

ANAPHYLACTIC REACTION FROM ATRACURIUM

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ABSTRACT

For induction of anaesthesia many agents are administered intravenously, anaphylactic reaction can occur to any of these agents. Neuromuscular blocking agents are most commonly implicated as the cause of anaphylactic reaction in anaesthesia practice. Amino-steroids, benzylisoquinoliniums and suxamethonium are being commonly used for intubation and perioperative muscle relaxation. We are presenting a case of anaphylactic reaction to benzylisoquinolinium i.e. atracurium in a young patient. The patient was revived with a prompt diagnosis and treatment.

Keywords: Anaphylaxis, Atracurium, Intra-operative reaction.

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INTRODUCTION

Intraoperative anaphylaxis is a rare event but it can cause significant mortality and morbidity. Intravenous (I/V) induction agents, I/V fluids, latex products, neuromuscular blocking agents, antibiotics and blood or blood products or any agent used perioperatively may be implicated as a causative agent.

The incidence of anaphylactic reactions during anaesthesia varies between countries ranging from 1:1250 to 1:18,600 per procedure¹. In 69.1% cases neuromuscular blocking agents (NMBAs) especially atracurium and in 12.1% cases latex were the most frequently involved agents implicated for anaphylaxis according to the most recent French epidemiological survey. The most frequently involved NMBAs are suxamethonium and rocuronium². In a retrospective study in Newzealand anaphylaxis was 10 times more common with rocuronium and suxamethonium than with atracurium³. Rarely death may occur, despite proper treatment.

CASE REPORT

A 19-year-old male patient presented for appendicectomy under general anaesthesia. He

gave history of dust allergy with respiratory symptoms during childhood. He was symptom free at present; no history of previous surgery under anaesthesia; his clinical examination and laboratory investigations were essentially normal. In the operating room, intravenous line was secured with 18 G IV cannula, standard ASA (American Society of Anesthesiologists) monitors were attached and recorded a baseline heart rate (HR) 70/min, blood pressure (BP) 110/74 mm Hg and a SpO₂ of 99% on room air. Initially, he received 10 mg nalbuphine intravenously (I.V). After preoxygenation of 3 min, anaesthesia was induced with 100 mg propofol and muscle relaxation for endotracheal (ET) intubation was facilitated by 75 mg suxamethonium. After confirmation of proper placement of ET tube by auscultation and EtCO₂, ET tube was fixed at 22 cm. Anaesthesia was maintained with 100 % O₂ and 1% isoflurane. Three minutes after intubation, when respiratory efforts were seen, 20 mg atracurium was given I.V. Within 20-30 seconds after atracurium administration, we noticed a tachycardia of 140-160/min; BP was unrecordable and a peak airway pressure of 50 cm H₂O with a SpO₂ of 88%; however, we did not find any skin manifestations. On auscultation, chest was full of rhonchi. We made a presumptive diagnosis of anaphylactic reaction; lungs were ventilated with 100% oxygen, intravenous 50 mcg adrenaline was

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administered in a dilution of 1:10000 and a rapid infusion of Ringer's lactate was initiated. After 1 min BP was 65/35 mm Hg, SpO₂ - 90% and airway pressure was 40 cm H₂O. Electrocardiography displayed sinus rhythm with a HR of 140/min. After another 2 min we repeated same IV dose of adrenaline and continued rapid infusion of Ringer's lactate. After 2 min of second dose of adrenaline, we recorded a BP of 140/90 mm Hg, SpO₂ 90%, peak airway pressure of 30 cm H₂O, sinus tachycardia with a HR of 135/min. Wheezing was auscultated all over the lung fields. We then administered 10 mg chlorpheniramine and 200 mg hydrocortisone by slow IV injection. We decided to postpone the surgery for that day. We tried to awaken the patient but he did not regain consciousness and was having respiratory distress with a SpO₂ still 91%. We did not reverse the block and decided to ventilate the patient in intensive care unit. The airway pressures were high and chest was full of wheeze and SpO₂ was not coming above 92%. Aminophylline infusion in the dose of 5mg/kg body weight diluted in 100 ml 0.9% normal saline was started @ 40 µdrops/ min. After 5 minutes airway pressure started decreasing and SpO₂ rose to 97%. Patient's chest started clearing of rhonchi and it was free of any wheeze after 1 hour. X-ray chest and 12 leads echo-cardiography (ECG) done in intensive care unit (ICU) were within normal limits. He was fully conscious after 6 hours and maintaining normal vitals and SpO₂ so he was weaned off ventilator and extubated. ECG in the postoperative period was normal. Serum tryptase and allergogenic tests were not available in our hospital. His symptoms of appendicitis settled in the postoperative period so he was discharged from hospital with the written instructions to avoid atracurium if anesthesia was required in future.

DISCUSSION

The most frequently incriminated medications in case of anaphylactic shock in the operating room are muscle relaxants. The mortality from perioperative anaphylaxis has been quoted in a range between 3 and 9%⁴. The

most recent studies report 4.1% mortality due to neuromuscular blocking agents⁵. NMBAs are responsible for around 50-70% of allergic reactions under anesthesia⁶. These immediate hypersensitivity reactions may either be immunologic (immunoglobulin E mediated anaphylaxis) or related to direct stimulation of histamine release (anaphylactoid reactions)⁷. Anaphylactic reactions may not be clinically distinguished from anaphylactoid reactions. Therefore, any suspected anaphylactic reaction must be thoroughly investigated. Although, it may sometimes be difficult, investigation results are not always those that were expected⁸. The reaction and the nature of suspected drugs must be documented to provide precise recommendations for future anesthetic procedures. Cross reactivity among different muscle relaxants is common and hence other muscle relaxants should also be tested. It is documented that the negativity of intradermal tests to other NMBAs allows for a subsequent safe use of these negative drugs. However, false negative results are also reported⁹. Our current knowledge and evidence do not support routine intradermal testing for the sensitivity to NMBA in all patients because it requires dangerous provocation tests; but allergy assessment may be recommended in high-risk patients¹⁰. Prior exposure to the offending drug is not necessary for development of anaphylaxis¹¹.

The principal anesthetic challenge of this clinical case was the identification of hypotension, tachycardia, increased airway pressure and desaturation as these can also be due to other clinical conditions. Tension pneumothorax is one of them. However, temporal association between the event and atracurium injection and dramatic response with injection adrenaline guided that anaphylaxis was more likely. We also considered the possibility of acute cardiogenic pulmonary edema, which was less likely due to absence of any preoperative cardiac abnormality and basal crepitations in lung fields.

One interesting fact about our case is that the patient did not develop any skin reaction or angioedema. The presenting features were limited to cardiovascular and respiratory system which responded to adrenaline^{12,13}. The management of anaphylaxis in our case was in line with the recommendations of Resuscitation Council UK guidelines¹⁴.

In literature only a few cases have been reported leading to anaphylaxis with atracurium. Moreover, anaphylaxis is more common with suxamethonium and rocuronium than with atracurium.

Anaphylaxis during anaesthesia presents a diagnostic dilemma. A high index of suspicion should be kept as early diagnosis and treatment is vital for survival of the patient.

CONFLICT OF INTEREST

This study has no conflict of interest to declare by any author.

REFERENCES

- Mertes PM, Volcheck GW, Garvey LH, Takazawa T, Platt PR, Guttormsen AB, et al. Epidemiology of perioperative anaphylaxis. *Presse Med* 2016; 45(9): 758-67.
- Chiriac AM, Demoly P. Allergy to neuromuscular blocking agents. *Presse Med* 2016; 45(9): 768-73.
- Reddy J, Cooke P, Van Schalkwyk J, Hannam J, Fitzharris P, Mitchell S. Anaphylaxis is more common with Rocuronium and Succinylcholine than with Atracurium. *Anesthesiology* 2015; 122(1): 39-45.
- Gibbs NM, Sadleir PH, Clarke RC, Platt PR. Survival from perioperative anaphylaxis in western Australia 2000-2009. *Br J Anaesth* 2013; 111: 589-93.
- Reitter M. Fatal anaphylaxis with neuromuscular blocking agents: arisk factor and management analysis. *Allergy Eur J Allergy Clin Immunol* 2014; 69: 954-9.
- Peroni DG, Sansotta N, Bernardini R, Crisafulli G, Franceschini F, Caffarelli C, et al. Muscle relaxants allergy. *Int J Immunopathol Pharmacol* 2011; 24 (Suppl 3): S35-46.
- Trautmann C, Seidl J, Stoevesandt C, S Seitz, "General anaesthesia-induced anaphylaxis: impact of allergy testing on subsequent anaesthesia," *Clinical & Experimental Allergy* 2016; 46: 125-32.
- Sheldon J., Philips B. Laboratory investigation of anaphylaxis: not as easy as it seems. *Anaesthesia* 2015; 70(1): 1-5.
- Hagau N, Gherman-Ionica N, Hagau D, Tranca S, Sfichi M, Longrois D. Is a positive history of non-anaesthetic drug allergy a predictive factor for positive allergy tests to anaesthetics? *Br J Clin Pharmacol* 2012; 73(3): 460-6.
- Leysen J, Uyttbroek A, Sabato V, Bridts CH, De Clerck LS, Ebo DG. Predictive value of allergy tests for neuromuscular blocking agents: tackling an unmet need. *Clin Exp Allergy* 2014; 44(8): 1069-75.
- Maitra S, Sen S, Kundu S, Pal S. Anaphylaxis from atracurium without skin manifestation. *J Anaesthesiol Clin Pharmacol* 2014; 30(1): 104-105.
- McKinnon RP, Wildsmith JA. Histaminoid reactions in anaesthesia. *Br J Anaesth* 1995; 74: 217-28.
- Christopher M, Immanuel A, Cherian V, Jacob R. Anaphylaxis. *Update Anaesth* 2000; 14: 1-3.
- Resuscitation Council (UK). Emergency treatment of anaphylactic reactions: Guidelines for healthcare providers 2008. Available from: <http://www.resus.org.uk/pages/reaction.pdf>. [Cited 2012 Sep 23].