Case Report
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Difficult Airway Management in a Case of Hair Dye Poisoning

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Abstract

There is no doubt regarding the significance of establishing a patent airway in the critically ill patient in the Emergency Department. Failure to secure the airway can drastically increase the morbidity and mortality of the patient within few minutes. Cannot intubate and cannot ventilate situation is a nightmare to all emergency physicians. Hence, knowledge of alternative measures to secure the airway and ventilate the patient is necessary. Prompt decision to proceed for emergency surgical airway (cricothyroidotomy or tracheostomy) is one of the utmost important rescue measures under such circumstances. Hesitating to perform this procedure may lead to repeated unsuccessful attempts at oral-tracheal intubation and inadvertently, to hypoxia and subsequent brain damage and death. We report a fatal case of hair dye poisoning that presented with severe angioedema and airway compromise.

Keywords: surgical, airway, super vasmol, poisoning, tracheostomy

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1. Introduction

Supervasmol is an easily accessible hair dye and an emerging cause of deliberate self-harm in South India. The major toxic ingredients of the dye are paraphenylenediamine (PPD), resorcinol, propylene glycol and ethylene diamine tetra acetic acid (EDTA). Ingestion of super vasmol hair dye causes cervicofacial edema, respiratory distress due to upper airway obstruction, rhabdomyolysis and acute kidney injury. Treatment is mainly supportive with emphasis on early airway management and prevention of acute renal failure. This case report explains the need for preparedness in the Emergency Department to manage cannot intubate-cannot ventilate situation.

2. Case Report

A 26-year-old married lady had consumed 100 ml of super vasmol hair dye with an intent of deliberate self-harm. She was initially taken to a primary health center where she had developed swelling of face, lips, neck and hoarseness of voice. She was treated with gastric lavage, intravenous hydrocortisone and antihistaminics and then was referred to our tertiary care center. When she presented to our Emergency Department five hours after consumption, she was agitated, restless and unable to vocalize. She had extensive swelling over face, lips, neck and her tongue was swollen and protruding outside the oral cavity. Her pulse rate was 100/min, blood pressure was 100/60 mm Hg, room air oxygen saturation was 85% and respiratory rate was 30/min. She was treated with oxygen via non-rebreathing face mask and intravenous hydrocortisone. In view of severe angioneurotic edema with upper airway obstruction, we decided to secure the airway immediately with endotracheal intubation.

Since we anticipated difficult airway, Anesthesiologist was called in for backup. 100% oxygen and pre-treatment with 50 mg of intravenous ketamine was provided to the patient. Paralytic agent was not given in view of anticipated difficult airway. First attempt by emergency physician at oral-tracheal intubation using gum-elastic-bougie was unsuccessful due to swollen tongue which could not be displaced laterally with direct laryngoscope. Immediately, bag-valve-mask ventilation was resumed but unable to

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ventilate the patient effectively. While anesthesiologist was attempting at nasotracheal intubation, patient sustained hypoxia, went into bradycardia and cardio-respiratory arrest. Cardio-pulmonary resuscitation was started with chest compressions and 1 mg of intravenous adrenaline. In view of "*Cannot Intubate, Cannot Ventilate*" situation, we prepared for emergency surgical airway. It was difficult to identify anatomical landmarks for cricothyroidotomy because of the swollen neck. Hence cricothyroidotomy was deferred and we decided to perform emergency tracheostomy. Using a no. 20 surgical blade, midline vertical incision (three cm in length) was given two fingers breadth gap above suprasternal notch. Skin and strap muscles were cut layer by layer and trachea was identified. Horizontal incision was made through the membrane between tracheal rings and 6 mm size cuffed endotracheal tube was inserted and inflated. Endotracheal tube placement was confirmed with bilaterally equal breath sounds and 5-point auscultation method. Cardio-pulmonary resuscitation was continued throughout the procedure as per ACLS guidelines. In spite of our resuscitation efforts, patient expired within 30 minutes of arrival to the Emergency Department. Her postmortem examination revealed edematous supraglottic larynx.

3. Discussion

Super vasmol is a popular and an easily available hair dye in India. It is emerging as a popular means of deliberate self-harm in developing countries probably due to its low cost. The major ingredients of the hair dye are paraphenylenediamine (PPD), resorcinol, propylene glycol, ethylene diamine tetra acetic acid (EDTA), sodium lauryl sulphate, preservatives and perfumes. The main compound responsible for clinical toxicity is PPD. [1] PPD is a coal-tar derivative, which on oxidation produces Bondrowski's base, an allergenic and highly toxic compound. [2] It is widely used in industrial products for colour enhancement such as dyes, tattoos, gasoline, photographic development and dark coloured cosmetics. [1] Propylene glycol is associated with hyperosmolality, raised anion gap metabolic acidosis, central nervous system depression, arrhythmias and renal dysfunction. Resorcinol is a phenol derivative, which may also contribute to renal toxicity. The mechanism of rhabdomyolysis is due to leakage of calcium ions from the smooth endoplasmic reticulum, followed by continuous contraction and irreversible change in the muscle's structure. Rhabdomyolysis is the main cause of acute renal failure and the morbidity is high once renal failure develops. [2] The characteristic clinical triad of hair dye poisoning is early angioneurotic edema with stridor (80%), rhabdomyolysis with chocolate coloured urine (60%) and acute kidney injury. [3] The combined effects of the individual toxicants result in significant morbidity and mortality.

The main toxicities of this hair dye include severe edema of the face and neck which may be life-threatening and frequently requiring emergency tracheostomy which was clearly evident in our patient. Our case presented with severe angioedema of the upper airway requiring emergency tracheostomy. But she sustained hypoxic brain injury before we could establish a patent airway. Antihistaminics and steroids are commonly used in the management of airway edema because of the possibility of a hypersensitivity reaction to PPD. There is no specific antidote for PPD. Supportive management of hair dye poisoning includes managing the compromised airway via endotracheal intubation/emergency tracheostomy, antihistaminics, steroids and prevention/treatment of acute renal injury via forced alkaline diuresis and hemodialysis. [4]

Mortality rate in hair dye poisoning varies from 30% to 60%. [5] Respiratory failure mainly determines the short term mortality, whereas long term morbidity is affected by muscular and renal damage. Early endotracheal intubation before the upper airway gets completely obstructed plays the key role in successful airway management. Delay in securing the airway leads to complete upper airway obstruction and hypoxic brain injury. In case our patient's airway had been secured at the primary health center where she was taken initially, she might not have succumbed to this fatal poisoning. This case clearly signifies the importance of pre-hospital care and appropriate treatment during inter-hospital transfer.

4. Conclusion

Hair dye poisoning is a life-threatening emergency which requires emergency resuscitation and aggressive management of the airway. Delay in establishing a patent airway may increase morbidity and mortality of the critically ill patient. All emergency physicians must be able to promptly recognize cannot intubate and cannot ventilate situation and be skilled in performing emergency surgical airway.



Figure 1. Hair dye poisoning patient presenting with extensive swelling of face, lips and neck with tongue protruding outside oral cavity



Figure 2. Emergency tracheostomy done with 6 mm size cuffed endotracheal tube in place.

5. Conflict of Interest

None Declared

6. References

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