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Perioperative anaphylaxis, a challenge to anaesthetists: A report of two cases

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Abstract

Perioperative anaphylaxis is a life-threatening, immediate hypersensitivity reaction, which occurs rarely, but carries a high rate of morbidity and mortality. Multiple causative factors have been attributed, where antibiotics and neuromuscular blockers are among the leading causes. Diagnosis is challenging due to the overlapping physiological alterations during anaesthesia and polypharmacy. This case series presents two cases of anaphylactic shock, due to different aetiologies during the perioperative period, which were managed successfully.

Keywords: anaphylaxis; perioperative anaphylaxis; neuromuscular blockers; methylprednisolone; nap 6.

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Introduction

Perioperative anaphylaxis is a life-threatening immediate hypersensitivity state. It occurs rarely, but may lead to increased morbidity or mortality. The incidence has been quoted to be in the range of 1 in 10,000 [1], with multiple factors attributed, where antibiotics have taken precedence over neuromuscular blockers as the leading trigger in the UK, recently [2]. Perioperative diagnosis of anaphylaxis and immediate identification of the causative factor could be difficult due to overlapping physiological changes during anaesthesia and polypharmacy. Here in we discuss perioperative anaphylaxis in two patients believed to be due to, muscle relaxant and corticosteroid injection respectively where the prompt diagnosis and management led to good outcomes ultimately.

Case description

Case 1

A 24-year-old previously healthy female was scheduled for a thyroid lobectomy for an uncomplicated solitary thyroid nodule. No history of anaesthesia, atopy or allergy were noted. She was induced with intravenous fentanyl and propofol. Intravenous atracurium was administered and air way was secured. Anesthesia was maintained with inhalational agents. Five minutes later, the patient developed a diffuse skin rash with facial oedema with severe haemodynamic instability. A severe anaphylactic reaction was suspected. Intravenous adrenaline 1:10,000, 0.5 ml aliquots were given in 5-minute intervals with a 10 ml/kg crystalloid bolus. An intravenous adrenaline infusion

was prompted through an internal jugular line with persistently low blood pressure while she was managed per guidelines. The surgery was postponed and patient was transferred to the intensive care unit. Adrenaline infusion was gradually weaned off with improved haemodynamics and she was extubated 4 hours later without neurological deficits. Serum tryptase levels were elevated. Skin-prick and intradermal tests following immunology referral revealed Atracurium and Vecuronium sensitivity. She later underwent the same surgery without complications with Pancuronium as the relaxant.

Case 2

A 46-year-old female with end stage renal disease and controlled bronchial asthma underwent a live donor renal transplant. After induction, she was covered to prevent hypothermia.

Prior to release of cross clamps, intravenous methyl prednisolone was administered. Concurrently, high airway pressure and obstructive pattern on Capnography was noted followed by silent chest signifying a severe bronchospasm. Back to back nebulization, intravenous aminophylline and ketamine were utilized as therapy. A simultaneous drop in systolic blood pressure was initially attributed to reduced venous return in a hyper-inflated chest or secondary to cross clamp release. The persistent bronchospasms and declining systolic blood pressure resulted in exposure of the patient, which revealed an urticarial rash. Timely diagnosis of anaphylaxis was made and three intravenous adrenaline 1:10,000 0.5 ml aliquots and normal saline boluses abated the bronchospasm and hypotension swiftly. The surgery was completed and the patient was admitted to ICU. She was extubated four hours later and made an uneventful recovery over next 24 hours. Serum tryptase levels were collected at 1 hour, 6 hours and 24 hours during and subsequent to the episode; however, the patient was lost to further anaesthetic follow up negating further immunological testing.

Discussion

Anaphylaxis is an acute, potentially lethal, multi-systemic state, which can occur at any point during anaesthesia. The mortality has been quoted to be around 4% according to UK based data even though morbidity is not yet known [2]. Induction carries an elevated risk with concurrent administration of multiple drugs. Females are affected more than males [3]. History of prior exposure to anaesthetic drugs does not seem to be necessary and interestingly, eighty percent of the reported cases of perioperative anaphylaxis have been without any prior exposure [3]. Prompt diagnosis and management are pivotal for better outcomes.

The National Audit Project 6 (NAP 6), which analyzed perioperative anaphylaxis in the UK, concluded that the majority of the cases were due to antibiotics and muscle relaxants, where the onset have been abrupt, followed by chlorhexidine and patent blue dye, with a delayed onset [2]. The quaternary ammonium ions, the allergenic precipitant in muscle relaxants, are found in day to day chemicals, sensitizing individuals and predisposing to perioperative anaphylaxis [4]. Latex induced anaphylaxis shows a declining incidence in recent years [5]. Methylprednisolone which is a class A synthetic glucocorticoid is also being implicated, related to the steroid molecule, excipient or the ester component [6]. The associated hypersensitivity reactions are categorized as immediate (occurring within one hour) and late (after an hour) [7]. Cross-reactivity between steroids may preclude the use of the particular class in a sensitive patient [8]. In 30-50% cases of perioperative anaphylaxis, a definite causative factor has not being identified [9].

Perioperative anaphylaxis is commonly rapid in onset and often follows intravenous drug administration [10]. The commonest presentation is with sudden, drastic haemodynamic compromise and less commonly with bronchospasms (elevated risk in asthmatics) [10] and desaturation. Importantly, anaphylaxis during anesthesia is particularly difficult to diagnose and as a result of which is frequently underreported [11] for several reasons: Early or mild symptoms, including itching and shortness of breath, may go unrecognized in an anaesthetized patient. Cutaneous signs may go unnoticeddue to drapings. On the other hand, non-allergic aetiologies mimicking anaphylaxis are several during the perioperative period such as opiate and muscle relaxant induced rashes, bronchospasm induced by air way instrumentation and multiple anaesthetic and surgical factors leading to hypotension [11]. Thus high index of suspicion and prompt exclusion of former are warranted. Confirmation of perioperative anaphylactic reactions require clinical, biological (histamine or tryptase studies) and allergologic (skin tests) proof [10].

Prompt initial treatment is essential in an anaphylactic episode, as delayed resuscitation may lead to increased morbidity including hypoxic-ischemic encephalopathy, multi-organ dysfunction syndrome and death. Depending on the grade, the management varies. Circulatory collapse denotes grade 3 and 4, which should be managed as an emergency with crystalloid boluses and epinephrine, latter being the cornerstone of the management. It has been shown that the delays in commencement of epinephrine has been associated with poorer outcomes [10]. Steroids which have delayed onset, are recommended after initial stabilization and the antihistamine, chlorpheniramine was found to be innocuous in NAP 6 study [2]. The surgery or the intervention may be deferred depending on the progression of the reaction and haemodynamic stability.

Following perioperative anaphylaxis, patients should be referred to an immunologist for identification of the offending agent. Historically, well-planned subsequent anaesthesia with avoidance of the triggers have resulted in no further complications during the course of anaesthesia and recovery. Similarly, simulation based training of anaesthetists on perioperative anaphylaxis have contributed to these improved figures.

Conclusion

Peri-operative anaphylaxis is an unexpected entity which may confound the outcome of the patient and the anaesthetists are posed with daunting task of diagnosing this early in the background of polypharmacy administration during anaesthesia in a fully draped patient. However, bearing this in mind, exercising high index of suspicion in a suddenly deteriorating patient soon after the induction and the timely diagnosis, institution of epinephrine in par with fluid resuscitation may prove to save countless lives. Immunology referral to identify the culprit agent and avoidance of triggers are necessities to avoid future catastrophes.

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