



UNANTICIPATED DIFFICULT AIRWAY MANAGEMENT IN A TRAUMA PATIENT WITH SEVERE ANKYLOSING SPONDYLITIS

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ABSTRACT

Ankylosing spondylitis is a chronic debilitating arthropathy affecting multiple joints in the body. Airway implications related to the disease pose a significant challenge to the anaesthesiologists especially when an unanticipated difficult airway is encountered. A case of 42 year old trauma victim who needed an emergency definitive airway at ward set up, is reported here. Failed intubation due to complex airway anatomy associated with ankylosing spondylitis ensued him being ended up with an emergency surgical tracheostomy. Appropriate use of newer airway adjuncts and workplace soft skills contributed to successful management of an unanticipated difficult airway.

KEYWORDS : Difficult Airway, Ankylosing Spondylitis

CASE HISTORY

A 42 year old male with acute cervical spinal cord injury was posted for emergency tracheal intubation due to a sudden deterioration of the conscious level and desaturation at the trauma casualty ward while he was awaiting elective cervical spine fixation.

He had sustained unstable vertebral body fracture at C7 level following a road traffic accident two days ago, rendering him to be quadriplegic. The primary and secondary survey had excluded other injuries including head, maxillo-facial, tracheobronchial, chest and abdominal injuries.

Moreover, he had been diagnosed of ankylosing spondylitis (AS) over 10 years ago. Further, it revealed him to have had limited cervical spine mobility secondary to AS and restricted activity in daily living due to chronic back ache. However, a proper airway assessment had not been done after hospitalization.

Upon calling for emergency securing of the airway, the patient was immediately attended by an anesthetic medical officer who was well competent in airway management. Meanwhile, the patient was lying supine with a Philadelphia collar applied to the neck for restriction of cervical spine mobility. On examination, his GCS was 7/15, conjunctivae pink and was febrile. His pulse rate was 92 beats per minutes and blood pressure was 113/68 mmHg without inotropic support. He had feeble respiratory efforts with respiratory rate of 34 breaths per minute. Oxygen saturation was 88% with oxygen via a Hudson mask at 10 L/min. Factors hindering face mask holding such as facial disfiguration, large beard or moustache were not noted. Despite having non-receding chin and mouth opening of about 3 cm, his jaw protrusion was difficult manually. However, the assessment of thyromental distance, sternomental distance and mallampati score were not possible.

With limited airway assessment due to the circumstances, he was attempted for intubation. First, pre-oxygenation was done using a tightly fitting face mask and bag valve mask ventilation along with airway maneuvers. Anterior part of the Philadelphia collar was removed and the manual in line stabilization of the cervical spine was maintained throughout the procedure. Cricoid pressure was applied.

Ventilation with face mask was not difficult. Sedation and muscle relaxation was achieved with IV Midazolam 2.5 mg and IV Suxamethonium 100 mg.

Difficult intubation was encountered after the first laryngoscopic attempt using size 4 Macintosh blade and gum elastic bougie. Hence, oxygenation was maintained with face mask ventilation. Intubation was reattempted with size 3 Macintosh blade while removing cricoid pressure and applying external laryngeal manipulation. Nevertheless, intubation was doomed failure due to anterior larynx of Cormack and Lehane grade IV which completely obscured laryngoscopic view.

While immediately calling for senior airway assistant; arrangements were made to urgently get down a videolaryngoscope, intubating LMA and emergency front of neck access equipment. At the same time, the third attempt of intubation was done using a size 4 McCoy blade after administration of Rocuronium 6 mg so as to ensure complete muscle relaxation. Failing of which, final attempt of intubation was done by a senior anesthetist using a videolaryngoscope. Yet, the larynx was hardly visualized and failed intubation was declared, wherefore a size 4 intubating LMA was inserted. The patient was managed to successfully maintain oxygenation with the supraglottic airway.

The patient was immediately transferred to the casualty theatre so as to perform emergency surgical tracheostomy by the ENT team. There, he was intubated with a size 6 reinforced endotracheal tube which was railroaded through the intubating LMA as guided by an ambuscope. It was performed under the direct supervision of a senior consultant anaesthetist who was well experienced in airway management. Once the definitive airway was established, he was connected to the ventilator and lung protective ventilation was commenced. Then the surgical tracheotomy was performed and he was transferred to the accident service ICU.

DISCUSSION

Ankylosing spondylitis is a chronic debilitating arthropathy affecting multiple joints including the spinal column and the temporo-mandibular joint (TMJ). It is characterized by a chronic inflammation, calcification of the intervertebral discs and ossification of the ligaments leading to progressive loss of mobility and secondary osteoporosis. The disease begins between the second and the fifth decade of life with the disease prevalence of 1-3 in 1000 (Chaudhary, Hullinger & Vives, 2011). Males are more frequently affected than females (2-3:1) (Eashwar, Dinesh & Gopalakrishnan, 2019, p. 2759).

Alteration of the biomechanics of the spine renders these patients for spinal fractures which are up to four times commoner compared to general population. Acute spinal

fractures predominantly inflict the cervical spine (81.2%) markedly at C5-C6 and C6-C7, which are considered highly unstable. Temporomandibular joint is involved in 10% of the patients and may increase up to 30-40% in long standing disease (Chaudhary, Hullinger & Vives, 2011).

Given the fixed cervical spinal deformity, limited TMJ mobility and associated vertebral fractures; Ankylosing spondylitis has become a significant challenge to the anesthesiologists when the airway management is concerned.

Life threatening airway complications occur in 1:20 000 during general anaesthesia according to the NAP 4 report. Further, 25% of major airway events occur in the emergency department or in the intensive care units while 39% of these patients suffer from an underlying airway pathology. Though extremely rare as in 1: 180 000, failed intubation and inability to maintain oxygenation has been a major cause of cerebral damage and death during anaesthesia (Cook, Woodall & Frerk, p.978).

A complex interplay between human factors, patient factors and situational/ institutional factors contribute to the adverse outcome related to airway management.

Ustun *et al* demonstrated that the neck extension, inter-incisor distance, sternomental distance and modified Mallampati test were significant predictors of difficult intubation in patients with AS (Ustun, Tok & Davarci, 2014, p.155). These components are included in the LEMON score as well. The predictability of difficult intubation is improved when the components are used in combination (Mshelia, Ogboli-Nwasor & Isamade, 2018, p.17)

Human factors account for 40% of the cases. Loss of situational awareness and poor decision making during critical airway management may be ensued from poor communication, poor teamwork and inadequacy in planning, equipment and training. It may be implicated with cognitive overload where the clinician loses the global perspective and become fixated on a particular task hampering their ability on critical decision making. This cognitive error during an airway crisis can be overcome by adhering to a protocol based management; so-called vertex approach, which should be properly taught and rehearsed among airway management team (Higgs, McGrath & Goddard, 2018, p.323)

Inadvertent delay to proceed for advanced rescue techniques in a critical situation is invariably accounted for the patient morbidity and mortality by increasing the probability and duration of cerebral hypoxia. A clear declaration of failure at the end of each step minimizes the undue delay to progress through the airway management protocol in these situations. Refraining from unnecessary attempts at each step is also equally important (Higgs, McGrath & Goddard, 2018, p.323).

Upon failure of initial tracheal intubation attempt, it is imperative to take all the measures to improve the laryngoscopic view and to minimize the number of subsequent intubation attempts. External laryngeal manipulation, removal of the cricoid pressure, use of bougie and the appropriate laryngoscopic blade are considered in this regard.

It is recommended by the difficult airway society 2015 guideline to achieve a complete neuromuscular blockade during an unanticipated difficult airway management since it will facilitate face mask ventilation and tracheal intubation. However, the above patient had hardly any relaxation in the pharynx or the jaw following the neuromuscular blockade, probably due to the ankylosing spondylitis affecting TMJ and the ligaments.

The videolaryngoscope provides an improved laryngoscopic view compared to the conventional laryngoscope (Higgs, McGrath & Goddard, 2018, p.323). The curved blade offers a better visualization of an anterior larynx. Nevertheless, the success rate may be affected by the familiarity of the instrument. Hence, all the anesthetists should be trained on that. The larynx in this patient was too anterior to be visualized even with the videolaryngoscope. Proper manipulation of the scope was hindered by the restricted mobility of the jaw so that the intubation was doomed to failure.

Intubating LMA (iLMA) has been designed to be used in a patient whose head is in neutral position so that the external manipulation of the head and neck is not required. Therefore, it would be a safer airway adjunct for patients with unstable cervical spine. Further, the inherent shape of the iLMA; allowing it to have a better fit with the oropharynx and a superior alignment with the glottis facilitates anaes the siologists to negotiate "high" or "anterior" larynx with Cormack and Lehane grade III or IV (Brain & Brimacombe, 1997, p.704)

Evidence supports that the LMA; when used as an emergency airway technique for unanticipated difficult intubations, provides superior success rate (94%) compared to fibreoptic bronchoscope (50%). Yet, the success rate for LMA in anticipated difficult airway is comparable to fibreoptic bronchoscope (94% Vs 92%) (Langeron & Cros, 2001, p.968) Therefore, the selection of the right airway technique for the right patient at the right time is key to success in both anticipated and unanticipated difficult airway scenarios.

CONCLUSION

Ankylosing spondylitis, though primarily an arthropathy affecting the sacroiliac joint and the spinal column, can bring about significant intrusions to the airway. It may be more serious when an unanticipated difficult airway management is concerned, especially if the condition is complicated by cervical spine fractures. Protocol based management of unanticipated difficult airway is key to success in these conditions. Newer airway adjuncts like intubating LMAs, videolaryngoscope and fibreoptic techniques should be used appropriately and without delay. Yet, the grace of clinical experience, good communication, team dynamics and leadership behaviors on critical decision making cannot be overlooked.

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