

teaching, intraosseous access may be secured without difficulty and should be considered in any paediatric emergency in which intravenous access cannot be secured promptly. Bolus and infusion doses of adrenaline can be given safely by this route, as can other pharmacological agents recommended in anaphylaxis.

In children with signs of upper airway obstruction caused by laryngeal mucosal oedema, nebulised adrenaline may lead to prompt resolution of stridor.³ It should be given as a dose of either 0.05 ml of a 2.25% (racemic) solution/kg diluted to 2 ml with normal saline or, more conveniently, as 0.5 ml of a 1/1000 solution/kg (to a maximum of 5 ml). The child whose clinical history prompted Fisher's review would probably have benefited from this treatment.

Finally, in both his article and the summary in "This week in *BMJ*" Fisher states that oxygen should be given in severe anaphylaxis. We prefer the recommendations of the Association of Anaesthetists of Great Britain and Ireland that oxygen should be given in all cases of anaphylaxis regardless of the initial severity.³ Hypoxaemia will develop quickly if a patient suddenly develops airway obstruction as a late complication of an initially mild attack.

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- 1 Fisher M. Treatment of acute anaphylaxis. *BMJ* 1995;311:731-3. (16 September.)
- 2 Wauldhausen E, Keser G, Marquadt B. Der Anaphylaktische Shock [Anaphylactic shock]. *Anaesthetist* 1987;36:150-8.
- 3 Association of Anaesthetists of Great Britain and Ireland. *Anaphylactic reactions associated with anaesthesia*. London: AAGBI, 1990.
- 4 Roberts-Thompson P, Hewdell R, Kupa A. Adrenaline and anaphylaxis. *Med J Aust* 1985;142:708.
- 5 Jordan WS, Graves CL, Elwyn RA. New therapy for post intubation laryngeal edema and tracheitis in children. *JAMA* 1970;212:585-8.

Expressing the dose of adrenaline in milligrams is easier

EDITOR,—In his article on the treatment of anaphylaxis Malcolm Fisher emphasises the role of adrenaline.¹ The dose that he recommends is expressed as two volumes of two solutions of differing concentration. Quoting a dose in this way increases confusion and makes the dose less memorable—which may partly explain why the doctor described in the introductory letter "fumbles through pages of a book to figure out adrenaline dosage."

The revised guidelines of the European Resuscitation Council's working party now express the adrenaline dose in milligrams, and this has both simplified resuscitation algorithms and made them more memorable.² This has been complemented by the availability of adrenaline in rapid assembly preloaded syringes of 1 mg (10 ml of 1/10000) (Min-I-Jet). Although these syringes are currently recommended by the manufacturers for only intravenous or intracardiac use, they will readily accept a 21 gauge syringe and could therefore also deliver an intramuscular dose.

If the recommended dose of adrenaline was expressed in milligrams and delivered by a preloaded syringe the correct treatment of anaphylaxis would be swifter, simpler, and easier to remember.

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- 1 Fisher M. Treatment of acute anaphylaxis. *BMJ* 1995;311:731-3. (16 September.)
- 2 European Resuscitation Council Working Party. Adult advanced cardiac life support: the ERC guidelines (abridged). *BMJ* 1993;306:1589-93.

Treatment takes precedence over monitoring

EDITOR,—We believe that the ability to start immediate and effective treatment for acute anaphylactic shock is an essential skill for any medical practitioner. Unfortunately, Malcolm Fisher may have caused confusion with his recommendations for the use of intravenous adrenaline.¹ Fisher contradicts himself by stating that intravenous adrenaline should not be given to an "unmonitored patient" and then subsequently recommends its use in this very situation. We agree that early placement of cardiorespiratory monitoring devices is essential in any severe anaphylactic episode but would strongly urge that the administration of intravenous adrenaline should not be deferred until such equipment is available. In its recommendations for the management of anaphylactoid reactions the Association of Anaesthetists of Great Britain and Ireland emphasises the need for early administration of adrenaline intravenously.²

With regard to the management of bronchospasm, we agree that inhalation of the volatile anaesthetic agent isoflurane may have a role but would suggest that halothane, which has more potent effects as a bronchodilator, is more appropriate.³ Numerous reports describe the use of inhaled and nebulised adrenaline solutions in life threatening acute upper and lower airway obstruction caused by anaphylaxis.^{4,5} We are therefore surprised that this accepted therapeutic regimen is omitted from the recommended treatment protocols for bronchospasm and angio-oedema.

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- 2 Association of Anaesthetists of Great Britain and Ireland. *Anaphylactic reactions associated with anaesthesia*. London: AAGBI, 1990.
- 3 Calvey TN, Williams NE. *Principles and practice of pharmacology for anaesthetists*. Oxford: Blackwell, 1991.
- 4 McConachie I. Laryngeal oedema following anaphylactic shock. *BJHM* 1992;47:201.
- 5 Muller U, Mosbech H, Blaauw P, Dreborg S, Malling HJ, Przybilla B, et al. Emergency treatment of allergic reactions to Hymenoptera stings. *Clin Exp Allergy* 1991;21:281-8.

Investigations help to confirm diagnosis

EDITOR,—Malcolm Fisher's review highlights the need for adrenaline along with volume replacement in the management of severe systemic anaphylaxis.¹ This observation was recognised by the Association of Anaesthetists of Great Britain and Ireland, which in 1990 produced a booklet for all members² and a wall chart for the theatre area.

As Fisher states, cardiovascular collapse is a common feature of anaphylaxis, but, particularly in the context of surgery, it is not the only diagnosis that has to be considered: myocardial infarction, pulmonary embolus, and concealed hypovolaemia are some of the diagnoses that have to be excluded. The diagnosis may be unclear, especially if the patient dies. Furthermore, the management of an acute systemic anaphylaxis is stressful. Information is often not readily available about which investigations to carry out or what to do with samples, so blood tests can be spoiled or results

After resuscitation carry out the following:

Blood tests

Take 20 ml of blood for mast cell tryptase, specific IgE antibodies, and complement at 1, 3 and approximately 8 hours after the suspected reaction.

Bottle as follows:

10 ml in an activated gel bottle (speckled top) for serum and 5 ml in each of two edetic acid (EDTA) (full blood count) bottles. Label the form correctly. Send to the department of immunology in Southmead. If outside laboratory hours inform the haematologist, who will separate the serum and, if necessary, store it at -20°C. The samples must be processed as soon as possible, but they need not be sent to immunology out of hours.

Part of follow up card for anaphylaxis

misplaced. The relevant history and clinical signs may not be documented. To combat these shortcomings a plastic laminated action card has been written, which is placed in the operating theatres of the hospitals in Bristol. It describes in simple terms how to investigate a case of suspected anaphylaxis (figure).

Requests are made for full details from a checklist, including history of allergies; use of latex (urinary catheter or sterile gloves); treatment with antibiotics, colloid, and blood; date, time, and severity of reaction; etc. The action card instructs the attending anaesthetist to pass the patient's details to a designated consultant anaesthetist, who has an interest in anaphylaxis and who then refers the patient to the immunologist.

Assay of serum mast cell tryptase is helpful in the follow up.^{3,4} Tryptase is liberated along with histamine from mast cells when they degranulate. Furthermore, unlike histamine, it is stable in blood. If tryptase is increased then mast cells have been degranulated. It has also been assayed after death, which could be important medicolegally.⁴ Specific IgE is also helpful in this respect, a view shared by Laroche *et al.*⁵

Immunologists from other regions may disagree with the investigations or the timing of the samples as written in the extract from our follow up card. Nevertheless, the instructions have increased the amount of useful information for the immunologists and have enabled suspected systemic anaphylaxis to be diagnosed and more fully investigated.

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- 1 Fisher M. Treatment of acute anaphylaxis. *BMJ* 1995;311:731-3. (16 September.)
- 2 Association of Anaesthetists of Great Britain and Ireland. *Anaphylactic reactions associated with anaesthesia*. London: AAGBI, 1990.
- 3 Tanus T, Mines D, Atkins PC, Levinson AI. Serum tryptase in idiopathic anaphylaxis: a case report and review of the literature. *Ann Emerg Med* 1994;24:104-7.
- 4 Ansari MQ, Zamora JL, Lipscomb MF. Postmortem diagnosis of acute anaphylaxis by serum tryptase analysis. A case report. *Am J Clin Pathol* 1993;99:101-3.
- 5 Laroche D, Lefrançois C, Gerard JL, Dubois F, Vergnaud MC, Gueant JL, et al. Early diagnosis of anaphylactic reactions to neuromuscular blocking drugs. *Br J Anaesth* 1992;69:611-4.

Chart helps with calculation of dose of adrenaline for children

EDITOR,—In the report of a case of anaphylaxis that prompted Malcolm Fisher's review the casualty officer had difficulty in determining the correct dose of adrenaline for a 5 year old child.¹ Fisher recommends 0.01 ml of 1/1000 adrenaline solution/kg by intramuscular injection or 0.1 ml of 1/10000 solution/kg intravenously. This advice would not have helped the attending doctor to check the