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Case Report

Rare case of unforeseen tragic event of severe anaphylactic reaction to lidocaine in a paediatric patient in rural low resource setup

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ABSTRACT

Anaphylactic reaction to lidocaine is a very rare and life-threatening event. Lidocaine (xylocaine) is one of the most common anaesthetic drugs used as local anaesthetics for minor dental and other minor surgical procedure. Although minor allergic reactions after administration of lidocaine are common and easily resolved after just antihistaminic with or without steroid administration. However severe anaphylaxis leading to death is very rare; so much that the physicians might be unaware of its occurrence and its emergency management. From 1957 to 2012, there were seven reports of single case and one report of 8 cases with sufficient information for review. In paediatric patients, very few have history of allergies and due to unawareness of their allergic condition they may land in tragic event of anaphylaxis which if not managed on time can lead to death. We hereby presented such a rare case of a 14 years old female posted for a minor surgical procedure, who had anaphylactic shock due to lidocaine, followed by sudden cardiorespiratory arrest leading to death despite of all the prompt management.

Keywords: Hypersensitivity, Anaphylaxis, Allergy, Lidocaine, Paediatric

INTRODUCTION

Whereas minor allergic reactions to lidocaine (xylocaine) being common in clinical practice; anaphylactic shock due to this anaesthetic agent is a rare and life-threatening condition. Minor allergic reactions like itching, rash, urticaria are common and easily reversible on prompt treatment with just antihistaminic and steroids. However severe Anaphylactic shock is of rare occurrence. It constitutes only about 1 percent of all adverse anaphylactic reactions.[1] The symptoms set in within seconds to 30 min after drug administration and can lead to death within an hour or two. Even the literature related to this is sparse due to few notified cases. The rarity of this can be established from fact that; from 1957 to 2012, there were only seven reports of single case and one report of 8 cases with sufficient information for review.[2] The fulminant development of anaphylactic shock condition after lidocaine administration even in minor surgical procedures may be considered as a fatal coincidence of circumstances that may not be foreseen by any physician or anaesthetist. Allergic reactions are subdivided into four types. Anaphylaxis, one of type I hyper-sensitivity is the most severe form of allergic reaction and can cause death unless it is immediately treated. Xylocaine sensitivity testing (prick test or intradermal test) is recommended prior to any surgical procedure to rule out any allergic reactions. However there has been rare cases where despite of a negative xylocaine sensitivity test patient has landed up in severe anaphylactic shock. Drug challenge is required for confirmation, when prick tests are negative and are essential for confirmation of diagnosis.[3]

We presented a case of a paediatric patient; 14-year-old female with fibroadenoma breast who was posted for a surgical removal of same. With no past history of any allergies and despite of a negative xylocaine sensitivity (intradermal test) test patient landed up in severe anaphylactic shock after administration of lidocaine on

OT table followed by cardiorespiratory arrest and later death. The aim of this case report was to add up to the sparse literature available on this topic and to help clinicians in being more vigilant and aware about prompt diagnosis and management of such rare incidences.

CASE REPORT

A 14 year old female child was referred from a rural hospital to the emergency department of our tertiary care hospital; brought by parents in an unconscious state in a cardiac ambulance. As per history narrated by the parents; patient was apparently alright in the morning. She was diagnosed with fibroadenoma in left breast a few days back which was evaluated. She was posted for a surgery and lumpectomy was planned. Patient was admitted a day prior for the planned surgery. Her preoperative preparation was done. On the day of surgery, a xylocaine sensitivity test was done 4 hours prior to surgery. While shifting to operation theatre patient was alright and had received injectable antibiotic, PPI and an antiemetic. As per history given by anaesthetist, she was given injection ketamine and injection xylocaine at appropriate doses calculated for her weight. An incision was given at surgical site. But following the administration of anaesthetist drugs her vital parameters started dropping. Patient went into bradycardia, followed by sudden cardiorespiratory arrest. Patient was intubated immediately and resuscitation done. Injection adrenaline, injection atropine, injection hydrocortisone, injection aminophylline was given during that time. She had no cardiac activity for 10 minutes in operation theatre. After appropriate resuscitation patient was revived after 10 minutes. As it was a rural hospital decision for transferring patient to our tertiary hospital was taken by operating surgeon. When patient came to our hospital she was intubated and on bag and tube positive pressure ventilation. Patient was unconscious not responding to any stimuli. Peripheral pulses feeble, carotid and femoral was palpable. Heart rate was 36 /min (<1st centile), Blood pressure was not recordable even on inotropic support. Patient had swelling on bilateral forearm. Also, bluish blackish discoloration was seen over left forearm and left hand around xylocaine sensitivity test demarcated area (Figure 1). Sutures present over left breast. Other systemic examination was normal.

A provisional diagnosis of anaphylactic shock due to lidocaine was made. Patient was immediately shifted on ventilator with appropriate settings. Injection dopamine infusion drip with injection mannitol, injectable antihistaminic, injectable antibiotics and IV fluids was started. Routine blood investigations were normal. However due to lack of resources and being a rural hospital specific investigation such as allergen specific serum IgE levels and mast cell tryptase level could not be done. CT brain was done which was suggestive of gross cerebral and cerebellar oedema. Patient's condition deteriorated despite all the management and patient succumbed after 48 hours. Autopsy revealed laryngeal oedema, pulmonary oedema, cerebral oedema, eosinophil infiltrates in many organs and other changes which confirmed our diagnosis of anaphylaxis.

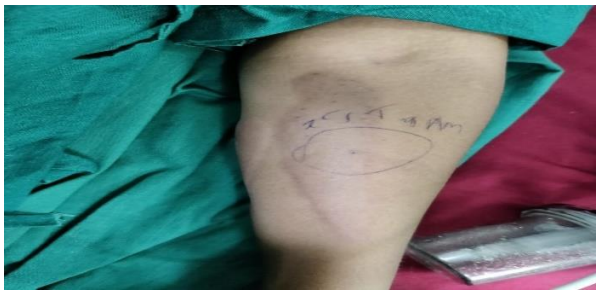

Figure 1: Huge raised maculopapular rash on left forearm around drug sensitivity tested area after injecting complete dose of lidocaine.

DISCUSSION

Local anaesthetics are one of the most commonly used drugs in anaesthesia practice and its use can be dated back to use of cocaine in 1884. Based on their chemical structure, they are classified into two main groups, esters and amides. Ester group consist of procaine, tetracaine, benzocaine and amide group comprise lidocaine, ropivacaine, mepivacaine and bupivacaine. Most often allergic type 1 and 4 reactions are caused by ester compounds. PABA a metabolic product of ester, is responsible for their strong allergic potential. Also, preservatives in their preparations (methyl paraben) may cause both type 1 and 4 allergic reactions.[4] As compared to ester group, allergic reactions to the amino-amide compounds are extremely rare. However few case reports as published by Brown et al describing immune mediated reaction to injectable amide local anaesthetics are been reported.[5] However, as per opinion of allergists less than 1% of reported allergic reactions to local anaesthetics are immune system mediated and out of those the amide immune reactions are a minute fraction of those. Amongst the notified cases of anaphylactic reactions to lignocaine; fatal anaphylactic reactions to lignocaine were generally characterised by fast onset of symptoms (within seconds to <30 min of drug exposure) and rapid progression to cardiopulmonary arrest and death (23 min to ~1 hour).[1]

Hypersensitivity reactions have been classified into four types based on pathogenesis. Amongst the four types, acute form of type 1 hypersensitivity reaction is systemic and fatal commonly known as anaphylaxis. Symptoms of anaphylaxis are angioedema, bronchospasm, urticaria and cardiorespiratory depression. Immediate type 1 reactions are characterized by release of histamine and other mediators from mast cells and basophils, following attachment of IgE antibody to the allergen. An increase in vascular permeability and smooth muscle contraction lead to above mentioned symptoms and in severe cases shock. The severity of an anaphylactic reaction depends

on allergen dose, entry route and the amount of allergen-specific IgE antibody.[6] Type IV reactions present as the other end of the spectrum. It is characterised by a slower onset, a non-IgE mediated release of bioamines such as histamine. For unclear reasons, there seems to be female propensity for allergy to LAs. In comparison, a previous retrospective study showed that actual adverse drug reactions due to local anaesthetics were very rare, only 16 cases out of 210,017 patients in France.[6] In another previous study, authors examined 199 patients who had suffered from alleged lidocaine hyper- sensitivity and found that true lidocaine hypersensitivity was demonstrated in only 1 patient. The authors said that most patients suffered from symptoms that would most likely be caused by vasovagal syndrome.[7]

To avoid such tragic and unforeseen acute events of anaphylaxis physicians should take certain precautions. First a detailed medical, drug reactions, past anaesthetic experiences, food and any other allergy history should be taken. A complete emergency kit containing all emergency drugs in case of anaphylaxis and oxygen with all equipment's for ventilatory support should be available at standby before any sensitivity testing or anaesthesia. The various methods of allergy testing are-skin prick test (SPT), intradermal testing (IDT), subcutaneous challenge test (drug provocative test-DPT)-gold standard, patch test.

Amongst the above test the type and sequence of the test to be chosen was important. Skin prick test is of great value as it can be accurately reproduced but not used routinely in India. The intradermal test is a routinely followed preoperative sensitivity test in India, especially in low resource rural hospitals. Subcutaneous injections are not recommended until the prick test and intradermal test are negative as it can be rapidly absorbed and lead to adverse reactions if sensitive. Patch test can test numerous allergic agents together and can provide us with alternate drugs in case one drug is sensitive. If the skin prick test and intradermal test in (1:100 dilution) are both negative a subcutaneous test with 1:10 dilution, then undiluted 0.1 ml followed by undiluted 1 ml should be done.[8] This is the proper sequence of doing a sensitivity testing (Figure 2). Interpretation of skin test also is challenging sometimes as false positive results can be seen in trauma due to injection or local histamine release due to injection. False negative results can be seen if drug enters the system or if the metabolite is allergen instead of the drug. However, drug sensitivity testing is of utmost importance as if the test is negative a complete dose of anaesthesia dose can be given safely.[9]

In our case a patient was a 14-year-old female with no prior drug or any other allergies and she had no history of prior anaesthesia exposure. So, sensitivity to any anaesthesia drug couldn't be evaluated based on history. An intradermal drug sensitivity testing was done 4 hours prior to planned surgery with xylocaine (undiluted 0.1 ml) which was negative. Despite of the negative sensitivity testing patient landed up in anaphylactic shock and cardiorespiratory arrest within few minutes of administration of drug.

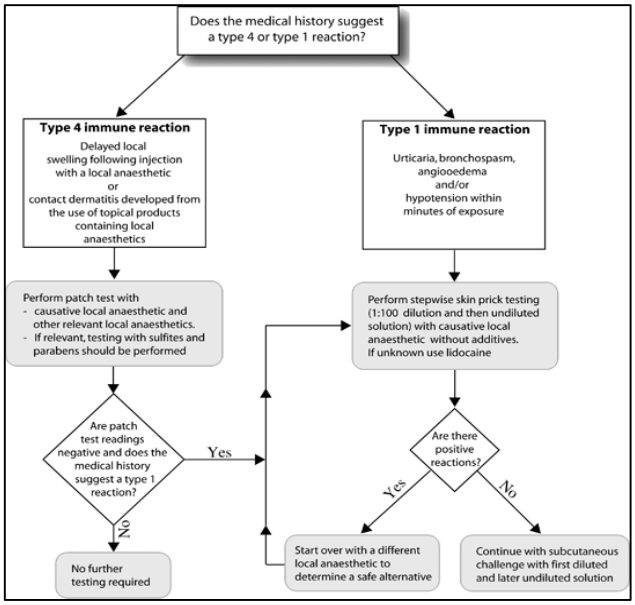

Figure 2: Stepwise sequence of allergy testing.

In 75% of cases of anaphylaxis, death is due to asphyxia from laryngeal oedema and hypoxia from severe broncho-spasm and 25% of deaths due to circulatory failure with hypotension.[10] In such cases of anaphylactic reaction, recommendation is to give subcutaneous or intramuscular epinephrine injection.[11] In our case, patient already had a venous access and anaesthetist could give intravenous epinephrine. Additionally, aminophylline and steroid were given to the patient to prevent biphasic and protracted anaphylaxis. Despite of the prompt recommended treatment patient succumbed due to circulatory collapse and hypotension after 48 hours. As mechanical ventilatory support facility was not available at the low resource rural setup and patient was transferred for the same to our tertiary care; the delay in providing proper ventilatory support might have been an additive for the tragic outcome.

CONCLUSION

To conclude it is imperative for all the medics and paramedics to know the life-threatening and acute nature of anaphylaxis, and also its management. Knowledge about this rare condition and its diagnosis, importance of detailed history, drug sensitivity testing and its management protocols can save the patient's life as well as physicians from the dilemma in case of a rare encounter during one's practice. The term 'allergy' is used far too casually for a lay man to know about the consequences of acute allergic reactions. When diagnosing or suspecting a diagnosis of local anaesthetic allergy we must remember that less than 1% of cases have an immune basis and if the local anaesthetic is an

amino- amide, a fraction of these has an immune basis. This places local anaesthetic allergies as one of the rarest drugs amongst a long list of differential diagnoses of possible causes of adverse drug reactions. Despite of the above facts, clinicians should be aware that anaphylactic reaction to lidocaine is possible and should be aware of the rapid and simple treatment with epinephrine along with resuscitation for a patient who has suffered from anaphylaxis.

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