and cough. Kelly and colleagues in 1985 published a 20-year study that examined 106 consecutive patients who had neck trauma (100 penetrating and 6 blunt); all the 80 patients who had tracheal injuries had signs of airway compromise in the emergency department. Hemoptysis was an unreliable sign of serious injury

and patients who had major vascular or tracheal injuries rarely survived.⁸

Early detection of penetrating esophageal injuries remains difficult. The average delay to diagnosis from the time of injury is usually many hours when using a selective approach, and the resultant morbidity and mortality are significant.^{9,10}

Our patient presented within 45 minutes of injury probably explaining the good outcome. Diagnostic evaluation of penetrating neck injury include lateral neck plain radiograph. Subcutaneous emphysema is often the most common presenting sign in significant injury to the aerodigestive tracts.¹¹ Patients with airway disruption, the surgical anatomy of the rupture creates air leak pattern on plain films. Patients who have laryngeal transection may also have gross, deep, and superficial cervicofacial emphysema, whereas patients who have tracheal rupture often present with massive mediastinal and deep cervical emphysema without pneumothorax.¹² Computed tomography has significant impact on selective management of penetrating neck injuries, it can accurately identify extrapulmonary air, directly visualize tracheal wall disruption and signs of transtracheal balloon herniation in intubated patients, and locate extratracheal tube position.¹³

The patient presented did not do any of the imaging studies because of the emergency nature of the presentation and constraint of ready availability of radiologist suites. The emergent treatment of all penetrating neck trauma requires (1) airway establishment, (2) blood perfusion maintenances, and (3) classification of the severity of the wound.

Early and rapid airway assessment followed by definitive airway protection is the key to neck trauma management. The airway must be secured, and any hemorrhage must be staunched and replaced with blood or blood products. In-line cervical stabilization is a safe method of stabilizing the cervical spine during intubation. The optimal technique for intubating a patient who has penetrating neck injuries is by direct laryngoscopy, although it has not been studied at length. It is not clear when a patient should be observed expectantly for impending airway compromise or when the patient should be intubated to avoid a situation in which the anatomy becomes so distorted as to make the procedure more difficult or impossible leading to an emergent surgical airway. These remain clinical judgments, clearly any patient in shock, with hypoxia, or with clear airway compromise needs immediate intubation. Rapid sequence induction using a short-acting paralytic agent is safe. In recent series of literature 100% of the 39 patients were successfully intubated using succinylcholine.¹⁴

Conclusion

Patient with gunshot injury to the neck may present with difficult airway to the anaesthetist. There is high risk of aspiration of blood and gastric content. It is therefore crucial that the anaesthetists are aware of other safer, faster, and easier approaches of managing airway.

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