

Fatal Laryngeal Oedema in Burns

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Abstract

The present study reports the cause of death of a 30 year old male victim of fire. Autopsy findings reveal gross laryngeal oedema with narrowing of the air passage. The burn injuries involved about 30% of the total body surface area. The signs of asphyxia were quite prominent on autopsy. The person suffered from inhalation injuries along with burn injuries. A thorough literature review brought forth the fact that, a timely intubation could have saved his life.

Keywords: Laryngeal oedema; Burn injuries; Autopsy

Introduction

Laryngeal oedema can result from various causes like inhalation of flame or irritant gases, infections, anaphylactic reactions, tumours, foreign bodies etc. The morbidity and mortality increases when burn injury is associated with smoke inhalation as mentioned in literatures [1,2]. Following burns involving face and neck, a person may develop laryngeal oedema presenting with hoarseness and stridor. The external oedema in such cases may be minimal but the airway oedema may be massive. Some highly water soluble gases like sulphur dioxide, ammonia and hydrogen chloride react with water in the mucous membranes of the upper airway. This produces strong acids and alkalis leading to irritation, ulceration and oedema of the mucosal surface. Laryngeal oedema is a usual presentation in such cases. Laryngeal oedema may also occur as part of generalised oedema with large body surface area burns >40%.

Case Report

The present case is concerned with the death of a 30 year old male due to the complications of burn injuries. The man was the victim of the flame of a stove while cooking in his house. The burn injuries involved about 30% of body surface area and were superficial dermoepidermal burns. The patient belonged to a rural area where he was admitted to a peripheral health centre. Their treatment records revealed that he had pulse 120/min. blood pressure 90/70 mm Hg, pallor, cyanosis, dehydration, cold clammy skin and chest crepitations. He was given IV fluids and haemacoel, IV antibiotics and pentaprazole along with dressing of the burns. Patient was then referred to the nearest higher centre. He was received dead in the casualty of the medical college hospital so no further treatment like direct tracheal intubation or tracheostomy could be done. The treatment records and the history given by the relatives suggested that the person died after about 6 hours of the incident. Autopsy of the body was conducted some 14 hours after his death.

On Autopsy

There were signs of asphyxia like cyanosis of nail bed, congestion of conjunctiva and bitten tongue. Superficial dermoepidermal burns were found over the whole face (Figures 1 and 2), neck, front of chest, upper third of front of abdomen, both side shoulders and medial aspect of both side arms including the axilla. There was singeing of most of the scalp hairs with some matting at the occipital area. The eye brow, eye lash, moustache, hairs in the nostrils and axillary hairs were singed. The eye lids and lips were swollen. The skin over the upper eye lids and chin were blackened. The base of the burnt area appeared red with a faint smell of kerosene appreciable from scalp hairs.

The internal examination revealed soot particles adhering to the oral mucosa. There was gross swelling and oedema of the larynx (Figure 3) involving the epiglottis and the vocal cords (Figure 4) with narrowing of the air passage. Some black coloured soot particles mixed with froth was found adherent to the tracheal mucosa. Heart was intact with fluid blood in the right side chamber. All other internal organs were intact and congested. Stomach contained some semidigested food without any specific odour. Estimation of carbon monoxide, carbon dioxide etc. like toxic gases was not done during autopsy so no statement about such poisoning can be given.

Discussion

The incident occurred in a closed room from the flame of a stove and the person died within few hours. The burns involved about 30% of body surface area, mostly confined to face, neck and chest. There was singeing of nostril hairs, soot in oral cavity and oedema of larynx. All the above facts indicate that the person suffered from inhalation injuries along with burns. In a retrospective study done by Madhani et al. [3], they concluded that patients with soot in the oral cavity, facial burns and / or body burns should be monitored closely because



Figure 1: Face burnt, lip swollen.

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Figure 2: Singeing of eyebrow and eyelash.



Figure 3: Laryngeal edema.



Figure 4: Swelling of epiglottis and vocal cords.

these findings indicate a higher likelihood of laryngeal oedema and the need for intubation. Barin Bose [4] in his management of burns has highlighted that if there is burn around the nose and mouth, possibility of flame inhalation must be considered. Laryngeal oedema can develop rapidly and lung function may deteriorate. The oedema of larynx involving epiglottis and vocal cords correlated well with the findings in burns and scalds as mentioned by B. B. Ong [5]. The proportion of inhalation injuries in burn victims is known to be quite high and found in about 20% of admissions to burn centres. Dry heat does not penetrate easily and is limited to the oropharynx and upper airway. Toon et al. [6] concluded in their work, that thermal injury below the vocal cords is rare because of effective heat dissipation in the upper airway. The person in our case study died within few hours of the incident just as mentioned by Heimbach and Waeckerle [7] in their work. Thermal burns occurring in the upper airway are usually manifested within 48 hours of injury. Diagnosis is made by direct visualisation of the upper airway, looking for signs of thermal injury. Blinn et al. [8] in their research stated, estimating the severity of inhalation injury is difficult, as signs of respiratory failure may occur hours or even days after the injury. One should also be careful in judging the cause of laryngeal oedema as it can occur in patients intubated for 4 days or more as concluded by Bastiaan H. J. Wittekemp et al in their research study [9]. In such cases ulceration and granular tissue are found mostly

posterior to the level of vocal cords. Cheng et al. [10] in their study of burns found that severe laryngeal burns could manifest as severe laryngeal oedema or atrophic changes. The treatment of thermal burns with inhalation injuries needs meticulous intervention. Clark [11] in his work concluded that the mortality rate of smoke inhalation victims without a burn is < 10% and with a burn is 30% to 50%, suggesting that thermal injury or its treatment is responsible for further lung damage. Ziyad Alharbi and others [12] in their work suggested that in burn injuries early recognition of airway compromise followed by prompt intubation can be life saving. If there is soot in the mouth consider early intubation even if the patient is breathing normally. Blinn et al. [8] and co-workers mentioned that patients with as little as 15% total body surface burns with mild smoke inhalation are at significant risk of respiratory failure and the need for ventilator support. Cancio et al. [13] has stated smoke inhalation injury to be a unique form of acute lung injury that greatly increases the occurrence of post burn morbidity and mortality. In addition to early intubation for upper airway protection, subsequent critical care of patients who have this injury should be directed at maintaining distal airway patency.

In cases of burn injuries, even if the % of body surface area involvement is less, one should be careful to identify inhalation injuries. Laryngeal oedema most often presents as laryngeal stridor and may be associated with respiratory failure due to airway obstruction. Endotracheal intubation can be life saving in such cases.

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