Review Article

Airway management in trauma

Address for correspondence:
Dr. Rashid Khan,
PO BOX 96,
Al Harthy Complex, Oman.
E-mail: seeras_alig@rediffmail.com

Rashid M Khan, Pradeep K Sharma[1], Naresh Kaul
Department of Anesthesia and ICU, National Trauma Centre, [1]Department of Anesthesia, Sultan Qaboos University Hospital, Muscat, Sultanate of Oman

Access this article online
Website: www.ijaweb.org
DOI: 10.4103/0019-5049.89870
Quick response code

ABSTRACT

Trauma has assumed epidemic proportion. 10% of global road accident deaths occur in India. Hypoxia and airway mismanagement are known to contribute up to 34% of pre-hospital deaths in these patients. A high degree of suspicion for actual or impending airway obstruction should be assumed in all trauma patients. Objective signs of airway compromise include agitation, obtundation, cyanosis, abnormal breath sound and deviated trachea. If time permits, one should carry out a brief airway assessment prior to undertaking definitive airway management in these patients. Simple techniques for establishing and maintaining airway patency include jaw thrust maneuver and/or use of oro- and nas-opharyngeal airways. All attempts must be made to perform definitive airway management whenever airway is compromised that is not amenable to simple strategies. The selection of airway device and route- oral or -nasal, for tracheal intubation should be based on nature of patient injury, experience and skill level.

Key words: Airway algorithms, airway management, airway trauma

INTRODUCTION

The global status report on road safety published in May, 2011 by world health organization noted that India had the maximum (125,000) deaths due to trauma on roads. This is 10% of global road accident death. The report also adds that "at least 2.2 millions sustain serious injuries each year".[1] Unfortunately, a majority of trauma survivors are either confined to bed or wheel chair for the rest of their lives due to either brain or spinal injury.[2]

The tragedy of India is that 78% of the victims are men in the age group of 20 to 44 years, causing significant impact on productivity.[3]

Why do these trauma victims die? This is predominantly due to hypoxia and airway mismanagement which are known to contribute up to 34% of pre-hospital deaths in these patients.[4]

Several studies have shown that 7 to 28% of patients with trauma require definitive airway management in the form of either endotracheal intubation (ETI) or a surgical airway.[5-7]

Although emergency definitive airway management is known to be associated with complications (1), avoiding it results in unacceptably high morbidity and mortality.[8,9]

The best strategy to salvage patients with trauma is to provide them with immediate trauma care, including airway management in the pre-hospital setting and advance trauma care within the first hour of trauma or the so-called Golden Hour.[2]

The aim of this article is to review the more recent theoretic and practical information that pertains to airway management in victims of trauma. This shall include identifying causes of difficulties in airway management, prediction of airway difficulties and the best strategies in terms of airway devices, techniques or maneuvers that may be useful in the management of airway in the trauma setting.

CAUSES OF AIRWAY MISMANAGEMENT

Airway mismanagement in trauma victims may be attributed to any one or combination of the following causes:[10]

How to cite this article: Khan RM, Sharma PK, Kaul N. Airway management in trauma. Indian J Anaesth 2011;55:463-9.

1. Failure to recognise the inadequate airway in the trauma victim.
2. Failure to establish a clear airway with or without an airway device.
3. Failure to recognise that the airway device that has been employed is incorrectly placed.
4. Displacement of a previously established airway.
5. Failure to recognise the need for ventilation, and lastly.
6. Aspiration of gastric contents.

An inadequate airway would lead to asphyxia that may progress to cerebral hypoxia, brain damage and finally death.

What are the locations at which airway mismanagement occurs in these trauma patients? The answer to this includes airway mismanagement can occur at the accident site or the trauma centre. Causes of airway mismanagement at the accident site include the following:

1. Unfavourable conditions (e.g., darkness, inadequate space, limited access to the patient's airway).
2. Poor patient positioning who may be lying on the road, cramped smashed cars and trains besides other such unusual locations.
3. Unknown assisting personnel with different levels of airway training.

Causes of airway difficulties leading to airway mismanagement at the trauma centre may include the following:

1. Oropharyngeal or pulmonary haemorrhage and/or facial trauma obscuring patient airway details.
2. An immobilised cervical spine such as in cervical collar or Halo frame.
3. A possible full stomach and the assistant applying faulty cricoid pressure (Sellick's maneuver).
4. An uncertain volume status putting a dilemma on the use of pharmacological adjuncts.
5. Hypoxaemia putting stress on the operator.
6. An uncooperative or combative patient.

All or some of these factors, as well as poor airway skills of the operator themselves, result in a difficulty in managing the airway in 7 to 10% of trauma patients. To avoid airway mismanagement, it is essential that the physician or paramedic attending to the patient is well trained, remains calm and does not panic. One should strictly follow the A, B, C……. rules of Advanced Trauma Life Support guidelines. [10]

PREDICTION OF INADEQUATE AIRWAY IN PATIENT OF TRAUMA

Potential trauma patients who can have inadequacy of airway include patients with:[10]

1. Altered consciousness secondary to head injury, drugs or alcohol.
2. Direct trauma to airway (faciomaxillary, neck, larynx and throat).
3. Severely wounded patients having profound bleeding or are comatose.
4. Respiratory failure secondary to blast or inhalational injury, or exposure to chemical agents.

Not all these patients will have a compromised airway. The following steps shall help to identify the obstructed airway of some of these potential patients:[10]

1. Look: Look for obtundation, agitation, cyanosis, retraction and/or use of accessory muscles of respiration, and asymmetrical rise and fall of chest.
2. Listen: Listen to patient attempting to talk but failing to do so, abnormal breath sounds associated with snoring, gurgling, stridor and crackles. Asymmetrical breath sounds over both hemithoracies and tachypnea also suggest an inadequate airway.
3. Feel: Feel for a deviated trachea and/or subcutaneous emphysema.

Patients with any or combination of the above should be presumed to have an inadequate obstructed airway needing appropriate management. All patients of trauma should be suspected to have an altered or compromised airway till ruled out. They should continue to receive supplemental oxygen and have cervical immobilisation done using manual-in-line stabilisation during examination and airway management.

While trying to identify an inadequate airway, take the opportunity to take a SAMPLE history if patient's condition permits. This includes the following:

S Signs/symptoms
A Allergies
M Medications, if any
P Past medical history
L Last meal, and
E Events prior to injury.

The 8th edition advanced trauma life support (ATLS)

guidelines strongly suggest that if the patient is well oxygenated and is reasonably stable (i.e., does not need to be intubated in the next 2 to 3 minutes), a methodical stepwise plan to assess for difficult airway should be made. For ease of remembrance, one is encouraged to use the following mnemonic for assessing the difficult airway in these patients: LEMON and BONES.

LEMON[10,11] for assessing difficult intubation:

L	Look externally	For massive facial or neck trauma, receding mandible, short neck (<3 finger breadth from sternal notch to thyroid cartilage).
E	Evaluate 3-3-2 rule	Mouth opening, submandibular space and distance between the thyroid notch and the chin of less than 3, 3 and 2 fingers respectively suggests difficult intubation.
M	Mallampati grade	≥2 should alert the operator for difficult laryngoscopy and tracheal intubation.
O	Obstruction	Obstruction to the airway may be fixed or rapidly changing as due to inhalation injury or faciomaxillary trauma.
N	Neck mobility	This may be fixed as in patients with cervical collar or Halo frame.

Difficult mask ventilation may be anticipated if the patient has 2 or > of the following parameters in the mnemonic.

BONES

B	Beard
O	Obesity (BMI>26 kg/m^2)
N	No teeth
E	Elderly (age >55 years)
S	Snorer.

Once it has been identified that the patient has an inadequate airway, one can adopt:

1. Simple airway strategy
2. Definitive airway strategy (ETI or surgical airway), or
3. Semi-definitive airway strategy for making the airway patent as per existing situation.

However, before initiating any of the airway maintenance strategies, it is essential to clear any blood clot and mucous from the oral cavity and nose. Remove foreign bodies such as broken dentures or avulsed teeth. One should also control the tongue position in case of symphyseal bilateral fracture of the mandible. Words of caution when suctioning the oral cavity: never suction further than you can see, always suction on the way out, never suction for longer than 15 seconds and always oxygenate the patient before and after suctioning.

SIMPLE AIRWAY STRATEGY

This includes Head tilt and Chin lift (avoid in patients with cervical trauma)/jaw thrust or the use of basic adjuncts such as oropharyngeal airway in unresponsive patients without gag reflex, and/or nasopharyngeal airway in patients with more active reflexes but without evidence of fracture of base of skull.

DEFINITIVE AIRWAY STRATEGY

This includes either ETI or a surgical airway. Indications for definitive airway strategy include the following:[10]

1. Presence of apnoea.
2. Need for airway protection form aspiration: vomitus, bleeding.
3. Unconsciousness: Glasgow Coma Scale <8.
4. Severe faciomaxillary fractures.
5. Risk for obstruction: neck haematoma, laryngeal/tracheal injury.
6. Impending or potential airway compromise: inhalation injury.
7. Inability to maintain SpO2> 90% by facemask oxygenation.

Options for achieving ETI may include any one of the following airway aids depending on the situation, device availability and presence of operator with necessary expertise.

1. Direct laryngoscopy and tracheal intubation.
2. Video laryngoscopy and intubation.
3. Fibreoptic tracheal intubation.
4. Lightwand-guided tracheal intubation.
5. Intubating LMA/C-Trach™-aided tracheal intubation.

6. Bullard™-, UpsherScope™- or WuScope™-aided intubation.
7. Retrograde technique of tracheal intubation.
8. Blind nasal intubation.

Direct rigid laryngoscopy using a straight or a curved blade laryngoscope is still the most successful aid in performing ETI in patients with trauma. This is because we have vast experience with its daily use; vision is not hampered in the presence of blood/secretion/vomitus, and it is robust enough while dealing with an uncooperative/combative patient. It has been erroneously believed that direct conventional laryngoscopy is associated with significant movement of the cervical spine. Cadaveric and studies done on live trauma patients have failed to support this assumption. Today, there is enough evidence that a gentle direct laryngoscopy with MILS is not associated with any aggravation of spinal cord injury.[12,13]

Video laryngoscopes such as GlideScope™ (Verathon, Bothell, Washington), TruviewPCD™ (Truphatek, Israel), McGrath™ Aircraft Medical Ltd., Edinburgh, UK) and others give the ability to view the images on a monitor, thereby providing immediate feedback to an assistant applying external laryngeal manipulation.[14] In addition, videolaryngoscopic techniques also have a great potential for teaching the art of airway management in trauma patients. But these techniques have their share of disadvantages such as blurring of view in presence of blood and secretions besides being expensive.

Fibre optic tracheal intubation is considered to be the preferred method for intubating a patient with an unstable cervical spine. Least cervical spine movement is associated with fibreoptic tracheal intubation.[15] In the emergency department, the success rate of this airway aid ranges between 50 and 90%.[16-18] However, one should remember that it is most likely to fail in the presence of blood, secretion and vomitus or in an uncooperative, combative patient.

Lightwand (Trachlight™: Laerdal Medical Corp., Wappingers Falls, New York) is a safe, effective, rapid and inexpensive intubating device. Lightwand tracheal intubation is a suitable airway aid in trauma patients where intubation is to be done in the neutral position or with minimal head extension. Its second major advantage is that its success is not significantly impacted by the presence of blood and secretion. However, since this method of intubation is a blind approach, it should be avoided in patients with expanding neck masses or laryngopharyngeal trauma.[14]

Intubating LMA/C-Trach™-aided tracheal intubation has been used in trauma patients for achieving tracheal intubation. They require minimal head and neck movement while placing them into the patient's oropharynx and facilitate ETI as the patient is being simultaneously ventilated. However, Brimacombe *et al.* have demonstrated that its use may be associated with significant displacement of the unstable cervical vertebra.[15] Intubating laryngeal mask airway (LMA) has been noted to cause greater cervical vertebra displacement as compared with conventional orotracheal intubation.[19] Hence, one should be cautious in its use in patients with cervical injury.

Bullardlaryngoscope™ (Circon Corp., Stamford, Connecticut), UpsherScope™ (Mercury Medical, Clearwater, Florida) or WuScope™ (Achi Corp., San Jose, California)-aided tracheal intubation have the advantage of conventional fibreoptic scope. In addition, they are more robust and need less intensive training.[20] Because of their anatomically curved shape, they are especially suited for patients with cervical spine injury as no head and neck movement is necessary for their use. Cricoid pressure and inline stabilisation of the head and neck does not seem to interfere with the utility of Bullard™ scope.[21] Like any other fibreoptic laryngoscopes, these are handicapped by their inability to aid visualisation of the larynx in the presence of blood, vomitus or secretions. However, WuScope™ is partly protected from this handicap as its optical system is relatively protected in its tubular blade.[14]

Blind nasotracheal intubation, though still a part of ATLS,[10] has very few indications in trauma patients. One such indication may be limited mouth opening as all other devices detailed above require a mouth opening of at least 2 cm for orotracheal intubation. In such situation, nasotracheal intubation may be attempted if surgical airway is not immediately indicated. One should remember that it should be undertaken only by expert personnel. Contraindications to nasotracheal intubation are significant midface trauma and coagulopathy.[14]

Once tracheal intubation has been achieved, it is essential to confirm correct tracheal tube placement. This is done by either visualising the tracheal tube pass through the vocal cords or using other methods such as watching the chest move and auscultating

5 points on the patient's chest; CO_2 detector and a chest X-ray. Capnography (continuous CO_2 detection with a waveform) is the recommended method now. Only when it is not available, capnometry (single measurement of CO_2) should be resorted. Once correctly placed, do not forget to secure the endotracheal tube lest it gets displaced.

Gum elastic bougie is an underutilised airway aid in the setting of trauma airway management. Its advantage lies not only in making a difficult intubation possible when only a portion of laryngeal inlet or epiglottis alone is visualised, but its use is also not affected by the presence of blood and secretion.[10,22,23] All trauma care operators should be satisfied with a Cormack and Lehane's class 2 or 3 view and use a bougie to aid tracheal intubation rather than use force to obtain class 1 view and aggravate cervical injury.

Surgical airway should be resorted when there is severe glottis oedema and/or oropharyngeal haemorrhage, fracture of the larynx and when endotracheal tube fails to be passed through the vocal cords. 1% of trauma patients requiring intubation require a surgical airway.[24] Surgical airway techniques include cricothyrotomy.[10] Cricothyrotomy can be performed using the following three techniques:

A. A needle using a 12-14 gauge cannula. The cannula, after withdrawing the needle, is connected to 40-50 psi source delivering oxygen at 15 l/minute. Intermittent insufflation, 1 second on and 4 second off, can provide satisfactory jet insufflation.
B. A needle airway procedure as above, but where the ventilation is provided by low pressure ventilation.
C. "Surgical Airway" where a cuffed tube is inserted into the trachea through the cricothyroid membrane and ventilation is performed through a self-inflating bag or other ventilating technique.

Percutaneous tracheostomy (PCT) is not recommended in the trauma setting.[10] This is essentially because for performing PCT, one needs to hyperextend the patient's neck. This can have disastrous consequences if the patient has a cervical injury. This procedure can be dangerous and is time-consuming and hence not advocated.

SEMI-DEFINITIVE AIRWAY STRATEGY

The role of semi-definitive devices (supraglottic airway devices) has been clearly defined in the management of trauma patients in the 8th edition of ATLS.[10] A simplified approach to definitive airway management in trauma patients in presented in Figure 1. The three devices which are recommended include LMA, Combitube and laryngeal tube (LT).

Laryngeal mask airway

The LMA is considered a useful airway device in any patient where definitive airway could not be established. However, LMA is not considered a definitive airway device. ATLS strongly recommends that physicians should plan for a definitive airway when patient with this device arrives in the emergency department. It has been recognised that for proper placement of LMA, appropriate training is essential.

Laryngeal tube

The LT is supraglottic airway device with capabilities similar to LMA. As with the LMA, LT is not considered a definitive airway device. Like the LMA, LT is placed without direct visualisation of the glottis and does not require significant manipulation of the head and neck. Unlike the combitube and ETI, LT offers improved insertion success and lesser placement time.[25]

Combitube

It is still recommended as a semi-definitive airway device to be used in trauma patients where facilities for definitive airway do not exist or have failed. It is a time purchase device and all attempts should be made to switch over to a definitive airway device at the earliest. Unlike the LT, it may rarely enter into the trachea. In such circumstances, an immediate switch over to the other proximal lumen should be done for initiating correct ventilation.

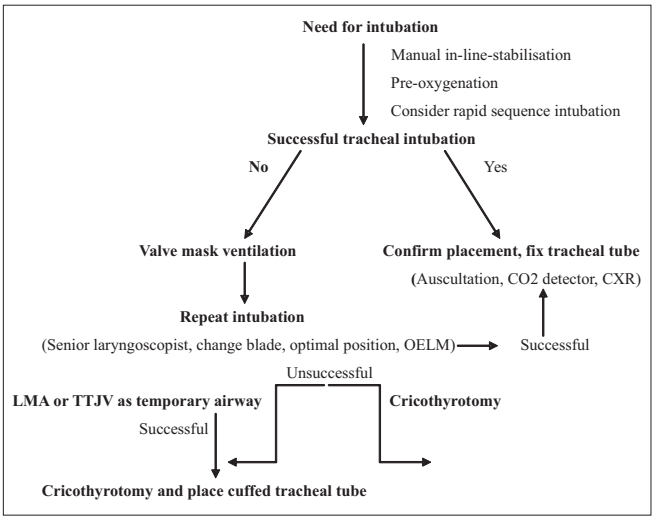

Figure 1: Simplified approach to definitive airway management in trauma patients

Miscellaneous issues during the airway management of trauma patient. These issues include the following: role of cricoid pressure and cervical immobilisation, dealing with a combative patient and dilemma of awake tracheal intubation.

Cricoid pressure, the "Sellick's maneuver," is not mentioned in the 8th edition of ATLS course manual except as a single line under rapid sequence intubation.[14] Although it has been used to prevent regurgitation of gastric contents, it is known to distort the laryngeal view and displace unstable cervical spine. If still utilised, cricoid pressure should be reduced or altogether removed, if felt that it is hampering tracheal intubation or placement of supraglottic device.

Cervical immobilisation

In a non-randomised comparative evaluation of three techniques of cervical spine immobilisation (rigid cervical collar, tape across forehead with sandbags on either side of the neck and manual-in-line-stabilisation) on laryngoscopic view of the glottis during laryngoscopy, Heath[26] noted poor laryngoscopic view (grade 3 or 4 of Cormack and Lehane's) in 64% patients when cervical immobilisation was attempted using rigid collar or tape across forehead as compared with only 22% when using MILS. Hence, MILS should be the favoured technique of cervical spine immobilisation in patient with suspected neck trauma.

Dealing with a combative patient

Patients with trauma may be combative as a result of intoxication (alcohol or drugs), but other equally important factors are because they are hypoxic, hypercarbic, head injured, frightened, disoriented or are in severe pain. One should also remember that there may be underlying medical condition such as hypoglycaemia contributing to their combative behaviour.[27] Addressing all these contributing factors should go side by side to airway management. Physical and chemical restraint during airway management should be restricted to patients in whom the above factors have been either ruled out or have been adequately attended. Physical restraint may be achieved by placing the patient on a long spine board with a cervical collar, tape and sandbags. However, if the patient continues to struggle, he can potentially injure his spine and warrants further action. In the haemodynamically stable patient, haloperidol, 5 mg, can be given in repeated doses intravenously every 5 minutes with observation for effect.[28]

Awake tracheal intubation

A commonly held belief in the 1970s and 1980s was that definitive airway management in an awake patient protects the injured cervical spine as the non-paralysed neck muscle tone acts as a splint. There is no evidence to support this assumption.[27] In fact, such patients can significantly aggravate their cervical injury due to coughing, bucking, gagging or struggling. In the National Emergency Airway Registry, a multicentre study of more than 15,000 emergency intubations, a phase-two data analysis of trauma intubations showed that 80% of patients underwent rapid sequence induction and intubation using muscle relaxant without cervical damage.[29]

Rapid sequence intubation

Rapid sequence induction and tracheal intubation under anaesthetic, sedative and neuromuscular blocking drug is still considered hazardous.[10] However, if the situation justifies the risk of administering these drugs, one should assure that skilled personnel are available to perform tracheal intubation.

Following steps should be strictly adhered to while carrying out rapid sequence intubation:

1. Ensure the presence of a person with skills to perform surgical airway in the event of failed intubation.
2. Ensure that suction and device to ventilate the patient is readily available.
3. Pre-oxygenate with 100% oxygen and apply cricoid pressure (Sellick's maneuver).
4. Administer etomidate 0.3 mg/kg or 20 mg and then administer 1-2 mg/kg succinylcholine intravenously. Avoid succinylcholine in patients with severe crush injuries, major thermal and electrical burns, pre-existing chronic renal failure, chronic paralysis and chronic neuromuscular disease as it has the potential for severe hyperkalaemia. Thiopental and sedative drugs (midazolam and diazepam) should be avoided in patients with hypovolaemia.
5. Perform intubation after the patient relaxes.
6. Inflate the cuff of the endotracheal tube and confirm correct tracheal tube placement by auscultation and presence of CO_2 in exhaled air.
7. Release cricoid pressure.
8. Ventilate the patient.
9. Secure the tracheal tube firmly.

REFERENCES

1. Global status Report on Road Safety, WHO, India. Available from: http://www.the hindu.com/2011/05/13/stories/2011051352810400.htm [Last cited on 2011 Aug 18].
2. Madan VS. Road traffic accidents: Emerging epidemic. Indian J Neurotrauma 2006;3:1-3.
3. WHO South East Asia Regional Office. SCN Department, New Delhi- Disability, violence – injury; prevention and rehabilitation. News Lett 2001;2:1.
4. Hussain L, Redmond A. Are pre-hospital deaths from accidental injury preventable? BMJ 1994;308:1077-80.
5. Rotondo MF, McGonigal MD, Schwab CW, Kauder DR, Hanson CW. Uregent paralysis and intubation of trauma patients: Is it safe? J Trauma1993;34:242-6.
6. Talucci R, Shaikh K, Schwab C. Rapid sequence induction with oral endotracheal intubation in the multiple injured patient. AmSurg 1988;54:185-7.
7. Kuchinski J, Tinkoff G, Rhodes M. Emergency intubation for paralysis ofthe uncooperative. J Emerg Med 1991;9:9-12.
8. Graham CA, Beard D, Oglesby AJ, Thakore SB, Beale JP, BrittliffJ. Rapid sequence intubation in Scottish urban emergency departments. J Emerg Med 2003;20:3-5.
9. Ollerton JE. Adult trauma clinical practice guidelines: Emergency airway management in the trauma patients. NSW Institute of trauma and injury management, North Ryde:NSW;2007.
10. Advanced trauma life support for doctors. Student course manual. Airway and ventilatory management. 8thed. Chicago, American College of Surgeons Committee on Trauma, 2008. p. 28-42.
11. Reed MJ, Rennie LM, Dunn MJ, Gray AJ, Robertson CE, McKeown DW. Is the 'LEMON' method an easily applied emergency airway assessment tool? Eur J Emerg Med 2004;11:154-7.
12. Gerling MC, Davis DP, Hamilton RS, Morris GF, Vilke GM, Garfin SR, *et al*. Effects of cervical spine immobilization technique and laryngoscope blade selection on an unstable cervical spine in a cadaver model of intubation. Ann Emrg Med 2000;36:293-300.
13. Walls RM.Airway management in the blunt trauma patient: How important is the cervical spine? Can J Surg 1992;35:27-30.
14. McGill J. Airway management in trauma: An update. Emerg Med Clin N Am 2007;25:603-22.
15. Brimacombe J, Keller C, Kunzel KH, Gaber O, Boehler M, Puhringer F. Cervical spine motion during airway management: Acinefluoroscopic study of the posteriorly destabilizedthird cervical vertebrain human cadavers. AnesthAnalg 2000; 91:1274-8.
16. Afilalo M, Guttman A, Stern E, Lloyd J, Colacone A, Tselios C, *et al*. Fiberoptic intubation in the emergency department: A case series. J Emerg Med 1993;11:387-9.
17. Delaney KA, Hessler R. Emergency flexible fiberopticnasotracheal intubation: A report of 60 cases. Ann Emerg Med 1988;17:919-26.
18. Mlinek EJ Jr, Clinton JE, Plummer D, Ruiz E. Fiberoptic intubation in the emergency department. Ann Emerg Med 1990;19:359-62.
19. Keller C. Pressure exerted against the cervical vertebrae by the standard and intubating laryngeal mask airways: A randomized, controlled, cross-over study in fresh cadavers. AnesthAnalg 1999;89:1296-300.
20. Borland LM, Casselbrandt M. The Bullard laryngoscope. A new indirect oral laryngoscope. AnesthAnalg 1990;70:105-8.
21. Shulman GB, Connelly NR. A comparison of the Bullard laryngoscope versus the flexible fiberoptic bronchoscope during intubation in patients afforded inline stabilization. J ClinAnesth 2001;13:182-5.
22. Jabre P, Combes X, Leroux B, Aaron E, Margenet A, Dhonneur G. Use of the gum elastic bougie for prehospital difficult intubation. Am J Emerg Med 2005;23:552-5.
23. Combes X, Dumerat M, Dhonneur G. Emergency gum elastic bougie assisted tracheal intubation in four patients with upper airway distortion. Can J Anaesth 2004;51:1022-4.
24. Adult Trauma Guidelines: Stanford Training Programs. Version 2.1. Available from: www.lulu.com/content/paperback_book/stanford_trauma_protocols/6307535 [Last cited on 2011 Aug 18].
25. Russi C, Miller L. An out-of-hospital comparison of the King LT to endotracheal intubation and the esophageal-tracheal combitube in a simulated difficult airway patient encounter. Acad Emerg Med 2007;14:S22.
26. Heath K. The effect on laryngoscopy of different cervical spine immobilization techniques. Anaesthesia 1994;49:843-5.
27. Hagberg CA. The traumatized airway: Principles of airway management in the trauma patient. In: Hagber CA, Editor. Benumof's Airway Management. 2nded.New York: Mosby Elsevier Inc; 2008.
28. Durbin CGJr. Sedation of the agitated, critically ill patient without an artificial airway. Crit Care Clin 1995;11:913-36.
29. Haas DA, Harper DG. Ketamine: A review of its pharmacologic properties and use in ambulatory anesthesia. AnesthProg 1992;39:61-8.

Source of Support: Nil, **Conflict of Interest:** None declared