Mrs Trip, a friendly, 40-year-old female of fairly generous proportions is wheeled into the operating theatre in a flimsy gown of pale blue cotton. She sits up on the trolley while the nurse and porter prepare the operating table for her. She smiles anxiously at the anaesthetist, Dr Dope, as she draws some thick milky fluid into an enormous syringe with a very thick needle.

Mrs Trip feels lightheaded. A sensation of nausea washes over her and beads of sweat form on her upper lip. ‘Looking a little pale, Dearie,’ says the porter as he prepares to move Anna across to the table.

Mrs Trip awakes to see hazy images of faces above her. She is lying on a sheet on the cold theatre floor with a pillow under her head. Dr Dope is taking her blood pressure (BP): ‘120 over 80, pulse 72 and respiratory rate 12,’ she says to the nurse who fills the figures in on the chart.

‘Ah, good to have you back,’ says the anaesthetist smiling calmly, ‘there is some colour in your cheeks again. You fainted. It is called a vasovagal attack. It is nothing to worry about. Mr Porter took care to lie you down carefully so that you did not hurt yourself. Should we try and get you onto the table now?’

We continue to discuss investigations in allergy. This article explores the measurement of total serum TRYPCTASE.
Mrs Trip is lifted onto the theatre table and Nurse Nice and Sister Sensible carefully attach the BP cuff to her right arm, the oxygen mask to her face, the electrocardiogram (ECG) leads to electrodes on her chest, and the oxygen monitor to her index finger.

Anna admits to having a fear of needles, so Dr Dope kindly chats to her while she inserts the large-bore needle for the intravenous line into her left arm. She explains that she is going to inject some medication to prevent nausea as well as a little test dose of an antibiotic called cefuroxime into the drip. Mrs Trip is feeling fine and is glad to be in such experienced and caring hands. Dr Dope checks Mrs Trip’s vital signs and then administers the full dose of antibiotic.

The surgeons are emerging from the washroom and pulling on their gowns and latex gloves. Sister Formidable prepares the green surgical drapes over Mrs Trip’s abdomen. She notices that there are raised red ‘hives’ appearing on the skin. Just then Dr Dope observes that Mrs Trip is starting to develop a tachycardia and that her blood pressure has fallen to 100 over 60 mmHg. She reacts quickly, recognising the signs of anaphylaxis. The surgery is aborted. No further medications are administered. The drapes are cleared so that Mrs Trip can be examined. Her neck, chest and abdomen are covered in urticaria and her lip is beginning to swell on the right. She is developing bronchospasm with an increased respiratory rate and an audible wheeze. Her skin is warm and flushed.

The end of the table is raised, while the concentration of oxygen entering the face mask is increased to 40%. A litre of normal saline is allowed to run very quickly into her vascular system, and half an ampoule of adrenaline 1/1000 is given immediately intramuscularly. This is followed by an intravenous ampoule of Phenergan (25 mg of promethazine).

While Dr Dope is working, she asks Dr Scalpel to take a sample of clotted blood in a yellow-topped tube and label it. After a second litre of normal saline and the rest of the adrenaline, Mrs Trip begins to stabilise. Her blood pressure returns to normal, her breathing settles and her rash begins to disappear, although her lip remains swollen. Dr Dope draws another clotted sample and labels it ‘1 hour following reaction’.
Mr Porter is summoned to transfer her to the intensive care unit for close observation.

‘Mrs Trip,’ says Dr Dope, ‘You took a most unexpected turn in theatre this afternoon. One of the medications that you received did not agree with you and you had a reaction which we call anaphylaxis. We need to find out what it is that you reacted to before we can remove those troublesome gallstones of yours.

‘We will need to take two more samples of blood in about 2-3 hours, and at 24 hours for tryptase levels to help us get to the bottom of this. In the meantime Nurse Vigilant will watch that you don’t have another episode. Sometimes people have what we call a “biphasic reaction”. You should get some rest now.’

Mrs Trip spends an uneventful night in the intensive care unit and is discharged the following day after the final blood sample is taken.

She has an appointment arranged with Dr Do-a-lot, the allergologist, the following week.

Her surgery is postponed until the cause of her anaphylaxis has been evaluated.

Fig. 1. Diagrammatic graph illustrating how serum histamine levels rise and fall more rapidly than tryptase levels following anaphylaxis.
The test results are negative for latex and chlorhexidine, but the CAST is strongly positive for cefuroxime.

Dr Do-a-lot arranges for Mrs Trip to acquire a MedicAlert bracelet onto which is printed: **Anaphylaxis: Allergic to Cephalosporin Antibiotics. Give Adrenaline.**

The surgery is rescheduled without cephalosporins. Mrs Trip does not sit up on the trolley, nor does she look at the large needles. She does not suffer from anaphylaxis following administration of a new class of antibiotic.

Her gall bladder with all its 12 stones is removed without complication, and her recovery is uneventful.

Mrs Trip has joined a ‘Walk for Zest’ group, and is enjoying her good health.

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Discussion

In anaphylaxis mast cells degranulate.

Tryptase is the most abundant protein found in mast cells.

Tryptase (along with histamine and other inflammatory mediators) is released into the circulation.

Although plasma histamine levels correlate well with anaphylaxis symptoms, the levels will often have reached baseline by the time the sample can practically be taken in an emergency situation. Plasma levels peak at 5-15 minutes and return to normal within about an hour.

Tryptase levels, however, peak at 1 hour, and remain elevated in peripheral blood for 4-6 hours.

Tryptase is easy to measure, and is a sensitive and specific marker of mast cell degranulation; however, a positive finding is much more helpful in making a diagnosis of anaphylaxis than a negative finding is in excluding the diagnosis.

A transient rise in serum tryptase strongly supports the diagnosis of anaphylaxis and is helpful in the patient’s subsequent investigation and management.

Ideally 2-5 ml of clotted blood is collected within the 1st hour, then 2-3 hours later, and again after 12-24 hours for a baseline specimen.

A single postmortem specimen can aid in confirming the diagnosis of anaphylaxis, as tryptase is stable in postmortem blood for at least 24 hours.

Tryptase may be elevated in systemic mastocytosis and in some haematological neoplasms; however in these conditions the levels remain raised and do not show the transient pattern that typifies anaphylaxis.