Securing airway in a burn patient with inhalation injury – A narrow escape

ABSTRACT
Inhalation injury is one of the major determinants of the outcome, morbidity and mortality in burn patients. Early intervention to secure the airway in a suspected inhalation injury proves vital in the management and outcome of such patients. Failure to identify such cases will push the attending physicians into a vortex and the patients will succumb to the injury. High degree of suspicion and the ability to identify airway burns is a must for all physicians involved in the management of burn patients. Here we present a case of inhalation injury where airway management was delayed by a few hours due to technical and logistic issues, where in we had a very hard time securing the airway.

Keywords: Airway, burns, inhalation injury

INTRODUCTION
Inhalation injury is a major determinant of morbidity and mortality in burn patients. Inhalation injury makes the management of burn patients very challenging, especially the airway. These patients deteriorate rapidly, and unless the airway is secured early, a complete airway obstruction may ensue. Here, we report how airway was managed in a 20-year-old lady, who presented to Sushma Koirala Memorial Hospital, Kathmandu, Nepal, following suicidal flame burn, with total body surface area (TBSA) 29%, involving the face, neck, upper chest, and parts of the lower limbs.

CASE REPORT
A 20-year-old lady was brought to Sushma Koirala Memorial Hospital, Kathmandu, Nepal, with suicidal flame burn injury involving the face, neck, upper chest, and parts of the lower limb, with TBSA 29%. The patient was stable hemodynamically. There was high suspicion for inhalation injury as the event occurred in a closed room, there was facial burn, nasal hair singed, and there was soot the face and oral cavity. Initial resuscitation was carried out according to the institutional protocol, and the patient was transferred to critical burn unit. There were no respiratory complaints, and she was maintaining oxygen saturations in room air. As there were a few staff in the night and most of the skilled staff of the operating room (OR) were not available, we decided to wait till morning to evaluate the airway.

In the morning, she had developed swelling of both the lips and a few blisters on her face [Figure 1]. She had been put on supplementary oxygen through face mask after saturations dropped in the early hours. The patient herself, however, did not complain of any breathing difficulty. On examination, mouth opening was 1.5 cm or less and the tongue was swollen. We decided to take the patient to the OR and evaluate the airway as well as apply dressings to the wound. The patient and her relatives were well

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explained regarding the condition of the patient and possible outcomes.

In the OR, she was laid on the operating table with slight head elevation. Monitors were attached to measure basic vital parameters. Preparation was made for anticipated difficult airway. The author took the lead, and all the OR staff were assigned specific roles. Our initial plan was video laryngoscopy and intubation, and if it failed, we had planned for nasal fiber-optic intubation with spontaneous respiration. We also had a rescue plan for securing front of neck airway, and the surgeons were informed and were present in the room. The induction of anesthesia was started with a titrated dose of fentanyl and propofol with a view of maintaining spontaneous respiration. Bag-and-mask ventilation was attempted once her efforts became shallow, and ventilation seemed to be fine. Anesthesia was deepened with addition of propofol, and sevoflurane was also started. With appropriately sized mask and two-hand technique, ventilation was good enough. Capnography was normal, and tidal volume was also acceptable. Once the anesthesia was deep enough, video laryngoscopy was attempted. The vocal cords and the surrounding tissue were edematous [Figure 2]. Attempt to intubate failed, as the tube could not be maneuvered through the glottis due to edema of the surrounding structures. We then attempted to introduce a bougie but it also could not be passed through the cords.

Bag-mask ventilation was resumed, and nasal fiber-optic intubation was planned. Apneic oxygenation was provided through nasopharyngeal airway in the contralateral nostril. Anesthesia was further deepened. No structure was recognizable in the nasal cavity as the mucosa was edematous. We were, however, able to navigate through the nasopharynx and further down to the larynx. The epiglottis was swollen along with the surrounding structures, which made it really difficult for the scope to pass through the glottis. The vocal cords were edematous, but we could pass...
through with difficulty. We finally reached the carina, and the mucosa was erythematous and edematous [Figure 3]. Then, an endotracheal tube of 6-mm internal diameter was passed over the bronchoscope into the trachea with much difficulty. After visual confirmation of tube position, the fiber-optic scope was withdrawn and ventilation was started and reconfirmed [Figure 4]. Wound dressing was done and the patient was transferred to the intensive care unit for elective ventilation.

**DISCUSSION**

Inhalation injury can result from direct local thermal and chemical exposures, immune response, systemic effects of inhaled toxins, endobronchial debris, and secondary infection. The effect on individual patients is complex and unpredictable.[1] Combined with cutaneous burns, inhalation injury increases fluid resuscitation requirements, incidence of pulmonary complications, and overall mortality of thermal injury.[2] The major concern with inhalation injury is airway edema, which progressively leads to complete airway obstruction. Thus, the early recognition of inhalation injury and prompt intervention to secure the airway is utmost important in these patients. With lapse of time, the airway becomes progressively difficult to secure. Airway edema increases over 12–18 hours after injury, and the early recognition of airway deterioration from mild pharyngeal edema to complete airway obstruction is vital. Endotracheal intubation is indicated in patients who have evidence of upper airway edema, decreased mental status, and signs of deteriorating respiratory status.[3] Securing the endotracheal tube can be difficult due to the burn wound and the rapid swelling that occurs within the first 72 h. Whenever upper airway obstruction is suspected, the most experienced clinician in airway management should perform endotracheal intubation.[4] All preparations should be made for difficult airway management, including the front of neck access. Early recognition and prompt intervention will prevent a possible airway catastrophe, resulting either from upper airway obstruction or imminent pulmonary complications.

**Declaration of patient consent**

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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**Conflicts of interest**

There are no conflicts of interest.

**REFERENCES**

1. O’Connell KJ, Manicone PE. Fire-Related Inhalation Injury. Zaoutis LB, Chiang VW, editors. Comprehensive Pediatric Hospital Medicine. Philadelphia, Pennsylvania 19103-2899: MOSBY ELSEVIER; 2007. p. 1144-7.
2. Dries DJ, Endorf FW. Inhalation injury: Epidemiology, pathology, treatment strategies. Scand J Trauma Resusc Emerg Med 2013;21:1-15.
3. Tubera D. Management of Inhalation Injury in an Adult Burn Patient. Internet J Adv Nurs Pract 2014;13:1-8.
4. Mlcak RP, Suman OE, Herndon DN. Respiratory management of inhalation injury. Burns 2007;33:2-13.