tum given intramuscularly in case 2 would not have been effective at the time of the crisis. Both patients were breathing spontaneously and would have been hypercapnoeic. The insertion of cocaine and adrenaline paste and almost immediate use of instruments in the nose in a patient with high catecholamine concentrations, a respiratory acidosis, and circulating halothane is a recipe for arrhythmias.

Although the anaesthetic technique in case 3 cannot be faulted, the cocaine and adrenaline paste was inserted into the nose 25 minutes after induction of anaesthesia, at which time surgery can be presumed to have started and the nasal mucous membrane had been disrupted. The insertion of paste into the nose in these circumstances and the immediate use of instruments would force some of the mixture rapidly into the circulation, with the inevitable likelihood of serious arrhythmias.

The usual practice when using cocaine and adrenaline paste is to place it into the nose 10-15 minutes before induction of anaesthesia, during which time the patient's pulse is monitored. Experience shows that a certain period is required to obtain the full benefit of the paste in terms of vascular constriction and shrinking of the nasal mucosa. Although cocaine alone will produce some vasoconstriction and mucosal shrinking, the operating conditions are undoubtedly better when cocaine is combined with adrenaline.

The complications associated with the use of any drug can be avoided by not exceeding the correct dose and by giving the drug in the correct manner. When an interaction with other drugs—for example, anaesthetic agents—might be expected the anaesthetic technique used must take this into account.

On the basis of the three cases reported, the authors' condemnation of the use of cocaine and adrenaline paste is unjustified and the suggestion that its continued use may have medicolegal implications is unnecessarily alarmist.

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1 Nicholson KEA, Rogers JEG. Cocaine and adrenaline paste: a fatal combination? *BMJ* 1995;311:250-1. (22 July.)

Inserting central venous catheters

Case for angiographically guided placement is not proved

EDITOR,—Andy Adam's editorial suggesting that long term central venous catheters (Hickman lines) should be placed only by interventional radiologists contains many errors that seriously weaken his argument.¹ His description of "traditional" surgical placement is incorrect: the lines are placed into the internal jugular vein or, less commonly, the cephalic vein and not, as he suggests, into the subclavian vein. The risks of arterial puncture in patients with coagulopathies is overstated, simply because coagulopathies should always be corrected before insertion of a central venous catheter, and the use of imaging does not exempt the operator from this requirement.

Adam states that the rate of arterial puncture is reduced when imaging is used. This is offset by the observation that the only death associated with placement of a catheter in one of the series that Adam cites in which catheters were placed by interventional radiologists occurred after arterial puncture in a patient with a coagulopathy.² Adam also states that the rate of misplaced catheters in a series in which imaging was not used was 6%.³ This is not strictly accurate as the study showed that use of ultrasound imaging to locate the subclavian vein

conferred no advantage over use of anatomical landmarks. The 6% rate of misplacement related to the whole study, including those patients in whom ultrasound imaging was used.

Imaging guidance does not "allow the procedure to be carried out under local anaesthesia and light sedation" as Adam suggests, as both surgical and blind percutaneous techniques can be undertaken this way. The use or lack of use of imaging has no bearing on the type of anaesthesia used. Moreover, it is the use of local anaesthesia and light sedation coupled with ingeniously designed catheters that converts placement of a central venous catheter from a surgical procedure to an outpatient procedure performed in a treatment room, not the skills of interventional radiologists.

Cardiologists, nephrologists, anaesthetists, intensivists, paediatricians, and many other groups are skilled in the techniques of venepuncture and the use of guidewires. In addition, small, portable ultrasound imaging devices specifically designed for imaging vessels and introducing catheters are available. With these devices the subclavian artery and vein can easily be distinguished and the vein punctured. Clearly, the skills required to place these lines are not unique to interventional radiologists.

Angiography facilities may not be as accessible as Adam suggests: they may not even be in the same hospital as the patient. It might be possible to show a cost benefit when placement in an angiography suite is compared with surgical placement, but we think that placement of routine catheters on the ward under local anaesthesia and sedation is the most economical option. Our success rate is 96%; we use percutaneous unguided techniques. There is no evidence that guided insertion is safer, cheaper, or more effective. We suggest that the "time for a new look" has not yet come.

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- 1 Adam A. Insertion of long term central venous catheters: time for a new look. *BMJ* 1995;311:341-2. (5 August.)
- 2 Robertson LJ, Mauro MA, Jaques PF. Radiologic placement of Hickman catheters. *Radiology* 1989;107:1007-9.
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Open technique has lower evidence of complications

EDITOR,—We disagree with Andy Adam's comments regarding the drawbacks of an open surgical technique for placing long term central venous catheters. It is our practice to place such catheters by using an open cutdown technique under local anaesthesia. We mainly use the cephalic vein, with fluoroscopic screening to ensure correct positioning. With this technique more than 800 catheters have been inserted over the past 10 years, for parenteral nutrition, antibiotics, and chemotherapy. The incidence of pneumothorax and injury to vessels at the root of the neck has been zero. These types of complications are seen when blind puncture techniques are used and were one reason for our change to an open technique. The bulk of our practice is the treatment of very sick patients with intestinal failure, who would tolerate such complications badly. Using our method, over the past 12 months we have failed to achieve central venous access in only two patients. We regard the open technique as a safe and reliable means of venous access that is well tolerated by our patients.

Adam seems to dismiss the surgical technique on the basis of a single study.² Without a systematic

appraisal of the literature there is a risk that important evidence of effectiveness may be missed, and this may bias the conclusions that are drawn.³ The references cited in the editorial do not include any randomised controlled trials, possibly because none exist. We would like to see evidence from more rigorous trials before we accept that one method is superior.

To solve the problem of lack of evidence regarding the techniques we recommend a systematic review of the literature. If doubt still existed then a randomised controlled trial comparing both methods of inserting catheters, including a cost analysis, would be appropriate.

The more important issue to be addressed is not the technique of inserting catheters but their subsequent care. Life threatening complications of central lines—namely, sepsis and central venous thrombosis—occur because of inadequate care. Patients should not be discharged until they or a designated person are competent to look after the line. This requires a great deal of professional skill and is a major factor in the success of the intestinal failure unit at Hope Hospital.

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Difficulties are rare and do not correlate with lifespan of catheter

EDITOR,—We strongly support Andy Adam's view that imaging guidance and experience are necessary for the placement of Hickman-type catheters.¹ The first surgical insertions of Hickman catheters at the Royal Marsden Hospitals were described in 1979,² but over the past decade the anaesthetists have developed a comprehensive percutaneous venous access service, and they currently insert over 1000 lines a year. Dedicated theatre lists of up to 10 patients are eminently suitable for consultants to teach the technique to trainee anaesthetists.

Oncology patients are carefully worked up preoperatively: clotting function is optimised and the suitability of the site of insertion assessed. In complicated cases, in which there is chest disease or venous thrombosis, radiological investigations are performed with the full cooperation of the radiology department. The lines are inserted with a combination of good quality sedation for adults, general anaesthesia for children, safe doses of local anaesthetics, oxygen treatment, and full monitoring. Although serious complications are rare, full resuscitation back up is essential, as are recovery facilities after any procedure that requires sedation.³ The insertion technique has been described by Stacey *et al.*⁴ Fluoroscopic screening is used for each step of the procedure. A recent internal audit showed that an open venous cutdown technique was required in only one in 1494 insertions and may be necessary for paediatric patients and patients with a refractory coagulopathy.

The lifespan of the catheter is of vital importance after insertion; in two consecutive audits at the Royal Marsden Hospital it has been found to be 91 days in 545 mixed oncology patients and 122 days in 949 patients with gastrointestinal malignancy. In the second audit a relation was sought between difficulties in inserting the catheter

and a shortened lifespan of the catheter, but none was found.

Recent studies have shown benefit from infusional chemotherapy,³ and its use is likely to increase. There could be a strong argument for rationalising use of the percutaneous technique of inserting central venous catheters: occasional operators are more likely to encounter difficulties, so specialist centres that insert over 200 a year are desirable and should incorporate a comprehensive education programme for both patients and staff.

The background of the operator is not critical provided that he or she has been trained and is capable of treating complications, monitoring patients, and recovering them safely. The anaesthetists at the Royal Marsden Hospitals provide this service and endeavour to refine the subtleties of the technique.

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Line should not enter the heart

EDITOR,—We are concerned by Andy Adam's statement that the correct position for the tip of long term central venous catheters is in the right atrium.¹ Cardiac tamponade secondary to erosion or perforation of the tips of catheters is a rare but well recognised and potentially fatal complication of central venous catheterisation. Several recent reviews have drawn attention to this and recommended that the tip of a central venous catheter should lie in the superior vena cava, typically judged as being at the angle of the trachea and right main bronchus.^{2,4}

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Operating theatre is better back up than venography

EDITOR,—Andy Adam asserts that interventional radiologists are the most appropriate specialists to insert long term venous catheters.¹ He does not, however, provide any evidence that such a practice would benefit patients or provide an improved service. As a surgeon responsible for over 400 procedures to gain central venous access annually,

I remain unconvinced of the benefits that Adam maintains accompany venography to provide "initial diagnostic information." Rather than simplifying the insertion of central venous catheters, this must surely constitute an additional complicating step.

In my practice over 95% of Hickman catheters are introduced by the percutaneous technique, with puncture of the subclavian vein performed blind. The anatomy of the subclavian vein in relation to the mid-third of the clavicle is remarkably constant, and I have been aware of inadvertent arterial puncture on only three occasions, with no subsequent morbidity. The use of an image intensifier to confirm placement of the guidewire and Hickman catheter is routine and allows for immediate correction in cases of misplacement (with the tip in the internal jugular or opposite subclavian vein).

In adults, over 80% of Hickman catheters are inserted under local anaesthesia. The advantage of performing the procedure in the operating theatre (as opposed to the angiography suite) is that this allows surgical cutdown of the jugular or saphenous vein to be performed in those few patients in whom a percutaneous approach to the subclavian vein is not feasible (for example, those with bilateral axillary vein thrombosis) and also allows for general anaesthesia. With these options available, the success rate in achieving long term central venous access is virtually 100% without resort to percutaneous puncture of the inferior vena cava, as Adam describes.

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Surgical cutdown technique should not be abandoned

EDITOR,—Andy Adam dismisses the surgical cutdown technique for gaining access to the subclavian vein to insert a long term central venous catheter.¹ We have used an open approach to the internal jugular vein for the past 10 years. This method does not suffer from the low success rate quoted by Adam, has an operating time of between 15 and 45 minutes, and rarely compromises the vein for future use. It avoids not only the major complications associated with blind puncture of the subclavian vein but also what Adam terms "the one real problem" with the radiologically guided percutaneous method—namely, that most x ray departments can barely cope with the demand for conventional imaging without the placement of venous catheters being added to their repertoire.

We do not doubt the value of blind or radiologically guided percutaneous placement techniques in the hands of experts and look forward to the day when the choice of techniques is widely, freely, and promptly available. Until then, open surgical placement in the internal jugular vein should be recognised as a safe, easily taught, effective, and readily available alternative. Adam's conclusion that the surgical cutdown technique should be abandoned does a disservice to the large number of patients whose quality of life can be transformed by long term indwelling venous access.

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Author's reply

EDITOR,—It is apparent that some of my statements have been misinterpreted: although interventional radiologists are best placed to insert permanent central venous catheters, there is no reason why other people should not be trained in this procedure. Nevertheless, it is important to acquire the appropriate skills in manipulating catheters: however "ingeniously designed," catheters cannot find their own way.

Used with the imaging guided technique, coaxial systems that use 21-22 gauge needles to introduce catheters provide a greater margin of safety than the larger, traditional needles: this is important, because coagulopathies are not always fully correctable.

The comments by Duncan Young and colleagues suggest unfamiliarity with the use of imaging modalities and misinterpretation of the literature: ultrasound scanning helps to avoid arterial puncture but cannot ensure correct placement of the catheter in the superior vena cava. Mansfield *et al* did not use real time ultrasound scanning; they simply marked the position of the vein using a preliminary scan, which is a much inferior method, and they themselves acknowledge that this may explain the problems they encountered.¹ Fluoroscopic guidance after the initial puncture ensures correct placement in virtually all cases. Fluoroscopy at the end of the procedure is better than nothing but is no substitute for guidance during placement, which eliminates misplacement and ensures that the catheter is the right length.

When discussing the imaging guided technique I did not recommend that the tip of the catheter should be in the right atrium, as Malcolm Hilton and colleagues mistakenly state. Their comment is based on unfamiliarity with the technique used: a long sheath is placed into the atrium, or even the inferior vena cava, but the catheter is cut to the correct length before placement, the necessary length having been measured during fluoroscopy. The catheter's tip is left at the junction of the superior vena cava and right atrium, and the sheath is then peeled away.

I agree with Jacqueline Filshie and colleagues that there are advantages to a centralised venous access service. Imaging guidance and modern methods that enable catheters to be inserted on an outpatient basis make it possible to rationalise the insertion of central venous catheters, improve training, and minimise trauma and inconvenience to patients.

Expert surgical teams can undoubtedly achieve satisfactory results with an inferior method, but this is no reason to deny progress; imaging guidance and modern catheters can do better.

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Treatment of gall stones

Non-surgical treatments should not be dismissed

EDITOR,—In their review on the treatment of gall stones N Tait and J M Little are unnecessarily dismissive of treatments other than surgery.¹ They are perhaps being deliberately provocative when suggesting that such treatments are for patients who are dissatisfied with the outcome of alternative (previously defined by the authors as "folk," herbal, or naturopathic) treatments.

We believe that the personal preference of the patient is an important consideration. Some