

Retrograde Intubation for Airway Management of Firearm Injury in the Maxillofacial Region

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ABSTRACT

Endotracheal intubation is one of the most important anaesthetic skills. Trauma to the maxillofacial region is challenging in terms of airway management. Airway management in such patients is difficult and decides the survival of the patient. Endotracheal intubation in patients with difficult ventilation and difficult intubation always remains a challenge, especially in the absence of a flexible fiberoptic bronchoscope. The retrograde catheter technique is an acceptable option for airway management in cases where oral intubation is not possible because of difficult airway or is not recommended because of fear of dislodgement of fractured segments of facial bones. The author here reports a case of a 30-year-old male with firearm injury in maxillofacial region posted for emergency surgery with anticipated difficult airway. Emergency retrograde intubation was done for the management of airway with successful outcome.

Keywords: Endotracheal intubation, Emergency, Retrograde catheter technique

CASE REPORT

A 30-year-old male was brought to the emergency ward with injury to the face. He accidentally shot himself in the facial region. He was conscious, oriented at the time of admission. On clinical examination, there was disruption and destruction of soft tissues in the perioral region, mandible, maxilla and tongue region. The bullet entry wound was on the lower jaw and exit wound was in the parotid area. The patient remained stable and maintained his airway and haemodynamic parameters. The primary survey revealed no other life-threatening injuries. The oral and nasal cavity was suctioned properly. After securing peripheral intravenous access with two 18 G cannulas, he was resuscitated with lactated Ringer's solution.

Vital parameters on arrival were heart rate 96 per minute, blood pressure 112/68 mmHg, oxygen saturation (SpO₂) 97%, and respiratory rate 18 per minute. Glassgow Coma Scale (GCS) was 15/15, and the patient remained alert and conscious throughout the resuscitation [1]. An abbreviated secondary survey was performed with extreme care taken to prevent disturbances to the patient's airway. Oxygen was supplemented with nasal prongs, at 6 litres per minute.

Emergency surgery was planned under general anaesthesia. Mouth opening could not be assessed. Respiratory and cardiovascular systems were found to be normal on examination. Consent for anaesthesia was obtained and all the medicolegal formalities were completed. Airway examination revealed anticipated difficult ventilation and intubation.

A cricothyrotomy kit was made available anticipating acute desaturation. Premedication was done with ondansetron (4 mg), glycopyrrolate (0.2 mg), midazolam (1 mg) and fentanyl (50 µg). He also received 1 gram tranexamic acid and intravenous antibiotics. After checking for bilateral nasal patency, xylometazoline nasal drops were instilled in left nostril, and the left nasal cavity was packed for 10 minutes with gauze pieces soaked in 2% lignocaine with adrenaline to decrease the incidence of epistaxis. A trans-tracheal injection with 2 mL of 4% lignocaine and bilateral superior laryngeal nerve block using 2% lignocaine was given. Blind nasal intubation was tried after achieving conscious sedation, but could not be done. After two failed attempts, retrograde intubation was performed, as fiberoptic bronchoscope was not available. The cricothyroid membrane was pierced with a 14 G cannula assembly, attached to a 5 mL syringe

containing saline, for aspiration test. The needle was withdrawn, and J shaped guide wire was passed through the cannula in the cephalic direction [Table/Fig-1]. The wire was retrieved from the nose. After holding the wire firmly, a 7.0 mm PVC endotracheal tube was rail road over the guide wire up to the 26 cm mark. Bilateral air entry was checked and confirmed based on the end-tidal CO₂ (EtCO₂). After confirmation, the guide wire was removed.



[Table/Fig-1]: Retrograde technique with J wire.

Anaesthetic induction was done with intravenous thiopentone (250 mg) and vecuronium (5 mg) and maintained with oxygen, nitrous oxide, isoflurane and maintenance dose of vecuronium. Surgical reassessment revealed no significant changes from the patient's preintubation status and no obvious bleeding. After the completion of surgery, patient was extubated. Recovery was uneventful.

DISCUSSION

Injury to the maxillofacial region leads to varying extent of airway compromise and presents challenge to the anaesthesiologist, who needs to use his skills and expertise to decrease the morbidity and mortality. Haemorrhage and oedema prevent airway assessment and potentially make mask ventilation impossible. The most important

predictors of mortality in trauma patients are the GCS and the respiratory rate [1]. In this case the patient was conscious, obeying commands and able to maintain the airway and oxygen saturation. Routinely, during such cases awake fiberoptic intubation is the gold standard in securing the airway. Laryngeal Mask Airway (LMA) is also a definitive choice for securing the airway in difficult airway situations according to Difficult Airway Society Guidelines (DAS), but LMA was not a good choice in present case. Lack of availability of the fiberoptic bronchoscope in the setup was a major limitation. In such situations, the techniques for endotracheal intubation in patients with difficult airway include blind nasal intubation, retrograde intubation, and surgical tracheostomy.

Rosen CL et al., reported that incidences of tube penetration or impaction are minimal in fractures of midface region. However, this complication needs to be considered only in central anterior skull base fractures [2]. In the present scenario, after ruling out any skull base fractures, blind nasal intubation was attempted but may be due to the frequently associated airway anomaly, the procedure was not successful. Only a few cases of iatrogenic intracranial displacement have been reported in literature [3-5]. Thus, in maxillofacial injury, nasotracheal intubation is not an absolute contraindication; in fact, it can be considered as a preferred mode of intubation in conscious patients as it does not require any neck manipulation, sedation or muscle relaxation.

The technique of retrograde intubation was originally described by Butler FS and Cirillo AA in 1960 [6]. There have been several modifications of this technique throughout these years [7]. In a cohort study of 88 Emergency Medical Services (EMS) personnel, mannequins were used for retrograde intubations and the intubation was performed successfully by all the participants in their early attempts, with an average time of 71 seconds [8]. In adults, this can be done in the anaesthetised or a conscious patient (with preprocedural airway topical or regional anaesthesia). In adults, cricothyroid puncture can be done with a long arm central venous catheter or by passing an epidural catheter through the accompanying needle [9]. A commercially available kit for this procedure, is the Cook's retrograde intubation kit (containing a stiff J wire 110 cm long, 0.97 mm diameter). A commonly available J wire used in central venous cannulation is set for the purpose of retrograde intubation but its length is only 45 cm. A similar case study has been published by Bagam KR et al., who used a guide wire in central venous cannulation set as a rescue airway in an unanticipated difficult airway scenario [10]. Weksler N et al., conducted a retrospective analysis of anaesthesia records of 24 patients who underwent retrograde intubation, and concluded that retrograde tracheal intubation had high success rate is easy to perform with low incidence of complications [11]. It is a reliable alternative when fiberoptic bronchoscope is unavailable. Similarly, in the present case, due to non availability of fiberoptic laryngoscope and an ENT surgeon to perform tracheostomy, retrograde intubation was opted for. Another study conducted showed retrograde intubation in a series of trauma patients to be highly successful [12].

In this case, the placement of endotracheal tube was confirmed by bilateral equal breath sounds and appearance of EtCO₂ waveform. There are various other methods to aid in confirming proper positioning of the endotracheal tube, such as visualisation of endotracheal tube passing through vocal cord, fogging of the endotracheal tube, and if the patient is not able to vocalise. Newer methods include an end-tidal CO₂ detector, ultrasound, and radiography. The index patient was extubated fairly without any complications. The clinicians and emergency/intensive care team unit team should be aware of different methods of establishing a definitive airway. A study has revealed that the experiences and availability of various devices for management of difficult airway may be different across programs in residency and among program directors, with retrograde intubation kits seen only in 35% of the programs reviewed [13].

CONCLUSION(S)

In developing countries, the availability of flexible fiberoptic laryngoscope is rare and even when it is present it requires both experience and expertise. Retrograde intubation is an invasive technique which is used to secure a difficult airway, but it has limitations. It is highly recommended to develop appropriate protocols for the out-of-hospital and emergency settings. It is also important to continuously review these protocols. Although it is a forgotten technique, this can be life-saving in certain conditions and the clinicians should not forget older methods with introduction of the newer ones.

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