CASE HISTORY

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A 26 year old healthy male weighing 70kg was scheduled for circumcision under general anaesthesia. He had undergone one previous anaesthetic to allow manipulation of a broken bone.

The anaesthetist induced the patient using thiopentone 350mg. The patient rapidly became very wheezy and developed marked cyanosis despite the administration of oxygen. A student assisting with the anaesthetic commented that the pulse had become very weak and slow, and that a skin rash was developing.

Questions

1. What was the most likely diagnosis?

2. What is the management of the condition?

Answers

The patient developed acute cardio-respiratory collapse associated with severe bronchospasm, hypotension and a rash. The most likely diagnosis is an **anaphylactic** reaction to thiopentone. **Anaphylaxis** is a type of allergic reaction to a drug or other substance to which the patient has been previously exposed. During the previous exposure, an immune response to the substance developed resulting in immunoglobulin E (IgE) being formed against it. IgE binds to specialised immune cells known as "mast cells". If the patient receives the same substance again, it is detected by the IgE which causes the mast cells to release histamine and other vasoactive mediators. These cause marked vasodilation, increased capillary permeability and smooth muscle contraction.

In a few circumstances patients develop a similar syndrome during the first exposure to a drug. This reaction is not propagated via IgE but through another immune mechanism and is known as an anaphylactoid reaction. Clinically anaphylactic and **anaphylactoid** reactions are indistinguishable and require exactly the same management.

Clinical presentation of anaphylaxis

The **cardiovascular system** suffers marked vasodilation and considerable plasma loss from the leaky capillaries. This results in tachycardia and hypotension. Occasionally the hypotension may be severe enough to require cardiac massage during resuscitation. The cardiovascular signs may be all that is seen in some patients with anaphylactic shock.

Examination of the **respiratory system** may reveal bronchospasm, which may be severe. Laryngeal obstruction from oedema can occur.

The **skin** may feature a raised erythematous type of rash, peripheral oedema (especially around the face) or cyanosis.

Other symptoms may include loss of consciousness, nausea or vomiting and abdominal pain.

Management

Patients with anaphylactic shock should recover completely if they are treated immediately. Deaths are usually related to delayed management of hypoxia or hypotension.

1. The **airway** should be cleared and a high concentration of oxygen administered by facemask. Intubation may be required for laryngeal oedema.

2. If the **breathing** is inadequate, for example from bronchospasm, the patient should be intubated and the breathing assisted.

3. The **circulation** should be supported by immediately inserting a large intravenous cannula and rapidly infusing intravenous fluid. Colloids (such as Haemaccel or Dextran) are thought to be more effective than crystalloids in this situation. Large volumes may be required. If a pulse cannot be palpated cardiac massage should be commenced.

4. **Drugs**. In all serious reactions adrenaline should be given intravenously. In adults give 1 or 2ml boluses of 1:10,000 **adrenaline** until an effect is seen. Remember that adrenaline only lasts a short time and repeated doses may be necessary. The usual concentration of adrenaline supplied in hospitals is 1:1000 which contains lmg/ml. To prepare 1:10,000 adrenaline dilute lml of 1:1000 with 9mls of saline. (If no venous access is available give 0.5ml of 1:1000 adrenaline intramuscularly, or lOmls of 1:10,000 down the endotracheal tube).

Adrenaline is the recommended drug as it will reverse the vasodilation and treat the bronchospasm.

Intravenous **hydrocortisone** (200mg) is usually recommended but only acts after about 2 hours. Although it has little effect in the emergency situation, it may prove useful with persistent bronchospasm.

Aminophylline (5mg/kg) may be given slowly intravenously if the bronchospasm does not respond to adrenaline alone. **Salbutamol** may also be used for this indication.

Antihistamines are of little use.

5. After the immediate crisis has been managed the patient should be carefully observed in a suitable area of the hospital, for example the intensive care unit or recovery room. They are likely to need continued management on the above lines for some hours.

Follow up

The patient should be warned of the problem that developed during the anaesthetic and the drugs used recorded. The patient will then be able to explain the problem to any anaesthetist they meet in the future.

In some centres the patient can be tested to assess which drug caused the reaction, however this is not generally available.

If you have to anaesthetise a patient who has had a reaction to a general anaesthetic in the past but does not know the drugs that were involved check what kind of surgery the patient had and predict the likely technique used. Avoid the drugs which you think might have been used, particularly thiopentone and muscle relaxants. Ketamine, nitrous oxide, volatile agents and local anaesthetics are usually safe.

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