

## Airway management in adults with cervical spine injury

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### ABSTRACT

Cervical spine injury is a dangerous, complex and challenging task of trauma. Airway management is crucial in patients with cervical spine injury as airway management techniques may cause secondary neurological injury. Therefore, learning how to manage the airway in trauma patients has profound importance. In this review, we aimed to highlight airway management in adults with cervical spine injury and discuss areas of uncertainty and limitations.

**Key words:** Cervical spine injury, immobilization, intubation, airway management

### Introduction

Cervical spine injury is a dangerous, complex and challenging task of trauma. Its incidence is between 2-5% in blunt trauma patients [1]. There is a correlation between cervical spine injury and Glasgow Coma Scale [2]. The risk of cervical spine injury increases when Glasgow Coma Scale decreases. Airway management is crucial in patients with cervical spine injury as airway management techniques may cause secondary neurologic injury. For this reason physicians must be familiar with the techniques and be careful during intubation. Anesthesiologists prefer different approaches during airway management. Each technique has advantages and disadvantages. In this review, we aimed to highlight the airway management in adults with cervical spine injury and discuss areas of uncertainty and limitations.

### Cervical Spine Immobilization

Cervical spine immobilization is the standard of care until exclusion of spinal injury. Cervical collars and manual in-line stabilization can be used for immobilization.

**Cervical collars:** There are different types of collars. Rigid collars are better than semi-rigid and soft ones for restricting spinal motion. While collars restrict the spinal motion they also limit mouth opening. Goutcher et al. [3] showed that cervical collars reduced interincisal distance to 26-29 mm. So

if intubation is needed limited mouth opening can cause problems. During airway management, removal of the anterior portion of the collar and applying manual in-line stabilization is reasonable.

**Manual in-line stabilization (MILS):** MILS is used during procedures like airway management where other stabilization techniques are not appropriate. For achieving this maneuver the provider stands at the side of the patient and grasp the mastoid and occiput of the patient with their hands. The aim of MILS is to apply opposite and equal forces to laryngoscope to fix the head and neck in a neutral position. MILS decreases laryngeal visualization and hinders intubation. Nolan et al. [4] showed that MILS impairs glottic view in 45% of patients. However, glottic view is better with MILS when compared with collars. Nevertheless, we need more comprehensive studies to reveal affectivity, efficacy and limitations of MILS.

### Intubation Technics

There are many techniques for intubation. Providers must know the pros and cons of these techniques to choose the best option. In addition to intubation techniques, mask ventilation can cause cervical motion. Hauswald et al. [5] showed that mask ventilation is not innocent; it causes more cervical displacement than oral or nasal intubation do. So, physicians

must be careful in each step of airway management not to cause secondary neurologic injury.

**Direct Laryngoscopy (DL):** DL has many advantages. The experience of most of the providers is that it is easy to use and performed very quickly. On the other hand, it causes greatest cervical movement and when MILS applied glottic view is reduced. DL must be considered when the provider is not skilled with the other techniques or emergent intubation is needed.

**Videolaryngoscopy:** Videolaryngoscopes are new devices, and there are not enough studies to give definitive outcomes. However, we know that they may improve glottic view and ease intubation but it is not certain that they decrease cervical spine motion [6]. Also during intubation blood and secretions may cause difficulties for videolaryngoscopy.

**Fiberoptic intubation (FI):** Cervical spine movement is least with FI. However, there is no published data that shows FI has better neurological outcomes

compared to other methods. Ezri et al. [7] reported that 75% of American anesthesiologists agree with fiberoptic intubation at cervical spinal surgery. Nevertheless, just 59% of respondents declared that they are comfortable using the fiberoptic. Fiberoptic intubation needs experience, and it may cause airway obstruction and increase intracranial pressure. Malcharek et al. [8] showed that awake fiberoptic intubation and self-positioning to the prone position is feasible, successful and gives a chance for neurologic examination in neurosurgical patients at risk for secondary cervical injury.

As a result, immobilization is the standard procedure for cervical trauma patients. Urgency of the procedure and experience of the anesthetist are the main determinants to decide which airway management should be used. Currently awake fiberoptic intubation is the recommended intubation technique. However, there is not enough evidence to reveal the ideal intubation technique with least neurologic adverse effects.

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