

Neostigmine induced postoperative airway edema: a case report

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ABSTRACT

A 12 year old patient was taken up for adenotonsillectomy. Preoperative and intraoperative course was normal. Reversal of neuromuscular blockade was done with injection Neostigmine and extubation was done after a thorough oropharyngeal examination by the surgeon and anaesthesiologist. Within minutes the patient developed stridor with a fall in oxygen saturation to 77% on room air. Laryngoscopy revealed a gross uvular and posterior pharyngeal wall edema. Patient was immediately intubated and injection Adrenaline, Dexamethasone and Chlorpheniramine maleate were administered. Postoperative serum tryptase and Immunoglobulin E levels were raised. Elective ventilation was done overnight and patient was extubated next day after confirming a reduction in the oropharyngeal edema. Skin prick tests were done two months postoperatively which showed a positive reaction to neostigmine. The test was negative for other drugs used in the intraoperative period.

Keywords: Neostigmine, allergy, edema

An allergic reaction occurring during anaesthesia presents a major challenge to the anaesthesiologists. Anaesthetic drugs, antibiotics, blood products, colloid volume expanders, latex have been incriminated as the causes of perioperative allergic reaction. Although the incidence of intraoperative anaphylaxis is rare, many anaesthetic drugs can cause anaphylaxis. Neostigmine an anticholinesterase drug is commonly used for the reversal of anaesthesia. There have been three reported cases of allergic reaction to neostigmine in medical literature [1-3]. Early detection and a high index of suspicion is very important to decrease the perioperative morbidity and mortality. Here we report a case of an allergic reaction to neostigmine in a 12 year old patient posted for adenotonsillectomy.

CASE REPORT

We report a case of a 12 year old patient posted for adenotonsillectomy. Patient did not give any history of a

systemic illness, previous surgery or allergy. The systemic examination and preoperative investigations were normal. Anaesthesia was induced with injection midazolam 0.5mg, fentanyl 60µg, propofol 70mg, vecuronium 3mg and patient was intubated. Anaesthesia was maintained with oxygen, N₂O and isoflurane. Surgery proceeded uneventfully and lasted for 45 minutes. After the surgery got over, a gentle laryngoscopy was done which showed a normal bloodless surgical field. Neuromuscular blockade was reversed with injection neostigmine 2mg and glycopyrrolate 0.3mg. Thorough oronasal suction was performed and extubation was performed after confirming adequate return of oropharyngeal reflexes and muscle power.

However within minutes, the patient became agitated and showed a paradoxical breathing with stridor and a dip in the oxygen saturation from 99% to 77% on room air. Immediately injection propofol 70mg and succinylcholine 50mg were administered intravenously. Simultaneously a

cricothyroidotomy set and emergency tracheostomy were kept ready. A gentle laryngoscopy was done which revealed a grossly edematous uvula, soft palate and posterior pharyngeal wall (Figure 1, 2). Epiglottis could be visualised and endotracheal tube was inserted behind the tip of the epiglottis. Tube position was confirmed by capnography. The presence of laryngeal edema was confirmed postoperatively by absence of air leak on deflating the cuff of endotracheal tube.



Figure 1 - Image showing the edematous uvula and oral cavity after administration of injection neostigmine.

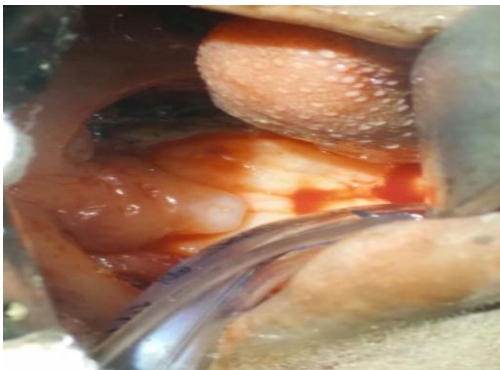


Figure 2 - Image showing the edematous uvula and oral cavity after administration of injection neostigmine.

Injection dexamethasone 6mg, chlorpheniramine maleate 15mg and Adrenaline (3 millilitres of 1: 10000) was administered. This was followed by a reduction in the edema (Figure 3) and patient was shifted to intensive care unit for elective ventilation and sedated with injection midazolam and fentanyl infusion. Serum tryptase levels were sent and were 32ng/ml (normal - 2-11.5 ng/ml). Injection dexamethasone 6 mg 8 hourly was started. The immunoglobulin E levels were 240 IU/ml (normal <158 IU/ml).

Next day, a gross reduction in the uvular and posterior pharyngeal wall edema was noticed. Patient was weaned off the ventilator and extubated. He was stable post extubation with oxygen saturation of 100% on room air. Skin prick test was done two months postoperatively which showed 8mm wheal and 9mm flare to neostigmine. The test was negative for other drugs administered perioperatively. However, we could not investigate the patient further as parents refused further workup.

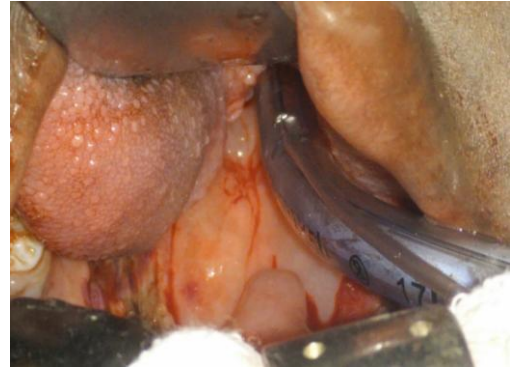


Figure 3 - Reduction in the edematous swelling after administration of chlorpheniramine maleate, dexamethasone and adrenaline.

DISCUSSION

Airway obstruction in the immediate postoperative period is very rare and has been reported to have an incidence of 0.17% and 0.19% [4-5]. Postoperative airway edema is a known complication of surgeries involving the oropharyngeal cavity. Tonsillectomy and adenoidectomy involve the use of surgical instruments and tissue manipulation. The presence of gauze packs along with the above factors causes hyperaemia, vasodilation and increased capillary permeability with a resultant fluid accumulation in interstitial space and development of edema. The duration of surgery is also a contributory factor in edema formation. However, edema seen as a result of surgical factors takes a few hours to develop [6]. The duration of surgery in our patient lasted for 45 minutes and is highly unlikely to cause edema severe enough to cause a postoperative airway obstruction.

The arytenoepiglottic folds, larynx, and anterior surface of the epiglottis are composed of loose areolar tissue which is prone to develop edema. The presence of an edema may push the epiglottis backwards and block the

glottis aperture on inspiration causing a severe respiratory obstruction as observed in our patient [7].

As the serum tryptase and immunoglobulin E levels were raised postoperatively, we believe that allergy to an anaesthetic drug played a significant role leading to severe angioedema seen in the pharyngeal and laryngeal tissues. Allergy to the anaesthetic induction agents and muscle relaxants generally manifests before the start of the surgery and hence was unlikely. Latex allergy was unlikely as there was no history of allergy to rubber balloons and gloves. Skin prick test done 2 months postoperatively confirmed an allergic reaction to Neostigmine and were negative for other drugs administered perioperatively.

The estimated incidence of anaphylaxis during anaesthesia is 1 in 10000 to 1 in 20000 patients [1]. Neuromuscular blocking agents are the drugs most commonly implicated as the cause of anaphylaxis and account for 58.2% of cases. These are followed by latex (16.7%), antibiotics (15.1%), hypnotics (3.4%), colloids (4%), opioids (1.3%) and other agents (1.3%) [8]. There are only three reported incidences of allergic reaction to neostigmine in medical literature. Seed et al reported the occurrence of generalised rash, bronchospasm, peri orbital edema, hypotension and bradycardia after 30 seconds of Neostigmine administration [2]. Yousef Shahi et al [3] reported the occurrence of immediate urticaria and bigeminal premature ventricular contractions after the administration of Neostigmine while Fisher et al reported Neostigmine as a cause of anaphylaxis in one case among a case series involving 443 patients [1].

The clinical features of allergic reaction range from mild non anaphylactic symptoms to severe anaphylactic shock and death. Cutaneous manifestations include erythema, urticaria and angioedema. The angioedema observed in our case was limited to the larynx and the oropharyngeal cavity. We believe that neostigmine was the primary cause of the severe edema and resulting respiratory obstruction as seen in our patient. Patient's family was informed about the same and was provided a warning card which mentioned allergy to neostigmine to avoid a future anaesthetic catastrophe. Patient was instructed to carry the warning card with him and to give a detailed history whenever he went to a hospital for treatment.

CONCLUSION

This case report is of immense value to anaesthesiologists and physicians who routinely use Neostigmine and identifies the drug as a potential cause of intraoperative drug reaction. A prompt diagnosis and immediate treatment on the line of anaphylaxis can help to decrease the morbidity and mortality in these cases.

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