Cocaine and adrenaline paste: a fatal combination?

K E A Nicholson, J E G Rogers

Time to abandon paste combining cocaine and adrenaline and to stick to recommended doses

Cocaine and adrenaline paste is most commonly used by otorhinolaryngologists for operations on the nose, including rhinoplasty and submucous resection. Cocaine readily penetrates mucous membranes and is an effective topical anaesthetic with an intense vasoconstrictor action that facilitates surgery and improves haemostasis. Cocaine blocks the reuptake of noradrenaline at sympathetic nerve terminals, thus potentiating sympathetic activity. Although local vasoconstriction is produced, arrhythmias and hypertension may occur.¹ Adrenaline is used in combination with cocaine to intensify the vasoconstrictor effect, thus improving the operative field, and also to reduce absorption of cocaine into the systemic circulation. Interaction between cocaine and adrenaline, however, may increase circulating concentrations of catecholamines and lead to arrhythmias.

Case reports

CASE 1

A fit 9 year old girl weighing 28 kg presented for examination of her nose under anaesthesia. She was given premedication with oral atropine. Anaesthesia was induced with thiopentone, and tracheal intubation was facilitated with suxamethonium. Anaesthesia was maintained with oxygen in nitrous oxide 66% and halothane 1%, and ventilation was assisted. Five minutes into the operation about 0.5 ml of paste containing cocaine 25% and adrenaline 0.18% (125 mg cocaine and 0.9 mg adrenaline) was placed in her nose. Instruments were immediately passed up the nose and within 10 s ventricular fibrillation occurred. The rhythm reverted with two precordial thumps.

CASE 2

A 10 year old boy weighing 49 kg presented for examination of his nose, bilateral anastomies, and intranasal submucous diathermy to the inferior turbinates. He was given premedication with oral atropine. Anaesthesia was induced with thiopentone, and tracheal intubation was facilitated with suxamethonium. He was given papaveretum 10 mg intramuscularly as analgesia. Anaesthesia was maintained with oxygen in nitrous oxide 66% and halothane 2%, and ventilation was spontaneous. Around 0.5 ml of paste containing cocaine 25% and adrenaline 0.18% (125 mg cocaine and 0.9 mg adrenaline) was placed in his nose, and within 30 s ventricular fibrillation occurred; sinus rhythm was regained with a direct current of 100 J.

CASE 3

A 30 year old woman weighing 58 kg presented for a transsphenoidal hypophysectomy for a prolactinoma. She was given premedication with temazepam. Anaesthesia was induced with thiopentone and fentanyl. Intubation was facilitated with atracurium, and anaesthesia was maintained with a propofol infusion and oxygen in nitrous oxide 66%. Twenty five minutes after induction about 1 ml of paste containing cocaine 25% and adrenaline 0.18% (250 mg cocaine and 1.8 mg adrenaline) was placed in her nose. Instruments were placed up the nose, and within seconds tachycardia, multifocal ventricular ectopic beats, sustained hyper-

tension, and ST segment depression occurred. She responded to treatment with lignocaine followed by labetalol, but when instruments were again placed up her nose she became hypertensive and the procedure was abandoned.

Discussion

These three cases occurred over one year in two hospitals in East Anglia, where paste containing cocaine 25% and adrenaline 0.18% is used routinely. During this time about 25 transsphenoidal hypophysectomies and 250 nasal procedures were carried out in the hospitals. All the patients received doses of cocaine and adrenaline that exceeded the maximum recommended doses. These cases clearly show life threatening complications associated with this routine practice.

Two surveys in the 1970s showed that 30% of otolaryngologists and 70% of plastic surgeons routinely used cocaine with adrenaline to improve operating conditions.^{2,3} Many commonly used additional submucosal lignocaine with 1 in 200 000 adrenaline. *Martindale* recommends cocaine solutions of no more than 4% and a maximum total dose for application to the nasal mucosa in fit adults of 1.5 mg/kg.¹ It also advises against the concomitant use of adrenaline. These recommendations are consistent with those of the *British National Formulary*.⁴ Solutions and pastes of up to 25% concentration continue to be used because increasing the concentration of cocaine reduces the time to onset of action and increases the duration of action.⁵ The addition of adrenaline to cocaine to limit systemic absorption and improve operating conditions and haemostasis has remained controversial. *Lips et al* showed that, although the addition of adrenaline to 4% cocaine solution significantly reduced systemic absorption of cocaine, this effect was not seen when adrenaline was added to cocaine paste.⁶ Cocaine paste improved operating conditions, however, and reduced blood loss. *Pfleiderer and Brockbank* confirmed that the addition of adrenaline to a 10% solution of cocaine significantly reduced the systemic absorption of cocaine during surgery.⁷ Despite the theoretical benefits of reducing systemic absorption of cocaine by combining it with adrenaline, there are reports of unusually rapid absorption when cocaine is combined with adrenaline.⁸ Sudden late rises in systemic concentrations have been attributed to a decay in adrenaline induced vasoconstrictor action.⁹ Thus the addition of adrenaline to cocaine is unpredictable and may increase the risk of the toxic effects that it is meant to reduce.

Other factors may influence arrhythmogenic potential and hypertension. Endogenous catecholamine production occurs in anxious patients or those who have not been given premedication. High circulating concentrations of catecholamines are associated with laryngoscopy and intubation. Maintenance of anaesthesia with halothane, a volatile anaesthetic agent, may augment any interaction between cocaine and catecholamines by sensitising the myocardium, although deep levels of general anaesthesia inhibit adrenal release of catecholamines and may conversely

Department of
Anaesthesia, Norfolk and
Norwich Hospital,
Norwich NR1 3SR
K E A Nicholson, senior
register

Department of
Anaesthesia,
Addenbrooke's Hospital,
Cambridge CB2 2QQ
J E G Rogers, registrar

Correspondence to:
Dr J E G Rogers,
Department of Anaesthesia,
Royal Devon and Exeter
Hospital, Exeter EX2 5DW.

BMJ 1995;311:250-1

decrease the potential arrhythmogenic effects. Hypercapnia may occur in patients who are breathing spontaneously during anaesthesia and predispose them to arrhythmias. The patient in case 3, however, had been given premedication and had undergone controlled ventilation avoiding volatile agents. This shows that cardiovascular disturbances can occur even when anaesthetic conditions are optimal.

These cases show the difficulties of applying small quantities of a highly concentrated paste without exceeding the recommended doses of cocaine. The risks are further compounded by the addition of adrenaline, which itself may be given in a high dose into a vascular area.

The value of adding adrenaline to cocaine is questionable; the clinical efficacy of the combination is dubious and we query the medicolegal aspects of this practice. Nasal surgery is rarely life saving and patients are commonly young and fit. Thus the benefits of using

a particular technique must be substantial to justify any risk.

- 1 Reynolds JEF, ed. *Marindale. The extra pharmacopoeia*. 30th ed. London: Pharmaceutical Press, 1993.
- 2 Feehan HF, Mancusi-Ungaro A. The use of cocaine as a topical anaesthetic in nasal surgery: a survey report. *Plast Reconstr Surg* 1976;57:62-5.
- 3 Johns ME, Henderson RL. Cocaine use by the otolaryngologist: a survey. *Transactions of the American Academy of Ophthalmology and Otolaryngology* 1977;84:969-73.
- 4 British Medical Association-Royal Pharmaceutical Society of Great Britain. *British National Formulary*. No 27. London: BMA-RPS, 1994:485.
- 5 Adriani J, Zepernick R. Clinical effectiveness of drugs used for topical anesthesia. *JAMA* 1964;188:711-8.
- 6 Lips FJ, O'Reilly J, Close D, Beaumont GD, Clapham M. The effects of formulation and addition of adrenaline to cocaine for haemostasis in intranasal surgery. *Anaesth Intensive Care* 1987;15:141-6.
- 7 Pfeiderer AJ, Brockbank M. Cocaine and adrenaline: a safe or necessary combination in the nose? *Clin Otolaryngol* 1988;13:421-6.
- 8 Bromley L, Hayward A. Cocaine absorption from the nasal mucosa. *Anaesthesia* 1988;43:356-8.
- 9 Fleming JA, Byck R, Barash PG. Pharmacology and therapeutic applications of cocaine. *Anesthesiology* 1990;73:518-31.

(Accepted 1 November 1994)

Qualitative Research

Qualitative interviews in medical research

Nicky Britten

This is the fourth of seven articles describing non-quantitative techniques and showing their value in health research

Much qualitative research is interview based, and this paper provides an outline of qualitative interview techniques and their application in medical settings. It explains the rationale for these techniques and shows how they can be used to research kinds of questions that are different from those dealt with by quantitative methods. Different types of qualitative interviews are described, and the way in which they differ from clinical consultations is emphasised. Practical guidance for conducting such interviews is given.

Types of qualitative interview

Practising clinicians routinely interview patients during their clinical work, and they may wonder whether simply talking to people constitutes a legitimate form of research. In sociology and related disciplines, however, interviewing is a well established research technique. There are three main types: structured, semistructured, and in depth interviews (box 1).

Structured interviews consist of administering structured questionnaires, and interviewers are trained to ask questions (mostly fixed choice) in a standardised manner. For example, interviewees might be asked: "Is your health: excellent, good, fair, or poor?" Though qualitative interviews are often described as being unstructured in order to contrast them with this type of formalised quantitative interview, the term "unstructured" is misleading as no interview is completely devoid of structure: if it were, there would be no guarantee that the data gathered would be appropriate to the research question.

Semistructured interviews are conducted on the basis of a loose structure consisting of open ended questions that define the area to be explored, at least initially, and from which the interviewer or interviewee may diverge in order to pursue an idea in more detail. Continuing with the same example, interviewees might initially be asked a series of questions such as: "What do you think good health is?", "How do you consider your own health?", and so on.

Box 1—Types of interviews

- Structured
Usually with a structured questionnaire
- Semistructured
Open ended questions
- Depth
One or two issues covered in great detail
Questions are based on what the interviewee says

In depth interviews are less structured than this, and may cover only one or two issues, but in much greater detail. Such an interview might begin with the interviewer saying, "This research study is about how people think about their own health. Can you tell me about your own health experiences and what you think of your health?" Further questions from the interviewer would be based on what the interviewee said and would consist mostly of clarification and probing for details.

Clinical and qualitative research interviews have very different purposes. Although the doctor may be willing to see the problem from the patient's perspective, the clinical task is to fit that problem into an appropriate medical category in order to choose an appropriate form of management. The constraints of most consultations are such that any open ended questioning needs to be brought to a conclusion by the doctor within a fairly short time. In a qualitative research interview the aim is to discover the interviewee's own framework of meanings and the research task is to avoid imposing the researcher's structures and assumptions as far as possible. The researcher needs to remain open to the possibility that the concepts and variables that emerge may be very different from those that might have been predicted at the outset.

Qualitative interview studies address different questions from those addressed by quantitative research. For example, a quantitative epidemiological approach to the sudden infant death syndrome might measure statistical correlates of national and regional

Department of General Practice, United Medical and Dental Schools of Guy's and St Thomas's Hospitals, London SE11 6SP

Nicky Britten, lecturer in medical sociology

BMJ 1995;311:251-3