DUBAI ANAESTHESIA

مؤتمر ومعرض دبي الدولي للتخدير

Dubai Anaesthesia 2015

5 - 7 March

Mohammed Bin Rashid Academic Medical Center

DHCC, Dubai, UAE

Anaphylactic and Anaphylactoid Reactions during Anaesthesia

Dr P F Kotur

Vice Chancellor & Sr. Prof. of Anaesth, Sri Devaraj Medical University

Kolar, Karnataka, India

Former Member Ex Co WFSA

Editor,SAARC Journal of Anaesthesia


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What I am going to speak:

- Anaphylactic and anaphylactoid reactions
  - -Definition and Classification
  - -Brief account of Common causative agents
- Prevention in the Pre-operative period
- Diagnosis and Management
- Investigation of an intra-operative hypersensitive reaction

not

What I am going to speak

- Pathophysiology of hyper sensitivity reactions
- Details of the confirmatory tests
- Detailed algorithmic management

Prologue

- Anaesthesiologist administers anaesthetic drugs, antibiotics, polypeptides, and blood products etc, perhaps too *rapidly* and in *quick succession*.
- May at times lead to fatal hypersensitive reactions, which contribute for peri-anaesthetic morbidity and mortality.

An anaesthesiologist

Should be able to

- Prevent them *preoperatively*
- Diagnose and treat them *intra-operatively*
- Investigate them further *postoperatively.*

Patient Exposure

In peri-operative period:

- Parenteral exposure (drugs, blood products, contrast agents etc)
- Environmental exposure (latex, air conditioning, different rays including laser, antiseptics etc)

Hypersensitivity Reactions:Classification:

- Terms anaphylactic and anaphylactoid, used inconsistently;so,the nomenclature task force of European Academy of Allergy and Immunology (EAACI) has reclassified into allergic anaphylaxis and nonallergic anaphylaxis
- Anaphylactic-immune mediated
- Anaphylactoid-chemically mediated

The Chemical mediators/Vasoactive substances are:

IgE, IgA, immunocomplexes, complement activated by an alternative pathway, tryptase, histamine, Serotonin

Eosinophilic Chemotactic Factor of Anaphylaxis(ECF-A)

Slow Reacting Substance of Anaphylaxis(SRS-A),

Platelet-activating factor (PAF), Kinins, Prostaglandins leukotrienes (LTC) & prostaglandins (PGD) etc

Anesthesiology 2003: 99:536-45.

Allergologia et Immunopathologia 2000 (28) 24-36.

J Allergy Clin Immunol. 2004;113:832–6.

Anaphylactic Reactions

- Anaphylaxis is life threatening clinical syndrome affecting multiple organs , more so in operating theater due to lack of cutaneous symptoms because patient is unconscious and he is draped so cutaneous signs are not discovered early.
- Type-1, immediate hypersensitivity reactions.
- IgE-mediated release of vasoactive substances from mast cells and basophils after exposure to an antigen to which there has been previous exposure and sensitization
- bronchoconstriction and vascular permeability

Anaphylactoid Reaction

- Clinically indistinguishable but occurs by a non-immune mechanism.
- Caused by direct release of histamine and other mediators.
- Less than 50% of all severe intraoperative allergic reactions are really anaphylactoid reactions.

Acta Clin Belg. 2004;59(1):34-43

Eur J Anaesthesiol.2002;19(4):240-62.

Anaphylactoid Reaction

- derived from the activation of the complement and/or bradykinin cascade and the direct activation of mast cells and/or basophils.
- Clinical symptoms indistinguishable from anaphylaxis, and sometimes severe, leading to cardiovascular collapse and death[18].

Acta Clin Belg. 2004;59(1):34-43

Eur J Anaesthesiol.2002;19(4):240-62.

INCIDENCE:

- Increased during the last 4 decades. Most published reports are from France, Australia, the UK and New Zealand.
- 1/1000 and 1/25,000 procedures,
- Muscle relaxants involved in almost three quarters (69.1%)
- Non-immune mediated reactions account for 30% to 40% of hypersensitivity reactions.
- Mortality is in the range of 3-6%.

-Acta Clin Belg. 2004;59(1):34-43, -Eur J Anaesthesiol.2002;19(4):240-62.

-AAGI Guidelines for Management of Anaphylaxis London, 2003.

Thumb rule!

Laxenaire's group, (French experts on anaphylaxis during GA has proposed that all reactions should be described as anaphylactoid unless an immune mechanism has been demonstrated.

Anesthesiology 2003: 99:536-45.

MINIMISING RISKS PRE-OPERATIVELY:

Are some individuals more at risk of anaphylaxis?

- A female predominance – (2.7:1); but no need for investgations /prophylaxis in females prior to anaesthesia.
- Patients with h/o food allergy, atopy, or asthma
- Patients on [beta]-blockers and those with asthma suffer more severe reactions.
- Patients in neuraxial anaesthesia having reduced catecholamine response.

No data to support pre treatment is as an effective preventative measure.

Ann Fr Anesth Reanim 1993;12:97-104.
Ann Intern Med 1991; 115: 270–6

General Measures for Prevention

- Select less potent drugs, such as histamine releasing agents.
- Slow as opposed to bolus administration
- Use of combined H1 and H2 antihistamines as a premedication significantly reduces tachycardia/ bradycardia, hypotension, skin response, and even gastric pH changes induced by histamine release

Eur J Anaesthesiol 1994;11:263-84.

An allergologic workup prior to anaesthesia is indicated in:

- Patients presenting a documented allergy
- Patients with h/o of an unexplained reaction during a previous GA
- Patients who allege an allergy to LA, If skin tests are negative, progressive challenge testing may be indicated

Minerva Anestesiologica: 2004 , 70(5) 285

An allergologic workup prior to anaesthesia is indicated in:

- Patients of high-risk group for sensitisation to latex (children subjected to multiple operations, those with spina bifida, patients of latex allergy, patients allergic to avocado, kiwi, banana, fig, chestnut, hazelnut, sweet pepper, melon, pineapple, papaya

Minerva Anestesiologica: 2004 , 70(5) 285

Diagnosis

- Clinical differentiation between anaphylaxis and anaphylactoid reactions not easy
- When restricted to a single clinical symptom, anaphylaxis can easily be misdiagnosed.
- Cutaneous symptoms are more frequent in *Anaphylactoid reactions*, whereas CVS collapse and bronchospasm are more frequent in case of *Anaphylaxis*.

Acta Anaesthesiol Belg. 2004;55(3):229-37.

Diagnosis

- The enigma of anaphylaxis is the unpredictability of occurrence, the severity of the attack, and the lack of a prior allergic history.
- Onset and severity depend on the mediator's specific end organ effects. Antigenic challenge in a sensitized individual usually produces immediate clinical manifestations of anaphylaxis, but the onset may be delayed 2-20 minutes.
- Spectrum of reactions ranging from minor clinical changes to acute cardiopulmonary collapse, leading to death.

Anaphylactic Reactions in Anesthesia and Intensive Care 2nd edition1992

Signs and Symptoms

SYSTEMS	SYMPTOMS	SIGNS
Respiratory	Dyspnea, chest discomfort	Coughing, wheezing, sneezing, laryngeal edema decreased pulmonary, compliance, fulminant pulmonary edema, acute respiratory distress
Cardiac	Dizziness, malaise, retrosternal oppression	Disorientation. diaphoresis, loss of consciousness, hypotension, tachycardia, dysrhythmias, decreased systemic vascular resistance, cardiac arrest, pulmonary hypertension
Cutaneous	Itching, burning	Urticaria (hives), flushing, periorbital edema, perioral edema

Clinical features during anaesthesia

Clinical symptoms	Anaphylaxis (n = 518) N. (%)	Anaphylactoid (N = 271)N (%)
CVS *symptoms*	**387 (74,7)**	**92 (33,9)**
Arterial hypotension	**90 (17,3)**	**50 (18,4)**
Cardiovascular collapse .	**264 (50,8)**	**30 (11,1)**
Bradycardia	**7 (1,3)**	**2 (0,7)**
Cardiac arrest	31 (5,9)	**–** **–**
Bronchospasm	**207 (39,8)**	**52 (19,2)**
Cutaneous symptoms	**374 (71,9)**	**254 (93,7)**
Angiooedema	**64 (12,3)**	**21 (7,7)**
		Allergy. 2005 Jun;60(6):828-34

Grade of severity for quantification of anaphylactoid reaction.

Grade	Symptoms
I	Cutaneous signs: generalised erythema, urticaria, angioedema.
II	Measurable but not life-threatening symptoms. Cutaneous signs, hypotension, tachycardia. Respiratory disturbance: cough, difficulty to inflate.
III	Life-threatening symptoms: collapse, tachycardia or bradycardia, arrhythmias, bronchospasm.
IV	Cardiac and/or respiratory arrest.
V	Death.

Recognition Of Anaphylaxis During GA

- Occurs at any time and may progress slowly or rapidly. 90% of reactions appear within minutes. Reactions well established before they are noticed.
- Common features: pulselessness, difficulty in lung inflation and desaturation. A decreased etCO2
- Delayed signs suggest an allergy to latex or volume expander.
- Blood transfusions can elicit a variety of systemic reactions, some of which might be IgE-mediated or mediated through other immunologic mechanisms

Clinical Anaesthesiology. 1998;12:301-23

Recognition Of Anaphylaxis During GA

- Latex allergy to be considered during gynaecological procedures. Particles from obstetricians' gloves accumulated in the uterus during obstetrical manoeuvres, could suddenly be released into the systemic blood flow following oxytocin injection.
- Anaphylactic reactions to antibiotics following removal of tourniquet during orthopaedic surgery

Eur J Anaesthesiol.2002;19(4):240-62.

Management Plan

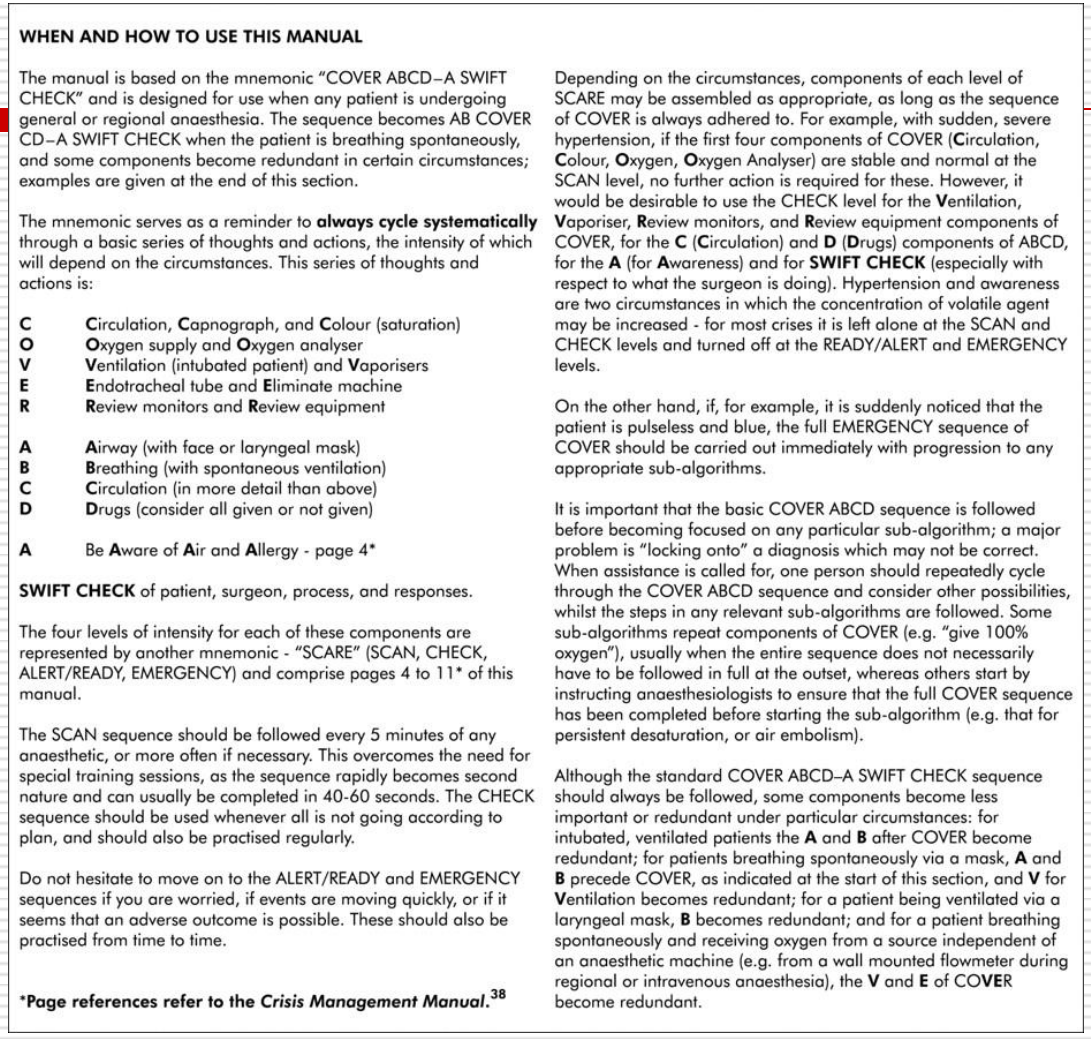
- Requires multidisciplinary approach
- Prompt recognition and stabilisation of the acute event by the attending anaesthetist
- Determination of the responsible agent(s) with avoidance of subsequent administration of incriminated compound(s).
- Detailed review of the anaesthetic report as well as appropriate in vitro and in vivo allergy tests.

MANAGEMENT PLAN

- In 1993, a core crisis management algorithm, COVER ABCD–A SWIFT CHECK (the AB precedes COVER for the non-intubated patient), was proposed as the basis for a systematic approach to any crisis during anaesthesia
- A specific sub-algorithm for anaphylaxis was supplemented
- 'Anaphylaxis drill', described by AAGBI in 2003 underlines the critical importance of prompt IV epinephrine, in saving lives.

Anaesth Intensive Care 1993;21:579–92
ual Saf Health Care. 2005 Jun;14(3):e19

Figure 1 Introduction to the Crisis Management Manual.



WHEN AND HOW TO USE THIS MANUAL

The manual is based on the mnemonic "COVER ABCD–A SWIFT CHECK" and is designed for use when any patient is undergoing general or regional anaesthesia. The sequence becomes AB COVER CD–A SWIFT CHECK when the patient is breathing spontaneously, and some components become redundant in certain circumstances; examples are given at the end of this section.

The mnemonic serves as a reminder to **always cycle systematically** through a basic series of thoughts and actions, the intensity of which will depend on the circumstances. This series of thoughts and actions is:

C **C**irculation, **C**apnograph, and **C**olour (saturation)
O **O**xygen supply and **O**xygen analyser
V **V**entilation (intubated patient) and **V**aporisers
E **E**ndotracheal tube and **E**liminate machine
R **R**eview monitors and **R**eview equipment

A **A**irway (with face or laryngeal mask)
B **B**reathing (with spontaneous ventilation)
C **C**irculation (in more detail than above)
D **D**rugs (consider all given or not given)

A Be **A**ware of **A**ir and **A**llergy - page 4*

SWIFT CHECK of patient, surgeon, process, and responses.

The four levels of intensity for each of these components are represented by another mnemonic - "SCARE" (SCAN, CHECK, ALERT/READY, EMERGENCY) and comprise pages 4 to 11* of this manual.

The SCAN sequence should be followed every 5 minutes of any anaesthetic, or more often if necessary. This overcomes the need for special training sessions, as the sequence rapidly becomes second nature and can usually be completed in 40-60 seconds. The CHECK sequence should be used whenever all is not going according to plan, and should also be practised regularly.

Do not hesitate to move on to the ALERT/READY and EMERGENCY sequences if you are worried, if events are moving quickly, or if it seems that an adverse outcome is possible. These should also be practised from time to time.

***Page references refer to the *Crisis Management Manual*.[38]**

Depending on the circumstances, components of each level of SCARE may be assembled as appropriate, as long as the sequence of COVER is always adhered to. For example, with sudden, severe hypertension, if the first four components of COVER (**C**irculation, **C**olour, **O**xygen, **O**xygen Analyser) are stable and normal at the SCAN level, no further action is required for these. However, it would be desirable to use the CHECK level for the **V**entilation, **V**aporiser, **R**eview monitors, and **R**eview equipment components of COVER, for the **C** (**C**irculation) and **D** (**D**rugs) components of ABCD, for the **A** (for **A**wareness) and for **SWIFT CHECK** (especially with respect to what the surgeon is doing). Hypertension and awareness are two circumstances in which the concentration of volatile agent may be increased - for most crises it is left alone at the SCAN and CHECK levels and turned off at the READY/ALERT and EMERGENCY levels.

On the other hand, if, for example, it is suddenly noticed that the patient is pulseless and blue, the full EMERGENCY sequence of COVER should be carried out immediately with progression to any appropriate sub-algorithms.

It is important that the basic COVER ABCD sequence is followed before becoming focused on any particular sub-algorithm; a major problem is "locking onto" a diagnosis which may not be correct. When assistance is called for, one person should repeatedly cycle through the COVER ABCD sequence and consider other possibilities, whilst the steps in any relevant sub-algorithms are followed. Some sub-algorithms repeat components of COVER (e.g. "give 100% oxygen"), usually when the entire sequence does not necessarily have to be followed in full at the outset, whereas others start by instructing anaesthesiologists to ensure that the full COVER sequence has been completed before starting the sub-algorithm (e.g. that for persistent desaturation, or air embolism).

Although the standard COVER ABCD–A SWIFT CHECK sequence should always be followed, some components become less important or redundant under particular circumstances: for intubated, ventilated patients the **A** and **B** after COVER become redundant; for patients breathing spontaneously via a mask, **A** and **B** precede COVER, as indicated at the start of this section, and **V** for **V**entilation becomes redundant; for a patient being ventilated via a laryngeal mask, **B** becomes redundant; and for a patient breathing spontaneously and receiving oxygen from a source independent of an anaesthetic machine (e.g. from a wall mounted flowmeter during regional or intravenous anaesthesia), the **V** and **E** of CO**V**E**R** become redundant.

Runciman, W B et al. Qual Saf Health Care 2005;14:e1

Management of Intra-op Anaphylaxis:

- during GA is similar to in other situations.
- Depends on the severity of the event. Severe reactions require early recognition and aggressive resuscitation. Traditionally, the mainstay of treatment is oxygen, fluids and epinephrine, with CPR and ACLS instituted as required

Minerva Anestesiologica: 2004 , 70(5) 285
Anesth Essays Res. 2012;6(2): 124–133.

Initial therapy

1. Stop Administration Of Antigen
2. Maintain Airway With 100% Oxygen
3. Discontinue All Anesthetic Agents
4. Start Intravascular Volume Expansion
5. Give Epinephrine (5-10 mcg IV initial bolus with hypotension, titrate as needed; 0.1 to 0.5 mg IV with cardiovascular collapse)
6. Intravenous administration of crystalloid (2-4 L) for the replacement of the peripheral vasodilation

Minerva Anestesiologica: 2004 , 70(5) 285

Secondary treatment

1. Histamine 1 and 2 blockers Antihistamines (0.5-1 mg/kg diphenhydramine)
2. Catecholamine Infusions (starting doses: epinephrine 5-10 mcg/min.norepinephrine 5-10 mcg/min, as an infusion, titrated to desired effects)
3. Bronchodilators (inhaled albuterol or terbutaline with bronchospasm)
4. Corticosteroids (0.25-1 g hydrocortisone; alternately 1-2 g methylprednisolone)
5. Sodium Bicarbonate (0.5-1 mEq/kg with persistent hypotension/ acidosis)
6. Airway Evaluation (prior to extubation)

Minerva Anestesiologica: 2004 , 70(5) 285

Management of Persistent Hypotension

- **Goals:** early return of spontaneous circulation and maintenance of adequate coronary and cerebral perfusion.
- **Basis:** CPR with a standard dose of epinephrine (10–20 μg.kg-1) has been shown to only provide 1–2 ml.min-1.100 g-1 of cerebral blood flow, about 1/10 of normal .
- Early administration of an **α-agonist** (e.g. metaraminol or equivalent) when patients are unresponsive or show limited response to epinephrine, will hasten achievement of these goals
- Based on the efficacy of **vasopressin** in vasodilatory shock, it should be considered in refractory anaphylactic shock .

Anaesthesia. 2005 Jun;60(6):621-2 N Engl J Med. 2001;345:588-95.

Anesth Analg 2001;93:1453-9.

Policy of systematic clinical and/or laboratory investigation

To confirm the nature of the reaction and to provide precise recommendations for future, perform:

- Plasma histamine, mast cell tryptase and specific IgE at the time of the reaction and at skin tests 6 weeks later. For muscle relaxants skin tests are 'Gold Standard' and for other compounds newer techniques such as analysis of in vitro activated basophils can be helpful.
- Safety and feasibility of diagnostic skin tests is established in children
- Allergy assessment must be performed in all high-risk patients

Acta Clin Belg. 2004;59(1):34-43

Allergy. 2005 Jun;60(6):828-34.

ta Anaesthesiol Belg. 2004;55(3):229-37.

Investigation of a hypersensitive reaction:

- Clinical history is the single most important source of information.
- Elevated histamine levels following the adverse reaction confirm the diagnosis, while an elevated serum tryptase concentration >25 μg L-1 favour an anaphylactic mechanism.
- Mast cell tryptase is to be measured which is thought to reach its peak plasma level after approximately 1 h.
- Serum samples should therefore be taken as soon as practicable after the start of the reaction, after 1 h and 6–24 h later. A serum sample should be refrigerated, not frozen, if it can be analysed within 48 h.

Acta Clin Belg. 2004;59(1):34-43

Investigation of a hypersensitive reaction:

- Negative test does not completely rule out anaphylaxis.
- Radioimmunoassay for the detection of drug-reactive IgE antibody identifies the causative agent of anaphylaxis. Also confirms diagnosis in patients in whom skin tests could either not been performed or are found to be negative.
- Sometimes challenge tests are required which are restricted to local anaesthetics and latex.

Minerva Anestesiologica: 2004 , 70(5) 285

N Engl J Med. 2001;345:588-95.

Recommended drug dilution scale for postoperative skin testing following anaphylactoid reaction during anaesthesia

.

	Prick test (mm)	Intradermal test 10^{-4}	10^{-3}	10^{-2}	10^{-1}
Succinylcholine chloride (10 mg mL^{-1}) excluded					
Vecuronium (4 mg mL^{-1})					
Pancuronium (2 mg mL^{-1})					
Rocuronium bromide (10 mg mL^{-1}) excluded					
Atracurium (10 mg mL^{-1}) excluded		10^{-1}			excluded
Cisatracurium (2 mg mL-1) excluded					
Latex					
— Stallergènes® excluded excluded				excluded	excluded
— Allerbio® excluded excluded				excluded	excluded
Hypnotics					
Morphine excluded excluded		10^{-1}			
Opioids (other)					
Local anaesthetics					

COMMON AGENTS IN PERIOPERATIVE SETTING (n=518)

Agent	Number	Percentage %
Neuromuscular blocking agent	306	58,2
Latex	88	16,7
Antibiotics	79	15,1
Hypnotics	18	3,4
Colloides	21	4,0
Opioids	7	1,3
Other agents	7	1,3

Agents involved (%) in anaphylaxis during anaesthesia in France (n=518) from 1999 to 2000

Allergy. 2005 Jun;60(6):828-34

Intra operative Anaphylaxis

- Intraoperative anaphylaxis caused by a hepatic hydatid cyst

  Singapore Med J 2011; 52(2) : e18

- PEA during LSCS under SA: a case report of severe anaphylactic reaction to Syntocinon.

  Int J Obstet Anesth. 2009 :18(1):85-8.

- Anaphylactic R after Cisatracurium in 2 pts Korean J Anesthesiol. 2013;65(2):147–150.

Intra operative Anaphylaxis

- Incidence of <1 in 10000-20000[2] anaesthesias and 1 in 6500 administrations of neuromuscular blocking agents (NMBAs), remain a major area of concern
- 2.1% of cases of intraoperative anaphylaxis are due to propofol.[

CNS Drugs. 2000;14:115–133

Drug hypersensitivity. Basel: Karger; 2007

Br J Anaesth. 2001;87:549–58..

Muscle Relaxants

- Succinylcholine and Rocuronium more frequently involved. Vecuronium and Pancuronium follow them whereas Atracurium is the least. Norway, after many reports of rocuronium allergy,has withdrawn it from routine practice
- Diagnostic tests include intradermal tests (IDT) and prick-tests(PT). IDT is for the search of the cross sensitization. 84% of patients do have cross sensitization to MRs but only 16% react to all MRs. The further use of MRs selected by negative IDTs has been proved to be safe.

Acta Anaesthesiol Scand 2001; 45: 1196–203

Allerg Immunol (Paris). 2002 ;34(7):233-40

Muscle Relaxants

- A documented anaphylactic reaction to a muscle relaxant is a positive risk factor
- At least 60% of those allergic to one muscle relaxant may react to another-Cross reaction.
- 15% of reactions to NMB agents have no previous exposure. This may be due to environmental exposure to quaternary ammonium groups found in items like cosmetics, over-the-counter medication and cleaning products.
- Safest approach is to avoid the drug class whenever possible.

Anesthesiology 2003: 99:536-45. Eur J Anaesthesiol.2002;19(4):240-62.
Br J Anaesth.2004; 93(4): 501-50 Anesthesiology 2000: 92;1074-81.

Histamine Release

Depends on the dose of drug

Most potent medications are:

- Morphine :Highest (>80%)
- Succinylcholine:43%
- Vecuronium: 37%
- Pancuronium: 13%
- Alcuronium: 76%
- Atracurion: 6.8%
- Galamine: 56%

Allergologia et Immunopathologia 2000 (28) 24-36.

Protamine Allergy

- Alternatives to Protamine are not currently available.
- Diabetic patients receiving Neutral Protamine Hagedorn (NPH) or protamine insulin have a 10-30 fold increased risk for anaphylxis
- Protamine is often administered concomitantly with blood products, so implicated as the causative agent in adverse reactions. Platelet and other allogeneic blood transfusions have a greater potential for allergic reactions compared to protamine.

J Thorac Cardiovasc Surg 98:200-204, 1989.
Anaphylactic Reactions in Anesthesia and Intensive Care 2nd edition1992

Latex

- Intraoperative latex sensitization: 1-5% of health-care personnel, 40% of children with spina bifida, 6% of blood donors.
- IgE-mediated reactivity to any number of antigens from Hevea brasiliensis, the source of latex
- Cross-reactions between latex and fruit proteins, such as banana and kiwi, in many as 50% of patients with latex allergy
- Diagnostic methods include skin tests, challenge, histamine release test, RIA, human basophil optical degranulation test, and ImmunoCAP.
- Although the female sex is accepted as predominant, atopy is controversial.
- The only known negative factor is the insertion of an endotracheal tube in asthmatic patients
- A "latex free" emergency cart to treat reactions. Rubber stoppered vials should be avoided.

Br J Anaesth.2004; 93(4): 501-504, Minerva Anestesiologica: 2004 , 70(5) 285, Allergy. 2007;62:471–87, J Allergy ClinImmunol. 2010;126:e1–e42.

Chlorhexidine & Betadine:

- Acute hypersensitivity reactions to chlorhexidine in OR occur during cleaning the surgical field in early phases of anaesthesia and also during insertion of CVP and epidural catheters.
- Allergic contact dermatitis, a Type IV cell-mediated hypersensitivity reaction, is more common with povidone-iodine.
- Allow any skin disinfectant to dry completely before starting a procedure.

Anaesth Intensive Care. 2005 Aug;33(4):521-4.
Br J Anaesth 2001; 87: 306–8
Dermatology. 2002;204(Suppl 1):96–8.
Immunol Allergy Clin North Am. 2004;24:491–505.

Dyes

- One must also consider iv dyes, such as methylene and isosulphan blue, and radiological contrast media, including fluorescein and the non-ionic, low-osmolar compounds. In one series of 2392 patients receiving isosulphan blue, the incidence of allergic reactions was 1.6%.
- It is always advisable to be vigilant, especially during minor procedures such as sentinel lymph node detection

Br J Anaesth 2002; 88: 133–5

Anesth Analg 2002; 95: 385–8

Methylene Blue:

- Methylene blue is used as a tracer for detecting digestive and urinary fistula, for assessing tubal permeability or as an alternative to isosulfan blue dye in sentinel lymph node biopsies. First case of a documented severe immunoglobulin (Ig) E-mediated hypersensitivity reaction associated with use of 1% methylene blue for detection of tubal permeability under GA has been reported recently.

Anesth & Analg 2005; 101(1) 149-150

Local anaesthetic agents:

- Local anaesthetics are too small (<300 daltons) to be antigenic, but may bind to plasma or tissue proteins as a hapten that possesses antigenic properties.
- true allergic reactions to esters account for 1% of all drug reactions to local anesthetics
- However, although allergy to amide LA is rare these reports must be taken seriously and appropriate investigations or referral organised.
- In cases of unexpected reactions, patients should undergo allergological follow-up to prevent fatal re-exposure.

Can J Anesth 2003;50:869-74.
esthesist. 2005;54(9):895-901

IV induction agents

- Thiopental anaphylaxis -1:30,000; 3 times>in females
- Propofol- 2.1% of cases of intraoperative anaphylaxis; IgE-mediated reactions may occur however, most reactions are nonimmunologic

My patient is allergic to eggs, can i use propofol?

- A case report and review in Saudi J Anaesth. 2010;4(3):207–08.
- Current evidence suggests that egg allergic patients are not more likely to develop anaphylaxis when exposed to propofol
- Serum tryptase, skin prick, ID testing, or serologic testing should be done to confirm the diagnosis

Benzodiazepines

- Diazepam is more likely than midazolam to cause an anaphylactic reaction because of the propylene glycol solvent that replaced Cremophor EL
- midazolam is safe for the induction of anesthesia in patients with drug allergy

Antibiotics

- 3rd leading cause of anaphylactic reactions under GA. Allergic reactions to *antibiotics* (esply, Penicillin, cephalosporins, vancomycin & b- lactam antibiotics) continue to increase - 15% of the anaphylactic reactions.
- clindamycin, gentamicin, and metronidazole rarely trigger

Nonsteroidal anti-inflammatory drugs

- Aspirin and NSAIDs are the second most common cause of drug-induced non-IgE-mediated anaphylactic reactions. (after antibiotics)

Other agents:

- Anaphylactic reactions to *colloids* are around 4%;gelatin is the most frequent. Extremely rare with Dextran(0.008%) and HES(0.08%)
- Opioid Anaphylaxis uncommon and only nonimmunological histamine release
- Fentanyl-no direct histamine release Rare reports of anaphylaxis to morphine and fentanyl
- Anaphylaxis to *halogenated volatile anaesthetics* has never been reported.Anaphylactic Reactions in Anesthesia and Intensive Care. 1992. Ann Allergy Asthma Immunol. 2006;97:681–7. Anesthesiology. 1982;56:93–6

Carry Home Message!

- An informed guess is not a reliable way of determining the cause of a supposed allergic reaction during anaesthesia and may put a significant number of patients at unnecessary risk.
  - -Wrong labelling for allergy, leading to unnecessary warnings against harmless substances,
  - -Risk of subsequent re-exposure to the real allergen.

- Patients with suspected allergic reactions during anaesthesia should be referred for investigation in specialist centres whenever possible.

Br J Anesth 95(4), 2005, 468-471


Thank You.