

CERVICAL STABILIZATION WITH HALO FIXATION: ANESTHETIC IMPLICATIONS

- Case Reports -

VIRENDRA JAIN*, GIRIJA P RATH**
HEMANSHU PRABHAKAR***, JAYANTA K MITRA*
AND ZULFIQAR ALI**

Summary

Halo fixation is often used to provide stability in patients with unstable cervical spine. These fixation devices pose unique challenges to the anesthesiologists encountered while securing an airway. Management of airway in patients with halo fixation is complicated by the fixed position, limited access to the face, and immobilization of neck. We managed two different patients, one in which halo fixation was done for atlanto-axial dislocation (AAD); and the other, who came with halo fixation and underwent wound debridement under general anesthesia. In the former case, procedure was carried out with laryngeal mask anesthesia and patient breathing spontaneously whereas, in the later case, procedure was performed after securing the airway using awake fiberoptic intubation technique.

Keywords: Halo fixation, anesthesia, airway management.

From Department of Neuroanaesthesiology, All India Institute of Medical Sciences New Delhi-110029, India.

* MD, Senior Resident.

** MD, CC ,Assist, Professor..

*** MD, D.M. Assistant Professor

**** MD, PDCC, Senior Resident.

Address for Correspondence: Dr. Girija Prasad Rath, Assistant Professor, Department of Neuroanaesthesiology, Neurosciences Centre, AIIMS, New Delhi-110029, India.

Tel: +91-9868398204, Fax: +91-11-26588663, E-mail: girijarath@yahoo.co.in.

Introduction

Neurological injury is always a possibility following airway manipulation in patients with cervical spine injury¹. The halo fixation is often used for stability in patients with unstable cervical spine.

By design, the halo device projects from the shoulders and holds the head in rigid fixation with four metallic struts and a metallic “halo” affixed to the skull with bolts².

Airway management in patients with halo fixation is complicated by the fixed position, limited access to the face, and immobilization of neck³. We describe airway management of two different patients, one in which halo fixation was required for atlanto-axial dislocation (AAD); and the other came with halo fixation, scheduled for wound debridement under general anesthesia.

Case Reports

Case #1: A 12-yr-old boy, 35 kg, ASA I with traumatic atlanto-axial dislocation (AAD) was posted for halo fixation under general anesthesia. Since the boy was uncooperative, anesthesia was induced with sevoflurane in oxygen/nitrous oxide mixture. After routine monitoring (5-lead ECG, pulse oximetry, and non-invasive blood pressure) were attached, a 20 G intravenous cannula was inserted in dorsum of left hand. Fentanyl 70 mcg was administered intravenously, and a classic laryngeal mask airway (LMA) size 3 was placed with ease. Manual-in-line-stabilization was maintained throughout the induction of anesthesia. Maintenance of anesthesia was done with sevoflurane in oxygen/nitrous oxide mixture, while the patient breathed spontaneously. Anesthetic agents were discontinued at the completion of the procedure, which lasted for 30 minutes. After patient became fully awake, LMA was removed, and patient shifted to intensive care unit.

Case #2: The second patient was a 35-yr-old female, 58 kg ASA I, who underwent transoral odontoidectomy and posterior fixation for AAD.

One month after discharge from the hospital, she presented herself in the emergency ward with history of high grade fever of 5 days and copious purulent discharge from back of neck (operated site). It was found that the implant used for posterior fixation got infected.

The management entertained was to remove the implant and drain pus from the wound. To provide stability to the cervical spine, halo fixation was done under local anesthesia. After 7 days, when the discharge decreased, debridement of wound with secondary suturing of skin was planned, in lateral position. Since the neck was immobilized with limited access to mouth opening, a decision was taken to secure the airway with awake fiberoptic intubation.

After explaining the procedure to the patient, glycopyrrolate 0.2 mg IM was administered 1 hour before the procedure. Routine monitors were connected. Conscious sedation was provided with incremental doses of midazolam and fentanyl while oxygen was administered with nasal prongs. Lidocaine viscous (4%) was used for gargling and superior laryngeal nerves were blocked with 2 ml lidocaine 1% on each side. Transtracheal block was performed with 2 ml lidocaine 4%. Fiberoptic bronchoscopy was done with Fujinon 120 T flexible bronchoscope (Fujinon-Corporation, Saitama, Japan) and a cuffed 7.0 mm ID tracheal tube was passed in first attempt. After confirmation of tracheal intubation, anesthesia was induced with fentanyl 100 mcg and propofol 120 mg. Intermittent positive pressure ventilation was instituted, and anesthesia was maintained with propofol infusion along with oxygen/nitrous oxide mixture (Fig. 1). After completion of procedure, anesthesia was discontinued. Trachea was extubated after the patient became fully awake. The patient was discharged on 10th day with intact neurological status.

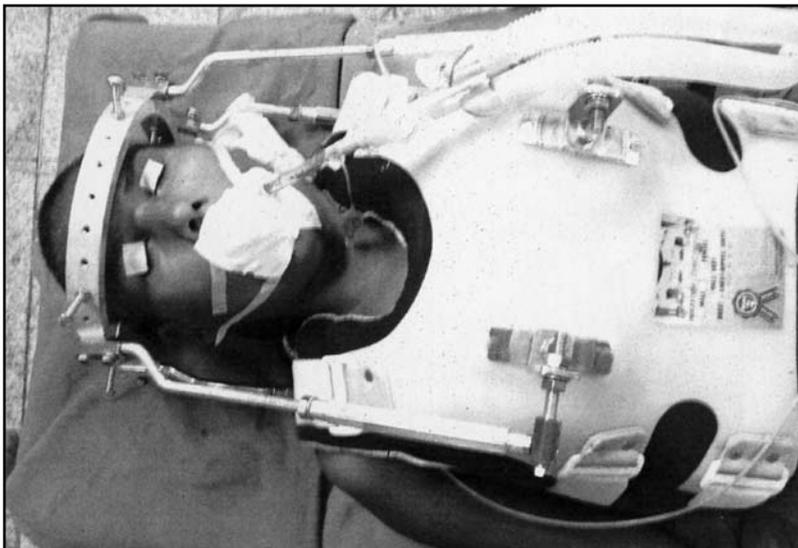
Discussion

Halo fixation devices used for cervical spine stabilization pose a unique challenge to the anesthesiologists in view of the fixed neck position and limited access to the face³. The halo frame immobilizes the head and neck,

and prevents “sniffing the morning air” position needed for intubation⁴. In patients with unstable spine, undue force during laryngoscopy and tracheal intubation may move the cervical cord and jeopardize the spinal cord^{4,5}. For these reasons, preference is given to awake fiberoptic tracheal intubation or intubating LMA⁵.

Fig. 1

Halo fixation in a patient with tracheal tube in situ



Generally halo devices are fixed under local anesthesia, however, as the first patient was a child (case #1) the procedure was carried out under general anesthesia. Due to non-availability of a pediatric fiberoptic bronchoscope, it was decided to secure the airway with an LMA, taking into consideration that the cervical spine is not free from movements during LMA insertion⁵. Hence, manual-in-line-stabilization was maintained to minimize the movements. Since the procedure was short it was decided to maintain anesthesia without using neuromuscular blocking agents, so as to maintain the respiratory muscle activity to promote early recovery and smooth removal of LMA.

Mercer and colleagues⁴ reported airway obstruction leading to

hypoxia after removal of tracheal tube in a patient with halo traction. Sims and co-workers⁶ in a retrospective analysis of 105 patients with cervical injury requiring halo fixation reported 13% of patients requiring emergent or semi-emergent intubation with half of these patients dying due to prolonged intubation attempts. Injury severity score, cardiac history and intubation on arrival to hospital were significant indicators of the need for an in-hospital emergent or semiemergent intubation or reintubation.

The second patient (Case #2) had halo fixation in place, and the scheduled procedure was to take place in lateral position. It was decided to proceed with awake fiberoptic tracheal intubation.

Airway management of patients in halo fixation is usually difficult. These difficulties are compounded by additional challenges and the fixation position of the halo device. In the case of halo fixation, sufficient provision must be made for mouth opening⁴. Awake tracheal intubation should be considered as a first choice, as this allows maintenance of spontaneous ventilation. In the anesthetized and paralyzed patient, loss of muscle tone tends to distort anatomic orientation. The larynx tends to move to a more cephalic position with induction of anesthesia and muscle paralysis, which may make tracheal intubation more difficult³.

Fiberoptic bronchoscopy has been recommended for elective tracheal intubation in these patients but, flexible fiberoptic intubation bronchoscopes are expensive and fragile instruments. Although experienced anesthesiologists make the procedure seem simple, fiberoptic intubation requires skill. This technique requires more time than direct laryngoscopy, even when performed by an expert. Thus, alternative provisions of airway management techniques such as retrograde intubation kit⁶, bullard laryngoscope⁷, intubating LMA³, combitube⁴, cuffed oropharyngeal airway⁸ should be available, which have been used successfully in the past.

To conclude, airway management in patients posted for or presenting with halo fixation is a challenge. Anesthesiologists must take necessary precautions to prevent further neurological injury. A difficult airway cart should be ready before managing such types of patients.

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