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Original Article

Bullet, Blood and Airway – Gun Shot Wound Face Managed with Limited Resources

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ABSTRACT

Airway management of patients with gunshot wound (GSW) face with maxillo-facial trauma is complex, critical and requires grit of attending anesthesiologist to ensure patient's survival. Airway management, ATLS and fluid management are challenging and a defining element in such cases. Failure to secure the airway and resuscitating can drastically increase the mortality of the patient within few minutes. Here, we report a case of a middle aged soldier who sustained GSW - with comminuted mandibular fracture , sagittal plain maxillary fracture, posterior pharyngeal wall rupture, nasal bone fracture, frontal bone fracture with active bleeding from mouth and nose who was received in a peripheral military hospital with limited resources and a single anesthesiologist. Our emergency team successfully secured his airway after initial resuscitation, aided in emergency surgery done by maxillo-facial surgeon and also airlifted the patient to tertiary care centre for further management.

Keywords*: Gunshot wound face, Maxillo-facial trauma, Difficult airway, Bleeding airway, Dual suction.*

INTRODUCTION

Gunshot wound (GSW) to the face causes devastating injuries that can be life threatening, with reported mortality rates as high as 15% [1]. If patients survive, morbidity is high, with complication rates of up to 30% [2].

The first challenge is to secure the airway for sufficient and effective breathing and/or ventilation. When planning to secure the airway, the physician has to consider several aspects:(a) potential difficulties in mask ventilation or endotracheal intubation, (b) nature of the trauma and its effect on airway, (c) significant bleeding that precludes view of airway anatomy and may cause circulatory deterioration, (d) the risk of regurgitation and aspiration of gastric contents, and (e) type of maxillo-facial operation required. The time available for deciding on and then performing the optimal method to secure the airway under a particular set of circumstances is often short because the patient's condition can deteriorate quickly. The need for emergent airway control in these patients ranges from 17% to 35% in recent reviews [3].

CASE REPORT

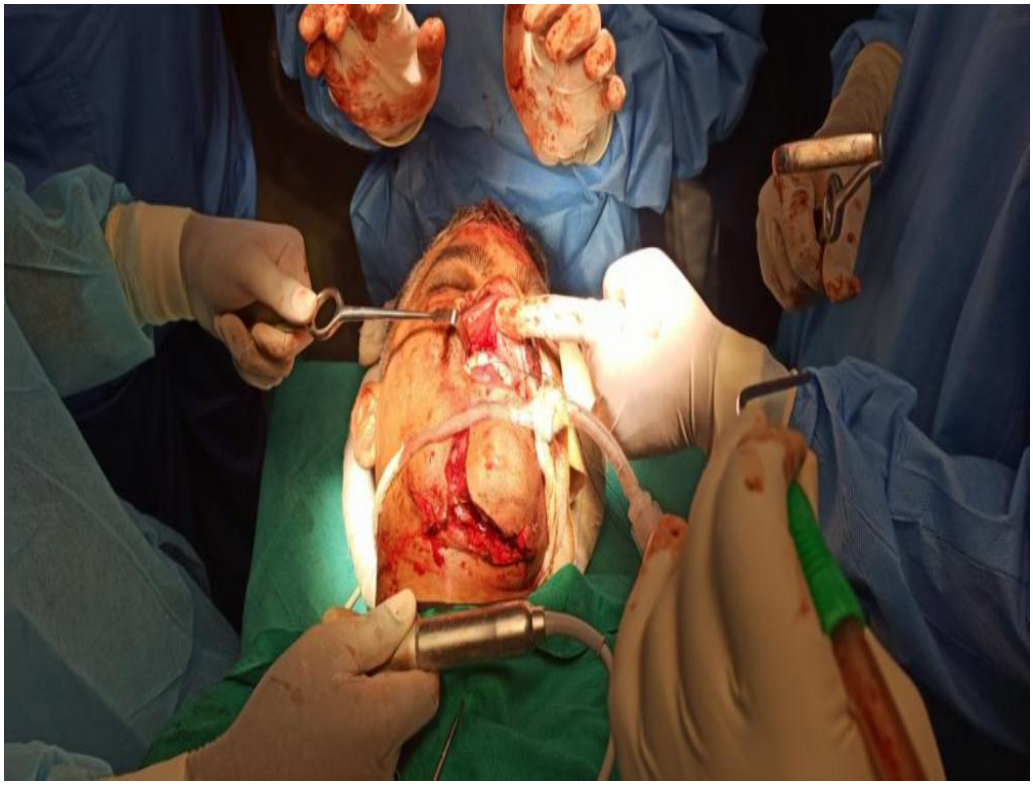

Figure 1: Gunshot wound maxillo-facial complex during damage control surgery after primary resuscitation and airway management

A 42-year-old soldier had allegedly shot himself by placing a gun under left side of his chin. He was air lifted and brought to our ICU. Glasgow coma Scale was 15/15. Airway – extensive soft-tissue injury involving sub-mandibular area (Entry wound), oro-nasal cavity, mandible, maxilla and forehead (Exit wound) were noted. Hence, we anticipated airway compromise and placed him on high-flow oxygen by non-re-breathing face mask. Mouth opening and neck extension were adequate, no loose/dislodged tooth, maxillary and mandibular fractures present but extent and severity were yet to be determined. Breathing – chest movement was normal, bilateral air entry was present. Apnoe and desaturation were noticed on reclining position due to sagittal fracture of maxilla and palate (bookshelf movement) causing blockage to air entry. Circulation – he was hemodynamically stable, but extensive fresh bleeding with clots in oro-nasal cavity was present hinting significant blood loss. Hence, we placed a 16 G IV cannula in peripheral vein and blood sample sent for hemogram and cross matching. And meanwhile patient was resuscitated with balanced crystalloid solution @10-15ml/kg /hr. Parallelly ABG analysis was done indicating, on setting combined respiratory and metabolic acidosis. Disability - severe pan-facial trauma with compromised airway.

Considering on going dreadful blood loss even after compressive dressing patient was heading towards massive hemorrhage and circulatory collapse, also compromised blood pooled airway with high risk of aspiration. Hence, patient was shifted to OT for emergency airway management, hemostasis and damage control surgery along with ongoing fluid resuscitation.

Patient in sitting position was placed with ASA standard monitors. Under light anaesthetic plain using Inj Fentanyle 60mcg IV, Inj Ketamine 30 mg IV, Inj Glycopyrrolate 0.6 mg IV,Inj Midazolam 2 mg IV patient was examined. Using continuous oral suction, the damage to facio-maxillary-frontal complex and oro-nasal cavity was noted.
Challenges faced during intubation – 1. The patient not tolerating supine position due to airway blockage. 2. FOB/Videolaryngoscope were unavailable. 3. Profusely bleeding oro-nasal cavity .4. Anticipated circulatory due to blood loss.

How we managed – emergency crico-thyrotomy set was kept ready. Thorough oral suctioning done. Patient was made supine with light sedation using Inj Propofol 0.5mg/kg. Ventilation by high flow FM was attempted. Depth increased by aliquot of Inj Propofol and check laryngoscopy was attempted. (Note -Muscle relaxant wasn't given in view of airway loss). Profuse bleeding persistent, thick blood blocked light penetration, airway not visualized. In view of aspiration and airway loss, direct laryngoscopic intubation was attempted in bloody field with single yankauer suction with cuffed endotracheal tube of adequate size. Oesophageal intubation occurred and was confirmed.

Corrective measures – Tube was deflated and removed immediately. Dual suction ports with yankauer with high pressure placed on both sides of oral cavity ensuring adequate suction from posterior pharyngeal wall. Depth was increased using IV Propofol and muscle relaxant was not given (to preserve spontaneous ventilation). On reattempt laryngoscopy, tip of epiglottis was visualized. Using gum elastic bougie, airway was negotiated and cuffed endotracheal tube was railed roaded, inflated secured and confirmed. In doing so, patient had hemodynamic collapse with hypotension and bradycardia.

Hemodynamic measures taken - Fluid resuscitation, along with Inj Noradrenaline infusion @ 0.05-0.15 mcg/kg/min. Hemodynamic parameters were still not stable. Started with whole blood transfusion (unique to military hospitals). Within 10 minutes post transfusion, hemodynamic parameters stabilized and achieved a plateau throughout surgery. Also Inj Tranhexamic acid 1gm Iv given in course of surgery. Hemostasis was achieved and damage control was performed by Oro-Maxillo-facial surgeon.Lt subclavian vein central line was placed. Patient was not extubated. Weaned off from tropes a shifted to ICU for further care.

Following evening patient was transferred to civil hospital for neuroimaging and subsequently airlifted to tertiary care centre. There he underwent elective tracheostomy and further reconstruction procedures in coming weeks.

DISCUSSION

Managing bleeding difficult airway in maxillo-facial injury requires adequate knowledge, skills, clarity of plan and also plan for failed measures in very short time with focused calm mind. Several factors posing challenges are mentioned here under [8].

(1) Postero-inferior displacement of a fractured maxilla parallel to the inclined plane of the base of the skull may block the nasopharyngeal airway.
(2) A B/L fracture of the anterior mandible may cause the fractured symphysis and the tongue to slide posteriorly and block the oropharynx in the supine patient.
(3) Fractured or exfoliated teeth, bone fragments, vomitus, blood, and secretions as well as foreign bodies, such as dentures, debris, and shrapnel, may block the airway anywhere along the oropharynx and larynx.
(4) Hemorrhage from distinct vessels in open wounds or severe nasal bleeding from complex blood supply of the nose may also contribute to airway obstruction.
(5) Soft tissue swelling and edema which result from trauma of the head and neck may cause delayed airway compromise. Figure 2 indicates the gunshot face patient before and after.

Figure 2: Preoperative resuscitation

Figure 3: Postoperative recovery of the patient at higher centre after Decannulation

Airway Bleeding Management:

Airway assessment is focused on how to safely secure the airway and control/stop the bleeding. An emphasis on oxygenation, organization of personnel, and preparation of the equipment and environment, as stressed in airway guidelines, is essential. Challenges posed during blow mentioned procedures are unique to approach and situation (Table 1) [4, 5].

Table 1: Techniques to secure Airway during life-threatening active Airway bleeding

Technique	Indication	Comments
Direct laryngoscopy and intubation with dual rigid suction with RSI [6	Profuse intra oro-nasal bleed requiring immediate hemostasis, impending arrest	Requires Two laryngoscopes, one among them videolargyngoscope. Two rigid Yankauer connected to two separate suction apparatus. Standby FONA cart [10].
Supraglottic airway device insertion [7]	For failed ventilation and/or as conduit for intubation, in the awake or unconscious patient.	Only suitable for bleeding above larynx. Requires adequate mouth opening. Poor protection against aspiration. Temporary technique till intubation.
Retrograde intubation [8]	An awake approach is recommended [9].	Can be used in patients with critical cervical spine injury. Can be applied with a supraglottic airway device in place. Can be combined with light-guided intubation.
Light-guided intubation, using either a lightwand [10], or flexible endoscope as light-guide	Awake, following induction, or unconscious.	High success rate in predicted difficult intubation in spontaneous breathing [11], or anesthetized patients. Can be combined with retrograde intubation.
Blind nasal intubation [11, 12]	Must be guided by breath sounds. Awake or with preserved spontaneous bleeding.	High success rate in spontaneous breathing patients with neck trauma [12].
Cricothyroidotomy [13]	Pre-emptive [13] or rescue [14]. Awake, following induction, or unconscious.	Patient may be unable to lie flat (but semi-recumbent position may be an option).
Tracheotomy	Pre-emptive or rescue [14]. Awake, following induction [14], or unconscious	Unidirectional measure, loss of airway if procedure fails
Ultrasound-guided intubation [15]	Visualization obscured by blood [15]. Awake, following induction, or unconscious	Requires separate operator. Recommended for the bleeding airway. Practically difficult to implement.
Oral-digital intubation [16]	Difficult technique; demands adequate mouth opening.	Not tolerable for awake patient [16].
Esophageal Combitube [17], Laryngeal tube, or similar device	Rescue technique.	Bulky; may be traumatic to insert; may interfere with surgical access.
Cardiopulmonary bypass/ extracorporeal membrane oxygenation [18]	Has been used for massive hemoptysis [18] and tracheal granuloma.	Does not protect from aspiration; may not be available for emergency use; anti-coagulation requirement may complicate hemostasis.

CONCLUSION

Management of airway bleeding can be extremely challenging and requires a structured, multidisciplinary approach to achieve a successful outcome. Optimization of technical and non-technical (i.e. communication, organizational and team) skills is crucial. The situation is complicated by the enormous pressure to provide prompt and professional medical care in short time. Presentation, audit and review of such cases are important in order to learn and improve future management. Undoubtedly, it will be the first time for anesthesiologists to encounter such scenarios, and we hope that this report will make the experience less daunting.

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None

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