Correspondence

Herbal medicine and anaesthesia

Kampo is a traditional herbal medicine widely used in Japan. It is a unique system, developed in Japan from Chinese origins. The Kampo takes a holistic approach to health, seeking to enhance the body's natural harmony and recuperative power. Kam and Liew suggested advising patients to cease the use of traditional Chinese herbal medicines (TCHM) before surgery (*Anaesthesia* 2002; **57**: 1083–9). However, the appropriate use of Kampo prescribed by an experienced physician should not cease to maintain health. Furthermore, a new Kampo prescription is useful for restoring the body's balance and thereby promotes healing of the systemic disharmony or irregularity. Of course, it may be prudent to cease the use of TCHM suggested by a non-professional.

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Chinese herbal medicines

I read the review article on Chinese herbal medicine (Kam & Liew. Anaesthesia 2002; **57**: 1083–9) with interest, not least because some of the products described seem to have been used 2000 years ago to produce anaesthesia. Hua Tuo, born around 111 AD, is reported by Fu to have used a mixture called *ma-fei-san* successfully for anaesthesia in surgical operations [1]. The author gives two recipes for the mixture, neither of which includes substances noted for their anaesthetic or analgesic actions. They do however, include *Rhododendron* and *Datura*, with their anticholinergic effects, *Angelica* species, *Jasmina* and *Acorus* and the potentially very toxic *Aconitum*. Hua Tuo seems to have known how to reduce this toxicity, for he advocates prolonged boiling of his mixture before use. At least he did not have interaction with 'western' medicines to contend with in his patients, but one wonders how many of our newer drugs will still be in use 2000 years hence.

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New GMC guidelines

In your correspondent's comments on the guidelines recently issued by the General Medical Council on 'Withholding and Withdrawing Life-Prolonging treatment' (White. *Anaesthesia* 2002; **57**: 1216), he states: 'The GMC recognises that a doctor (of any grade) may have a conscientious objection to discontinuing treatment. In this instance, however, the doctor concerned still has a duty to arrange for the patient's care to be taken over by another suitably qualified doctor (paragraphs 28 and 29).' This is incorrect. In the final version of the guidelines, junior doctors who object to ending the lives of patients are not obliged to find their own replacement; that is the responsibility of the senior clinician. Paragraph 29 reads: 'Junior doctors in this position must make their conscientious objection known to the doctor responsible for the patient's care who should then ensure that arrangements are made for another colleague to take over from the junior doctor.

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Problems with disposable laryngoscope blades

We report a case of failure of a disposable laryngoscope blade during emergency airway management. Following an uneventful elective septoplasty, a patient required emergency intubation in the recovery room. During direct laryngoscopy with a Penlon Crystal™

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Correspondence presented in any other style or format may be the subject of considerable delay and may be returned to the author for revision. *If the letter comments on a published article in Anaesthesia, please send three copies; otherwise two copies of your letter will suffice.*

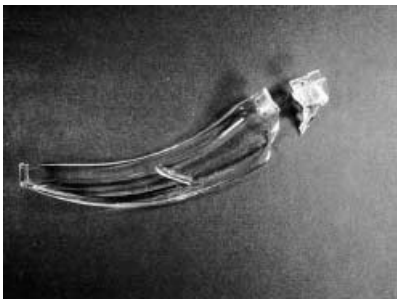

Figure 1

(Penlon Limited, Abingdon, UK.) disposable Macintosh 4 blade, the laryngoscope blade snapped (Fig. 1). Laryngoscopy with a standard reusable metal Macintosh blade was difficult and the patient's trachea was successfully intubated with an intubating laryngeal mask. The patient was transferred to the intensive care unit where he made an uneventful recovery.

The introduction of a variety of disposable laryngoscopes from various companies appears to have happened without rigorous assessment or comparison with traditional equipment. Two recent studies have endorsed the use of disposable equipment. In a study of only 100 patients, the Vital View™ (Vital Signs, New Jersey, USA) disposable laryngoscope blade was used as effectively as reusable equipment [1]. In a second study, the same disposable laryngoscope blade provided significantly higher illumination than a standard Macintosh blade with a blade cover [2]. This led the authors to recommend the use of disposable blades instead of reusable metal blades with disposable blade covers. However, problems with the quality and design of disposable laryngoscope blades have already been reported [3], and our case adds to this.

In January 2001, concerns about the theoretical risk of transmission of variant Creutzfeldt-Jacob disease (vCJD) led the Department of Health to advise that disposable equipment be used for tonsil surgery [4]. In December 2001, this advice was reversed following adverse events, including one death, associated with single-use surgical equipment [5]. However, the Royal College of Anaesthetists continued to advise the use of disposable anaesthetic equipment or equipment protected with disposable sheaths [6].

The unquantified and theoretical risk of transmission of vCJD needs to be weighed against the actual risk of complications resulting from the use of poor quality and untested disposable equipment. We believe that all disposable equipment should undergo rigorous evaluation and, until this happens, anaesthetist should use this equipment with caution.

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A reply

Thank you for the opportunity to reply, The event described was clearly a difficult intubation and I would like to recommend a size 4 McCoy laryngoscope for such a procedure than a single use laryngoscope.

Before being made available, the Crystal blades were tested to beyond 100 Newton (equivalent to 10 kg weight) at the tip of the blade under a variety of conditions. Unfortunately, in this case, it is likely that much higher forces were applied to the patient. Current products, including customers stock, are now manufactured form more resilient material than the blade used on this occasion. The new material is now nearly impossible to break.

The Crystal Single Use Laryngoscope represents an innovative and cost effective method of addressing intubation needs where caution is needed regarding infection control or any other times where single use blades are required.

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Time constant or half time of a breathing system?

At a recent meeting of the Association for Low Flow Anaesthesia (ALFA) a discussion arose as to which was the better way to describe the rate at which the anaesthetic concentration in a circle system changes in response to a change in the fresh gas concentration, the time constant (τ) or the half-time ($T_{1/2}$).

By convention, the rate at which the anaesthetic concentration in a circle system changes in response to a change in the fresh gas concentration is characterised by the time constant, which is calculated by dividing the volume of the breathing system (V_{BS}) by the fresh gas flow ($\dot{V}_F$) as follows:

(1) ..... $\tau = V_{BS}/\dot{V}_F$

After time τ, the anaesthetic concentration in the breathing system will attain 63% of its final value, after 2τ about 86% and after 3τ about 95% [1, 2]. However, for a given exponential function, τ bears a constant relationship to the half-time, which is the time taken for the concentration to achieve 50% of its final value. The precise relationship is as follows: [3]

(2) ..... $T_{1/2} = 0.693\tau$

Therefore, if we multiply both sides of equation 1 by 0.693, we get the following equation for the half-time of the breathing system:

(3) ..... $T_{1/2} = 0.693\ V_{BS}/\dot{V}_F$

Now consider the equation for half-time of an intravenously injected drug: [4]

(4) ..... $T_{1/2} = 0.693\ V_D/Cl$

This indicates that for a single compartment, the time taken for the plasma concentration of an injected drug to decrease to half of its initial value ($T_{1/2}$) is proportional to the volume of distribution (V_D) divided by the plasma clearance (Cl).

The similarity between equations 3 and 4 is striking. The volume of the breathing system V_{BS} clearly equates the volume of distribution of our anaesthetic agent if we consider the breathing system to be a single well-stirred compartment. But what about the relationship between the fresh gas flow and the clearance? It becomes clear that these are analogous if we consider what happens when we discontinue the anaesthetic at the end of the case. Under these circumstances, $\dot{V}_F$ can be considered to be the volume of gas in the breathing system that is cleared of the anaesthetic agent in unit time, i.e. the clearance of the breathing system.

I suggest that the use of the half-time to describe the rate of change of the anaesthetic concentration in a breathing system has the advantage of familiarity and provides a valuable link between the pharmacokinetics of inhaled and injected drugs.

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Magnetic resonance compatible equipment

The recent communication on MRI compatible equipment (Farling *et al. Anaesthesia* 2003; **58**: 86) gives some cause for concern. They bring to our attention the fact that some supposedly 'MRI compatible' monitoring equipment may have intrinsic ferromagnetic properties, which are potentially dangerous should the item come too close to the scanner. They are to be congratulated on sharing their experience; however, my concerns focus on two particular aspects: Why would they seek to place such a monitor within the specified danger zone in the first place?, i.e. less than 2.5 ft from the magnet in this case. Why was the make and model of device not specified, so that others could avoid the same mistake?

Having been responsible for equipping a new MRI installation to allow anaesthesia, my overriding philosophy has been one of caution and awareness on the part of all. This has been reflected by my insistence that any anaesthetic related equipment must meet the highest standards available and that all personnel must be specifically instructed as to the hazards of the environment they work in before entering the scanner room.

As a matter of principle, all extraneous equipment should always remain as far as possible from the magnet. We prefer this approach to the idea of specific 'Danger areas' marked on the floor, which may, as the authors unintentionally illustrate, give rise to a false sense of security and can easily be overlooked. Caution begins at the entrance to the scanner suit and should be maximal whenever entering the scanner room.

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A reply

Thank you for the opportunity to reply to Dr Train's comments. We debated long and hard whether or not to name the company who supplied the monitoring equipment. The decision not to name them was intended to ensure that individuals would confirm that their own equipment was being used appropriately, regardless of the make. In other words we did not wish to imply that only one item of equipment was subject to this particular danger. We feel justified in this approach because a similar incident has been reported in the *Discussion Forum* of the website of the British Association of MR Radiographers (http://www.bamrr.org.uk). This incident occurred with a different make of monitor to the one that we described! Anyone wishing to know details of the manufacturer involved in our incident should get in touch with us by E-mail: (peter.farling@dnet.co.uk).

We were not seeking to place the monitor close to the magnet. Perhaps it was unclear in our original letter that the incident occurred when the monitor was being moved to its operational position. The operational position is as far from the magnet as the length of leads and cables allow. The monitor is now stored is such a way as to avoid coming close to the magnet during transfer.

We applaud Dr Train's philosophy of caution and awareness. In fact we would encourage a high index of suspicion, if not paranoia, on the part of all those involved in the introduction of equipment into MR suites. For example, the *Knowledge Base* section of the BAMRR website described a problem relating to supposedly MR compatible fire extinguishers. When tested with a hand held magnet the cylinder of the extinguisher did prove compatible but the handle showed huge attraction! Continued vigilance is required to prevent the recurrence of such incidents.

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Thirteen centimetre central venous catheters, lucky for all?

There continues to be debate on the correct placement of central lines (Pollard & Johnson. *Anaesthesia* 2002; **57**: 1223). Some years ago in our intensive care unit we changed to 16 cm catheters because it had been shown that 20 cm catheters were very frequently placed into the heart [1,2]. However, despite this change, like Pollard [1], we found there was still a high incidence of intracardiac placement of central venous catheters.

As the average distance from the right internal jugular vein (RIJV) to the atriocaval junction is 16 cm [1], then if catheters are placed to 16 cm one would expect to find that half will be within the atrium. McGee [1] found that 7 of 38 (16%) 16 cm catheters placed via the RIJV and 4 of 18 (18%) via the right subclavian vein were intracardiac. Estimates from this work indicated that if central catheters are placed to 13 cm one could be 95% confident that the line will not be intra cardiac.

Therefore in December 2000 in Leicester the anaesthetic department adopted guidance that all right-sided catheters should be placed to a maximum insertion of 13 cm. Since that time, over 2000 catheters have been placed. The number of catheters that have been identified as having an intracardiac location has been less than 1%, and all of those have been placed more than 13 cm for various reasons (i.e. large patient, low approach). The simple step of placing right-sided central catheters to a maximum of 13 cm, virtually eliminates the risk of the catheter tip being intracardiac.

Left sided catheters are more complex, requiring negotiation of two junctions, and then aiming to be within a short length of superior vena cava (SVC). The distance to the heart from the left (IJV or SCV) being between 19 cm and 21 cm [2], it is relatively easy to ensure the catheter is clear of the heart with the usual length catheters. However, acute angulation of the catheter tip as it abuts the right lateral wall of the superior vena cava (SVC) is common. A review of the last 27 consecutive left-sided lines found that all were 16 cm long and none were intra cardiac using the carina as the landmark [3]. The catheter tips of the majority (70%) were closely adjacent and acutely angled towards the right border of the SVC. This abutment to the wall of the SVC was common in catheters placed anywhere between 13 and 16 cm. Two catheters had obviously damped pressures traces, presumably due to occlusion of the tip by the right lateral wall of the SVC. The best position is probably in the lower SVC, parallel to the wall of the SVC but still extracardiac. In the majority of patients catheters would have needed to be a 1–2 cm longer to be located in this ideal position.

It seems there is a fixation with the one-size-fits all mentality. In fact 16 cm catheters are too long for the right-sided approach, with the need to have 3 cm dangling from the patient, and too short for the left sided approach with acute angulation and risk of erosion of the SVC.

Ideally a 13-cm length of catheter could be used for right-sided access, reassured that intra cardiac placement is virtually eliminated. For left-sided access 16 cm catheters are too short. An 18 or 20 cm catheter would allow for placement to a range of positions guided by chest X-ray findings that simultaneously meets the needs to avoid either intra cardiac placement or SVC erosion and perforation.

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Critical incident involving an adjustable tracheostomy tube

A tracheostomy is a recognised aid to weaning from artificial ventilation. Many tracheostomies are now performed percutaneously in the intensive care unit, although some patients still require a formal tracheostomy. I would like to report a critical incident that occurred during such a procedure.

A 70-year-old woman was admitted to the intensive care unit following a cardiac arrest. Weaning from ventilation was complicated by recurrent pulmonary oedema, and a tracheostomy was planned. She was unsuitable for a percutaneous tracheostomy, as she had a previously unnoticed thyroid goitre, and a formal tracheostomy was performed in theatre. Intra-operatively, it was noticed that the distance from the skin to the trachea was greater than usual due to her goitre. The surgeon therefore decided to insert an adjustable tracheostomy tube (Portex – size 8 profile cuff, adjustable flange tube – see Fig. 2). On this tube, the position of the flange can be adjusted, altering the distance from the curve of the tube to the flange. The tube was placed through the tracheostomy and the flange adjusted to rest on the skin. As the tracheal incision was made at the third tracheal ring, we were concerned that the end of the tube might be impinging on the carina. This was confirmed using a bronchoscope, and the tube was withdrawn to lie with its tip 2 cm above the carina. The flange was readjusted to rest against the skin and was sutured into position using the anchor points supplied.

After completion of surgery, the tracheostomy tube was reconnected to our portable Oxylog ventilator. The ventilator circuit, which has a bulky

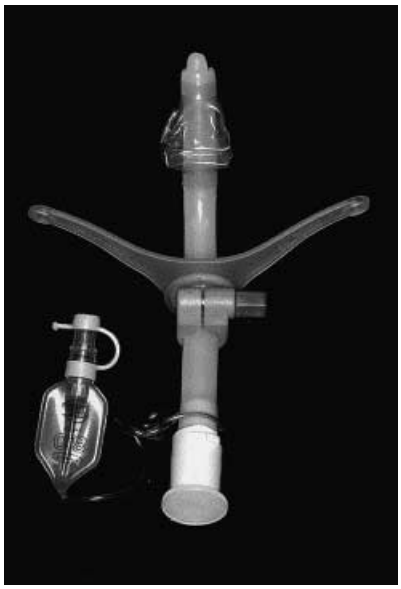

Figure 2

expiratory valve at the patient end, was attached via an HME filter. As soon as it was released, the weight of the valve-HME arrangement caused the tube to swivel in the saggital plane. I noticed that the flange was now approximately 2 cm from the skin. I deflated the cuff of the tracheostomy tube, and gently pushed it back into position. The cuff was re-inflated. The ventilator was disconnected and the patient reconnected to the anaesthetic machine. Expired CO_2 could not be detected, and hand ventilation proved impossible. As the oxygen saturation was beginning to fall, the tracheostomy tube was removed and the patient was re-intubated with a size 8 tracheal tube. Hand ventilation was then easy, and a normal Portex tracheostomy tube was placed uneventfully.

A number of factors contributed to this critical incident. The tracheostomy was relatively low, which meant that the tip of the tube impinged on the carina and had to be withdrawn. The amount of tube protruding from the skin was increased, adding to the torque on the tube when the ventilator tubing was attached. I postulate that withdrawing the tube also caused the preformed curve to lie within the subcutaneous tissue between the skin and the trachea and the length of tube within the trachea was reduced. It is likely that this reduced the stability of the tracheostomy further. Also, unlike on non-adjustable tracheostomy tubes, the plastic attachment flanges on this model of tracheostomy tube do not leave the stem of the tracheostomy at 90 degrees but at an angle. They are longer than those seen on the non-adjustable tracheostomy tube and when sutured to the skin they lie approximately 1.5–2 cm caudad to the tracheotomy incision. This has the advantage that they do not lie immediately over the skin incision of the tracheostomy but it means that the tube can more easily rotate in a saggital plane and become displaced.

Two points can be drawn from this case. Firstly, I believe the design of the adjustable flange tube as described above provides less stability than with a non-adjustable tube. Second, it reinforces the need to carefully select the tube required and only use an adjustable flange tube when absolutely necessary. Tracheostomies are often performed for patients who are returning to the intensive care unit where ventilator tubing, HME filters and suction apparatus are attached to the tracheostomy. This, combined with relatively awake patients can lead to considerable torque on the tracheostomy tube, and an increased risk of displacement. If it is necessary to use an adjustable flange tube, I would urge readers exercise extra vigilance, as it was only prompt action that avoided disaster in this case.

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Oxygen failure alarms

A recent letter (Andrzejowski & Freeman. *Anaesthesia* 2002; **57**: 931–2) describes a problem with detecting a failure of oxygen supply and the alarm presented by the Aestiva™ anaesthesia machine. The authors ultimately discovered a faulty Schräder valve to be the root cause. The authors suggested that the old-style whistle alarm was more 'intuitive' than the 'No O_2 Pressure' alarm incorporated into the Aestiva™. Datex-Ohmeda would like to respond to this letter.

Technological evolution increased the quantity and improved the quality of anaesthetic machine and physiological monitoring alarms. Unfortunately, the current number and type of alarms challenges the users' ability to understand them by sound alone. Recognizing this problem, the European Harmonised Standard EN 475 [1] classified electrically generated alarms by dividing these into informational notices, low priority alarms, medium priority alarms, and high priority alarms. From its inception, the Aestiva™ has conformed to this vital standard and is able to alert (acoustically) and inform (with text messages) the user about what has occurred.

The desaturation encountered by Andrzejowski is a constant concern. While it may occur as a consequence of normal anaesthetic technique [2], patient transfers require special consideration. As described by the authors, this case involved moving a patient from the induction area to the surgical suite. Adequate preparation to minimise desaturation may include adequate denitrogenation [3] and oxygenation [4] prior to induction and ventilation during the transfer. Even without manual ventilation, diffusion oxygenation [5] delays desaturation. These efforts are of little value, however, if the anaesthetic machine in the surgical suite is not turned on and adequately prepared.

To prepare the machine, it must undergo a complete checkout prior to use. An Aestiva™ specific pre-operative checkout [6], based on the recommendations of the United States Food and Drug Administration [7], is included with each new Aestiva™ purchased. Performing a pre-operative checklist will reveal the absence of oxygen pressure described in the Andrzejowski letter. Such a condition can then be rectified prior to the induction of anaesthesia.

Had the anaesthetic machine been turned on prior to the transfer in the case described, it would have generated a high priority alarm, which cannot be silenced. This alarm would have been sounding upon entry into the surgical

suite. Since, as described in the letter, no patient monitors would have been attached, the clear high priority alarm would have notified the user of a need to address one of the high priority alarms on the Aestiva™.

Aware of the number of nuisance alarms, Datex-Ohmeda also implemented an 'End Case' feature into the Aestiva™. This feature suspends all alarms upon ending any case; 'No O_2 Pressure' is not included in this feature. To silence a 'No O_2 Pressure' alarm the user must re-establish a satisfactory oxygen supply.

Finally, with respect to the whistle-type alarm, such alarms only sound when O_2 pressure is lost; not when O_2 pressure is absent. The authors recounted that the Aestiva™, despite the number and complexity of high priority alarms, successfully generated a 'No O_2 Pressure' alarm. This alarm requires minimal intuition on the part of the user; rather, it is direct, emphatic, and without equivocation.

In their conclusion, the authors point out that 'Departments using anaesthetic machines without oxygen failure whistles should be aware that their absence increases the difficulties in troubleshooting machine failures.' As outlined in this response, Datex-Ohmeda cannot agree with this conclusion. Nonetheless, the statement does speak directly to the need that everyone practicing anaesthesia have a full working knowledge of the anaesthetic machine, participate in in-service training programs, perform an approved pre-operative anaesthetic machine checklist, and understand the alarm systems employed by the machine.

Datex-Ohmeda agrees that users must be fully trained in the use of modern anaesthetic machines and must maintain familiarity with technological advances in these machines.

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Lingual tonsil hypertrophy with difficult airway and uncontrollable bleeding

Intra and postoperative haemorrhage is one of the major side-effects of tonsillectomy; the incidence requiring surgical control ranges between 2 and 20% [1,2]. Sometimes, massive bleeding has occurred that requires ligature of the external carotid artery (0.09%) [1] or lingual artery embolisation [2]. Henderson [3] has pointed out the risk of bleeding from hypertrophic lingual tonsil (LT) during attempted intubation; while Salvi [4] reported bleeding caused by failed intubation (though the origin of bleeding was unknown). Although postoperative haemorrhage following tonsillectomy is not rare, there is no report of postoperative haemorrhage after lingual tonsillectomy. This is a first report of uncontrollable bleeding from hypertrophic LT causing difficult airway management during and after tonsillectomy.

An 11-year-old-female whose medical and surgical history included uncomplicated palatine tonsillectomy aged 5. She presented with dyspnoea on effort, a sore throat, globus sensation, recurrent fever, and sleep apnoea. Awake tracheal intubation with a fibrescope under propofol conscious sedation was tried, with the stand by of emergent tracheostomy. The procedure was extremely difficult because of a narrow oropharyngeal space (Fig. 3). Multiple attempts at fibrescopic insertion were unsuccessful. Traumatic oozing from the surface of the LT made the fibrescopic view worse. Furthermore, the patient was coughing due to excessive bloody saliva. Finally, intubation was successful and the operation performed. The measured operative blood loss was 126 ml. Pre- and postoperative haematocrits were 39.6 and 34.0%, respectively. It was revealed later by chest X-ray that she aspirated a lot of blood during the awake intubation. After the operation, she remained intubated to maintain the airway in the face of glottic oedema.

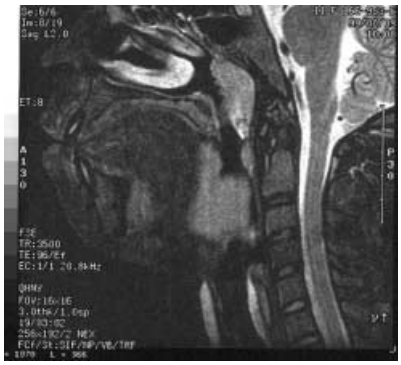

Figure 3 MRI of lateral view of neck, which shows a large mass at the base of the tongue with a narrow airway space.

Occult re-bleeding was recognised in the Intensive Care Unit 4 h post surgery with about 300 ml found in her mouth. Her haematocrits was 32% at this time. She was returned to theatre to obtain haemostasis. However, the operator was unable to find a bleeding point. Two days later she was extubated. She was aphonic for 3 days, and, hoarse for a further week., The LT is a normal anatomical component of Waldeyer's ring, which consists of uncapsulated lymphoid tissue located at the base of the tongue between the epiglottis posteriorly and the circumvallate papilla anteriorly [5,6]. Hypertrophic LT is fragile on contact. Anatomically, LT has no capsule, in contrast to an encapsulated palatine tonsil. Therefore, complete surgical extirpation is difficult because of no margin between the

tonsil and its bed., In conclusion, bleeding can complicate the airway management of LT hypertrophy during and after surgery.

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Laryngoceles and the laryngeal tube

The laryngeal tube (LT) [1] is a relatively new device for airway maintenance during elective surgery. It has two cuffs – one pharyngeal and the other oesophageal, which effectively seal the hypopharynx when properly placed [2], such that the hypopharynx communicates only with the larynx. This has the advantage of preventing aspiration of stomach contents and allows the use of high airway pressures (up to 40 cmH_2O) [3] during controlled ventilation, but can at the same time prove deleterious as illustrated by the following case report.

A 14-year-old girl (35 kg, 144 cm), ASA I, was scheduled to undergo reconstructive hand surgery. After consent from the patient's guardians, a LT was chosen to maintain the airway during surgery. After adequate pre-oxygenation, anaesthesia was induced with thiopental 5 $mg.kg^{-1}$, and after muscle relaxation with vecuronium 0.1 $mg.kg^{-1}$, a size 3 LT was inserted and its cuffs inflated in accordance with the manufacturer's specifications [4]. The lungs were ventilated with halothane 0.5% in a 50 : 50 oxygen and nitrous oxide mixture, with an airway pressure of 24 cm H_2O. Two minutes later, bilateral neck swellings in the infra hyoid region became apparent. Alarmed by these, the decision was made to remove the LT, although there was no problem with lung ventilation and the SpO_2 was 100%. The lungs were ventilated with a facemask while a 6-mm tracheal tube was prepared for intubation. During mask ventilation, the neck swellings increased and collapsed with positive pressure. The tracheal tube was subsequently inserted using a Trachlight™ and the rest of the surgery was uneventful. Postoperatively the patient recovered satisfactorily, but the patient's guardians refused any further investigations.

We believe that the lateral neck swellings were a previously undiagnosed laryngoceles. The properly placed LT allowed the high airway pressures to be transmitted to the larynx, thereby exposing the laryngoceles.

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Gum elastic Bougie and simulated difficult intubation

The recent article (Annamaneni *et al. Anaesthesia* 2003; **58**: 45–9) elegantly demonstrates the conundrum of a superior, but potentially contaminated, multi-use device (such as the gum elastic bougie) versus a sterile, single-use introducer. The authors also point out that anaesthetists are 'blinded to success' when attempting to insert a bougie in many situations of difficult intubation. Success is only confirmed either, as in their study, by direct visualisation of correct placement in the manikin, or in the clinical situation by the 'gold standard' method of the detection of carbon dioxide in expired gas following placement of the tracheal tube over the bougie. However, Millar *et al.* have pointed out that the familiar gum elastic bougie is, in fact, hollow [1]. When the bougie is connected to a carbon dioxide analyser and placed in the trachea, even in an apnoeic patient prior to intubation, carbon dioxide is detectable and thus confirms correct position of the bougie. Anaesthetists will be only too well aware that in the most difficult intubations it is not possible to see where the tip has gone and valuable time wasted whilst a tracheal tube is possibly inserted into the oesophagus. The success rates of 85% and 15% for the multi and single-use devices in the paper by Annamaneni *et al.* emphasises the problem.

Independently of Millar *et al.*, I have developed a new device, which I have called the 'Intelligent bougie' [2]. It is hollow but also contains a malleable nylon stiffener throughout most of its length. By attaching a capnography tube to the luer tip of the bougie during insertion at laryngoscopy, I have been able to demonstrate correct placement

of the bougie by detection of carbon dioxide in the trachea. In more than 40 cases, carbon dioxide was detectable within 2–3 sec of the tip entering the larynx. In five of these cases, the trachea was not visible and it was only the presence of carbon dioxide that immediately confirmed correct placement. Although this confirms the results of Millar *et al.*, mine are possibly superior to his due to the fact that the bougie has been specially designed for this use. Thus it is possible to have a single-use device, which is, I believe, superior even to the multi-use gum elastic bougie. A patent has been applied for [3].

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Time to switch to disposable bougies

The gum elastic bougie is undoubtedly a useful aid to intubation, although recently concerns have been raised over the potential risk of cross infection when using the device [1]. This concern is the same as that raised for many reusable items of equipment in anaesthesia and in medicine generally, which has caused a move towards the use of disposable equipment. Disposable bougies have now become available, though the extent of their use in the UK is unknown. Some have criticised the single use device suggesting that it is less effective for difficult intubation [2].

Currently in our hospital, we only use the Eschmann re-usable type of bougie. We monitored the use of bougies in our eight-theatre hospital over a 4-week period and found that they were used on 21 occasions during this time. Extrapolated over a year, the figure comes to about 250. Given that each bougie is designed to be used only 5 times and then disposed of, this equates to a need to replace a total of 50 bougies at an annual cost of £1508 inc. VAT (unit price £30.50). This compares with an annual cost of around £2,125 were disposable items to be used (based on a unit price of Portex disposable bougie of £8.50 in VAT). Given that over a 12 month period in our trust we ordered only 29 bougies, this would suggest that each bougie was used on average a total of 8–9 times prior to disposal, well above the manufacturers recommendations [3].

With this discrepancy in mind, as well as other issues relating to the use of bougies, we undertook a telephone survey of gum elastic bougie usage in our region comprising a large teaching hospital, two large and five smaller district general hospitals. We telephoned the head ODA in each hospital asking eight questions relating to the use of bougies.

Our survey showed that the majority of hospitals have a combination of Eschmann reusable and Portex single-use bougies available. A wide variety of cleaning and sterilising measures were in place, none of them directly in line with the manufacturers' recommendations. These included ethylene chloride, 'Betadine', Chlorhexidine, 'Sterilox', cold water cleaning and standard autoclaving. Worryingly, two hospitals admitted to only washing off the surface soiling under a running tap! Half the units questioned were unaware that the re-usable device is designed to be used only 5 times, and no unit had any method in place of determining the age/history of a given bougie, most stating that the suitability of the device for further usage was 'end-user determined'. Most units said they performed a visual inspection prior to use, looking for cracks in the outer resin coating, a well recognised complication of their repeated use [4]. Half the units stated that they were aware of evidence linking the use of bougies with the potential for cross infection between patients, and of those that were unaware, most were unsurprised by the suggestion. Half of the units said they had plans to change to single use disposable bougies, though the majority said that no cost analysis had been done. Finally, of those units using both Eschmann and Portex devices, only two units said that there was any preference amongst senior anaesthetists, that being for the Eschmann device.

It is clear that there is a wide variation in the methods currently employed to clean and sterilise bougies throughout our region and this, along with the fact that there is currently no accepted way or determining the age of a given bougie, are the most startling results of our survey. It is also apparent that despite the increased costs most departments have accepted that it will be necessary to switch to disposable items. This move seems well overdue given the potential risk to patients where bougies have been repeatedly overused.

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Unexpected difficult airway

Anticipated difficult airway is rarely a problem. On the other hand unexpected difficulty can be a challenge and is a test of the skills of the operators involved. We wish to record a case of a difficult airway, which we experienced during an elective operating list.

A 67-year-old-man was admitted to our hospital complaining of pain in the

throat. He was listed for direct laryngoscopy and possible biopsy of a lesion over the epiglottis. There was no history of hoarseness of voice, stridor, shortness of breath, or a cough. The airway was assessed pre-operatively and was classed as Mallampati 1. The consultant anaesthetist involved did not encounter any problems with airway management at that time. A small growth was seen on the ventral surface of the epiglottis. A biopsy of the tumour was taken and the patient made a full recovery.

He was listed for laser surgery a fortnight later, reviewed again by the consultant anaesthetist and as his condition had not deteriorated, airway management was expected to be routine. Anaesthesia was induced with propofol and remifentanil, and the patient's lungs were manually ventilated before we administered a neuromuscular blocking agent (atracurium). But soon after atracurium was administered, ventilation became impossible. An oral airway did not improve the patient's condition. The introduction of a laryngeal mask airway made the situation worse as the airway became totally obstructed. On laryngoscopy, we could not visualise the vocal cords as the epiglottis had prolapsed, sealing the laryngeal opening. The patient desaturated rapidly (45%) and he became progressively cyanosed. The laryngeal mask was reinserted and we managed to get some oxygen into his lungs and saturation improved slightly. Given the situation, we decided that a cricothyroid puncture would be appropriate. A 14G venflon was introduced into the cricothyroid membrane and the patient was oxygenated using a Sander's jet. The saturation gradually improved to 90% and laryngoscopy was attempted again. On this occasion, we could hear a hissing noise and were able to see bubbles of air escaping from the larynx.

As laser protected tracheal tubes have thicker walls, we used a size 4.5 mm internal diameter (external 7.0 mm) laser tube. The standard gum elastic bougie will not pass through the small laser tubes and the paediatric bougie is not long enough for adult tubes. Airway exchange catheters and Aintree catheters have larger diameters too. Therefore the only option available to us was to use an oesophageal dilator. A size 10F dilator was passed beyond the obstruction and the laser tube was railroaded over and the airway secured (Fig. 4). The tumour measuring 2.5 cm × 2 cm (Fig. 5) was removed successfully and the patient made a full recovery. He was discharged from hospital on the third postoperative day.

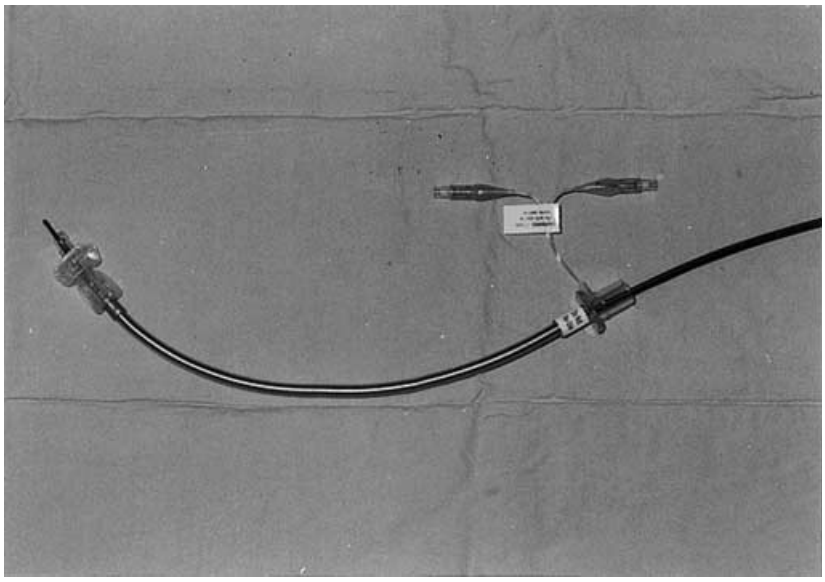

Figure 4

Our case clearly demonstrates that difficulties with a patient's airway can arise at anytime. We were not expecting any problems with our patient as he had undergone surgery only two weeks earlier and his symptoms had not changed. The same consultant anaesthetist was involved on both occasions. The only explanation we can offer is that the tumour had 'grown' in the space of two weeks and had weakened the epiglottis, causing it to prolapse at induction. Fortunately, we managed to secure the airway and proceed with surgery.

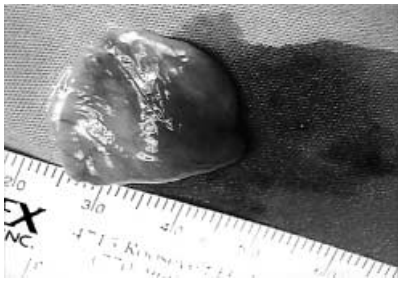

Figure 5

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Use of the laryngeal tube during cardiopulmonary resuscitation by paramedical staff

Because of the ease of insertion and a good airtight seal [1–3], the Laryngeal Tube (VBM, Germany) may have a potential role in airway management during cardiopulmonary resuscitation [1,2]. There has been report of such a case used by a physician [4]. Previously, we reported that all the 28 Fire Defense Academy students who had only had experience with the laryngeal mask airway, could insert the laryngeal tube at the first attempt in manikins; the majority of participants stated that its insertion was easier than insertion of the

laryngeal mask [5]. We report the initial five uses of the laryngeal tube during cardiopulmonary resuscitation by paramedical staff who have been allowed to use the laryngeal tube (in addition to the laryngeal mask, Combitube, but not a tracheal tube).

After training in its use at our hospital, paramedical staff used the laryngeal tube during cardiopulmonary resuscitation. No attempts were made if patients had vomited, suspected of a cervical spine injury, drowning, having an asthma attack or mechanical airway obstruction. In the initial five patients, cardiopulmonary resuscitation was started and a laryngeal tube was inserted. Manual ventilation was possible without an air leak around the device at the first attempt of insertion in four patients, and after the second attempt in one patient (although in another patient, the addition of air to the cuff was required to obtain an airtight seal). The chest expanded well in four of five patients. During the transport of the patients to the hospital, cardiac massage was continued, and the laryngeal tube was used for 8–30 min without airway obstruction or vomiting, until the trachea was intubated. In the remaining patient, ventilation was not satisfactory. In this patient, ventilation attempts using a self-inflating bag and mask (before insertion of the laryngeal tube) were associated with moderate to mild difficulty in expanding the chest. After insertion of the laryngeal tube, there was no air leak around the cuffs, but there was still difficulty in expanding the chest. There was no further airway obstruction during transport of the patient by an ambulance car, but when the patient was transported to an emergency department trolley, it became moderately difficult to ventilate the lungs. The laryngeal tube was removed and the trachea was intubated by a physician 15 min after insertion of the laryngeal tube. There was no improvement of ventilation through a tracheal tube, indicating airway obstruction beyond the trachea.

We believe that, although the laryngeal tube may share similar possible limitations with the laryngeal mask [6], it has a potential role in providing a clear airway during cardiopulmonary resuscitation.

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Failure of prefilled propofol syringe

We wish to report an event that occurred in our anaesthetic department involving malfunction of a prefilled propofol syringe resulting in a failure to deliver total intravenous anaesthesia (TIVA) and thus possible patient awareness.

A patient was to be anaesthetised for a laparoscopic cholecystectomy using TIVA with prefilled propofol 1% Diprivan syringes (Astra Zeneca), delivery controlled using the Fresenius Diprifusor Target Controlled Infusion (TCI) syringe pump. The TIVA tubing was connected to the patient via a non-return valve and three-way tap. The patient was then induced uneventfully and intubated following atracurium 0.5 $mg.kg^{-1}$ and alfentanil 1 mg. After 35 min, the patient's blood pressure had risen from a steady post induction 90/50 mmHg to 170/110 mmHg. The heart rate had increased from 55 to 65 $beat.min^{-1}$. There were no other signs of inadequate anaesthesia. All connections in the TIVA circuit were checked and no disconnection or mal-infusion was identified. Analgesia was provided with intravenous morphine and the TCI increased from an initial 3.8–5.5 ($g.ml^{-1}$. Five minutes later, a click was heard from the Diprifusor and it was found that the plastic flange (containing the blue identification microchip) had become disconnected from the glass syringe. As the clamp was no longer holding the syringe, the syringe and plunger were being pushed as a unit by the syringe pump with no administration of propofol to the patient. (Fig. 6). In fact, the clamp had served to hide the fault. (Fig. 7).

At this time, the syringe/plunger unit had been displaced approximately 30 mm indicating that approximately 150 mg of propofol had not been infused. On identifying this, the patient was immediately given a bolus of propofol 75 mg and alfentanil 1 mg before TIVA was recommenced with a new syringe.

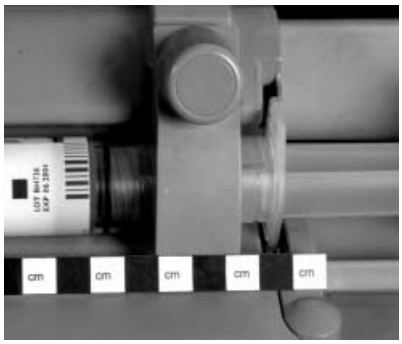

Figure 6 Flange is disengaged from the main glass syringe.

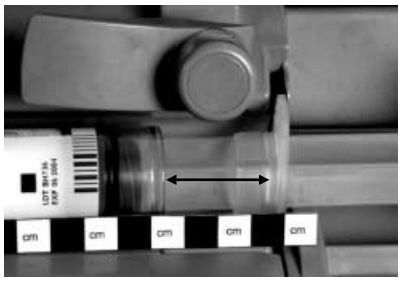

Figure 7 Clamp hides the fault.

During the same list, the problem recurred with a different patient and a different prefilled syringe of Diprivan 1% from the same batch (Lot BH736 Exp 06 2004). Other prefilled syringes from the same batch were checked and all flanges were found to be loose and easily detached from the main glass syringe. Pre-filled syringes from three other batches were checked and the flanges were much harder to detach and resisted rotation to a much greater degree.

In an attempt to establish the cause, the internal diameter of a glass syringe from the affected batch as well as that from an unaffected batch was measured using a standard industrial micrometer and found to be within 0.07 mm of each other. The plastic inserts were similarly measured. That from the affected syringes was found to be approx 0.3 mm smaller than its unaffected counterpart. We concluded that it was the plastic flange assembly that was the cause of the problem.

As a separate exercise, a total of eight tests were performed using four syringes from the faulty batch, which were then tested in four Fresenius Diprifusor and four Graseby 3500 Diprifusor pumps. None of these were connected to a patient. We set these to deliver an induction level of 6.0 ($g.ml^{-1}$ to a standard 40-year-old, 70 kg patient. The initial rate for both brands was 1200 $ml.h^{-1}$. The syringes were not attached to any tubing and so were fully occluded. Only one Fresenius and one Graseby 3500 Diprifusor pump indicated immediate occlusion. The other three Fresenius Diprifusor pumps indicated delivery of 17.7 ml, 20.0 ml and 17.5 ml, before indicating a misplaced syringe. The three Graseby 3500 Diprifusor pumps implied 7.5 ml, 7.5 ml and 7.6 ml, respectively, had been delivered before they too indicated a displaced syringe. Graseby pumps have much narrower syringe clamps and so detected misplacement much earlier. This demonstrates a design flaw by which TIVA delivery via the Diprivan Diprifusor may fail, and yet not be immediately obvious. We are not familiar with other similar cases. Astra Zeneca were contacted immediately and the defective batch withdrawn from local hospitals that day.

We would like to make the following suggestions to help others avoid a similar experience:

1 Check syringes before using or assembling. We would suggest:

The plastic flange should not be easily detached from the syringe using reasonable attempt to prise either side out (Fig. 8). The plastic flange should not rotate easily in the glass syringe but should be held firmly in place.

2 Check syringe and assembly regularly throughout anaesthesia and listen out for any abnormal 'clicks'. The fault is more easily hidden in pumps with a wider clamp that obscures any detachment (Fig. 7), and the syringe needs to travel much further before activating the misplacement alarm.

The manufacturers and suppliers of syringes and their patented pumps are under an obligation to ensure that mechanical assembly and manufacturing faults are minimised. However, in the immediate clinical setting, it is the anaesthetist who is legally responsible and it is the patient who suffers. Ideally, we need failsafe pumps and syringes to prevent a similar event happening at all. We also need reliable alarms to detect problems early when they do occur. We hope Astra-Zeneca act soon to prevent this problem recurring.

Figure 8 Moderate force is required to disengage the plastic flange from the glass syringe.

There is no easy mechanism by which information such as this can be rapidly disseminated to practising anaesthetists. Manufacturers and suppliers need to be able to withdraw and replace faulty stock with absolute minimal delay and ensure that any mishaps are communicated to the professional community immediately.

In the meantime, when using TIVA, especially in the paralysed patient, we need to be vigilant for signs of inadequate anaesthesia.

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A reply

AstraZeneca would like to thank Dr Browne for reporting this issue and providing the details of his case. Additionally, we would like to share with your readers the actions already taken to resolve this problem.

AstraZeneca became aware in December 2002 that there was a small risk that the plastic flange (finger grip) at the rear of the glass barrel on some batches of 'Diprivan' prefilled syringe (PFS) can become detached during use in a syringe-driver pump. We believe the problem occurred as a result of some minor dimensional changes made to the flange during the manufacturing process in order to minimise the incidence of syringe cracking. Even with these changes the force required to detach the flange remained well within our specifications.

AstraZeneca informed the regulatory authorities of this problem, and with their agreement, has moved rapidly to both manage the situation and to rectify the problem. In the UK and several other countries a 'Drug Alert' was immediately sent out to all anaesthetists and other relevant health care professionals who might use the affected product. We informed them of the problem and advised them to maintain an increased level of vigilance if they chose to use a 'Diprivan' PFS and to ensure that the

syringe/pump assembly and patients were monitored closely at all times.

Factors that influenced AstraZeneca's response to this situation included:

The low level of reported detachments.

If the flange detached during use and the problem was spotted quickly, there was no risk to patients.

The timelines for manufacture of an alternative flange were brief and stocks in most areas were low.

In affected markets, AstraZeneca obtained agreement with the local Regulatory Authority as to the actions that were taken.

At the time of writing this response (16th January 2003), in the UK and most other countries, stocks of 'Diprivan' PFS in the supply chain had been replenished with batches of product unaffected by this issue. AstraZeneca closely monitored the situation during the months that the issue was active, and continue to do so following rectification, to ensure that further action is not required.

With regards to the checking procedure suggested by Drs Ward, Browne and Lim in their letter, the user should be aware that there is a risk of fracture to the glass syringe barrel and possible injury to the tester. There is also a risk that the procedure may render subsequent detachment of the finger grip more likely.

Patient safety always remains of paramount importance to AstraZeneca; the rapid actions taken by AstraZeneca with regard to this issue were those it believes minimised the risk to patients.

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Operative ascitic drainage in a patient with primary intestinal lymphangiectasia

A 20-year-old, 74 kg woman with primary intestinal lymphangiectasia (IL) presented for open drainage of massive ascites. Seven months previously, she had undergone pericardiectomy and pleurectomy, to relieve pericardial and pleural effusions, and had had a Denver peritoneovenous shunt sited surgically; postoperatively, she had developed pulmonary oedema, related to peritoneovenous autotransfusion, requiring 3 days of intensive care therapy before extubation. She was not breathless at rest, but felt breathless and nauseous when supine. Her serum albumin level was 19 gl^{-1}. Preoperative echocardiography was normal, but pleural effusions were seen bilaterally in the lower third of the pleural cavity on an erect chest radiograph.

After placement of standard monitoring equipment, an 18G cannula was inserted into the right external jugular vein. After pre-oxygenation, with the patient semisupine, general anaesthesia was induced with midazolam 2 mg, fentanyl 100 μg and propofol 100 mg. Bag/mask ventilation was straightforward, and vecuronium 6 mg was administered. The patient was intubated with a 7-mm cuffed oral tracheal tube, correct placement being confirmed by auscultation, and the lungs ventilated using a Draeger Julian ventilator attached to a circle breathing circuit. Both a 20G radial artery cannula and a quadruple lumen left internal jugular catheter were inserted. The patient was carefully positioned fully supine. Anaesthesia was maintained using isoflurane 1–2% in a 50 : 50 air and oxygen mixture. Ondansetron 4 mg and coamoxiclav 1.2 g were administered. Unsurprisingly, airway pressures were initially high (45cmH_2O), with a low measured lung compliance (12 ml.cmH_2O^{-1}), and a central venous pressure of 8cmH_2O. Chylous fluid (18 l) was drained from the peritoneal cavity, and the Denver shunt repositioned. Subsequently, the airway pressure fell to 35cmH_2O, with improved airway compliance (20 ml.cmH_2O^{-1} – still poor and attributed to bilateral pleural effusions) and reduced central venous pressure (1cmH_2O). Warmed Hartmann's solution (1 l) was infused intravenously throughout the 45 min procedure. The patient was extubated uneventfully, in the sitting position. Patient-controlled morphine analgesia was administered postoperatively. She was discharged from hospital after a week.

Intestinal lymphangiectasia is a protein-losing enteropathy characterised by abnormal dilated lymphatic channels in the small intestine, resulting in ascites, hypoproteinaemia, oedema, malabsorption and lymphocytopoenia [1,2]. Primary IL is a generalised congenital disorder of the lymphatic system, associated with peripheral oedema and abnormal thoracic lymphatics. IL may occur secondary to a number of causes of obstructed intestinal lymphatic flow, including lymphoma, tuberculosis and radiotherapy [3]. Surgery for primary IL is only indicated for symptomatic relief; pericardiectomy and pleurectomy may relieve pulmonary oedema and pleural effusions, and improve breathlessness [4]. Insertion of a peritoneovenous shunt reduces the accumulation of ascites, further improving respiratory function while reducing hypoproteinaemia, and is considered when conservative therapies (diet and diuretics) are ineffective [5].

There are several anaesthetic considerations in patients with primary IL who present for surgery. Peripheral venous access may be difficult due to oedema; central venous access should acknowledge the presence of a peritoneovenous shunt. The supine position increases the risk of gastric aspiration; in addition, respiratory function is compromised by gross ascites and pleural effusions, necessitating thorough pre-oxygenation, intubation, and ventilation to high airway pressures. Operative decompression of ascites or pericardial effusions may reveal relative hypovolaemia, but intravenous fluids should be administered cautiously in the presence of hypoproteinaemia, particularly if autotransfusion is to be expected after shunt insertion. Drug administration should take into account both the patient's 'dry' weight (estimated as 45 kg in this case, secondary to malabsorptive growth retardation), and altered pharmacokinetics, consequent to hypoalbuminaemia. Lymphocytopoenia demands scrupulous maintenance of sterility in invasive procedures, and the administration of appropriate antibiotic therapy.

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An unusual anaesthetic for a through-knee amputation

A 41-year old, 79 kg woman with exudative elephantiasis of the left leg presented for through-knee amputation. In 1994, she had developed complex regional pain syndrome type 1 in the leg, after a minor injury. Elective immobility had resulted in gross occlusive lymphoedema of the leg. She had finally agreed to amputation, to avoid the risk of gangrene. She regularly attended a chronic pain clinic and had received a diagnosis of 'whole-body reflex sympathetic dystrophy'. A number of analgesic interventions had been tried without success; eventually, a spinal cord stimulator had been fitted, and she remained reasonably pain-free pethidine on 550 mg a day. She refused epidural anaesthesia, agreeing only to patient-controlled pethidine analgesia (she declared herself resistant to fentanyl and morphine, and allergic to diclofenac and codeine phosphate). She was extremely knowledgeable about her condition, and demanded ketamine anaesthesia and intra-operative intravenous magnesium infusion.

After placement of standard monitoring equipment, a 20G cannula was inserted into the dorsal venous plexus of the right hand. After pre-oxygenation, general anaesthesia was induced with midazolam 4 mg, fentanyl 100 μg and ketamine 140 mg. Bag/mask ventilation was straightforward, and vecuronium 6 mg was administered. The patient was intubated with a size 7 cuffed oral tracheal tube, correct placement being confirmed by auscultation, and her lungs ventilated using a Draeger Julian ventilator attached to a circle breathing circuit (delivering a 50 : 50 air:oxygen mixture). A 14G cannula was inserted into the left forearm. The patient was carefully positioned, supine. Anaesthesia was maintained by infusing ketamine (100 $mg.h^{-1}$), and remifentanil (0.16 $\mu g.kg^{-1}.min^{-1}$). Pethidine 100 mg, ondansetron 8 mg and coamoxiclav 1.2 g were administered intravenously. Magnesium sulphate 2 g in 1 litre of warmed Hartmann's solution were infused throughout the 90 min procedure. The patient was extubated uneventfully. She did not experience any adverse ketamine-related psychological sequelae. Excellent postoperative surgical pain relief was achieved by patient-controlled pethidine analgesia (10 mg boluses every 5 min, maximum 200 $mg.h^{-1}$), together with regular oral paracetamol. Twice-daily magnesium infusions were continued for 5 days postoperatively. She was discharged from hospital after 2 weeks.

Total intravenous anaesthesia using ketamine and remifentanil provided good intra-operative cardiovascular stability in this patient. There was minimal change in the heart rate during either the initial skin incision or periosteal manipulation, which may be attributable to the analgesic effects of both drugs. Emergence phenomena may have been avoided by the administration of midazolam (interestingly, the patient was also taking clonazepam 4 mg daily). Indeed, her request for ketamine infusion was not unreasonable – intravenous, subanaesthetic doses of ketamine, a N-methyl D-aspartate (NMDA) receptor antagonist, diminish neuropathic pain, although unacceptable side-effects (sedation and hallucinations) make such treatment clinically irrelevant [1,2]. Similarly, the presence of a centrally positioned magnesium ion blocks NMDA receptor activity, suggesting that supplemental magnesium may prevent nocioceptive–associated central sensitisation in neuropathic pain [3]. Magnesium sulphate infusion has also been shown to reduce postoperative analgesic requirements, which may have benefited this patient [4].

Anaesthesia does not have to be prescriptive in nature. Although the minutiae of anaesthetic interventions and drug use are alien to the majority of people, the autonomous patient remains entitled to define their own interests. Anaesthetists, when obtaining consent for anaesthesia, should regard the process as a stimulus for fluid reciprocal discussion with patients about treatment options [5], and providing that the patient requests safe therapy that is in their best interests, efforts should be made to comply with their requests.

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Different clocks, different times …

Within obstetric units much attention is paid to recording time during patient care. Time is used as a marker of quality of patient care, e.g. the 'decision-delivery time interval' for Caesarean section [1,2]. In risk management team meetings, the timed course of events is often critically reviewed in the risk analysis. However, within an obstetric unit there are a variety of clocks and watches available, each of which may be used as the time reference. Given the importance of accurately and consistently recording time, we decided to survey the number and accuracy of clocks and watches available on our obstetric unit. To do this, we took as our reference time the BBC clock on the Internet to which we synchronised a wristwatch. The time on this wristwatch was compared to the time recorded on the other clocks and watches available on the delivery unit and the difference recorded. Our findings are shown in Table 1.

We found that there were a large number of clocks and watches available and used within our unit. In general, the differences in the times recorded were small but there were examples of large differences in time, which if combined could produce a difference of 10 min or greater. The largest differences were found in wall clocks and the smallest differences were found between personal watches.

To help synchronise and improve the accuracy of time recorded in our unit we are intending to introduce radio controlled wall clocks that are synchronised to signals received from the Rugby MSF transmitter in the UK [3]. The signal is generated at Rugby using the atomic clocks and time code equipment provided by the National Physical Laboratory.

Therefore, different clocks will have the same time…

Table 1 Time differences in the delivery unit. Values are median (range).

Clinical Areas/Staff (n = number of time pieces)	Time difference in minutes
Delivery rooms (*n* = 14)	1 (–1 to +18)
Theatres (*n* = 6)	2 (–7 to +5)
Obstetricians and Midwives (*n* = 11)	0 (–2 to +4)
Anaesthetic and theatre staff (*n* = 5)	0 (–1 to +1)

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Post dural puncture headache

I fear that persuading neurologists and physicians to adopt fine, pencil point needles will need more than 'gentle persuasion' (Clark & Sellers, *Anaesthesia* 2003; **58**: 101). Neurologists have adopted the 'blunt' point but persist in using 20 g needles [1], in the face of evidence of fewer, lesser headaches [2] and the opinion of colleagues [3], arguing that finer needles were too difficult to use, took too long to collect fluid samples and measure pressure, and that 'extrapolation of anaesthetic data … may not be justified' [4]. In my own hospital, offers to the physicians' College Tutor to discuss ways of using spinal anaesthesia as a teaching opportunity for their trainees in the use of fine, pencil point needles have been ignored.

I wonder if patients are informed of the risks of, and the alternatives to wide, sharp pointed needles, before they give their consent to lumbar puncture?

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False dermatome testing

I would like to report an unusual cause of a false positive result to dermatome testing for regional anaesthesia. A 31-year-old woman presented for emergency Caesarean section for suboptimal foetal heart trace. She had an epidural *in situ* that had recently been topped-up by the midwife on the Delivery Suite. On testing with ethyl chloride spray at T4 (nipple) level she stated that she could not feel anything, but at T10 (umbilicus) to T6 she could feel 'icy cold'. On direct questioning, she stated that she had had a breast reduction operation, and it was then realised that she normally had relatively anaesthetic nipples. She was topped-up cautiously until anaesthesia was present to at least T6. She had an uneventful Caesarean section.

The nipple is a commonly used landmark for assessing the T4 dermatome. It is worth noting that any surgery around the nipple area may produce loss of sensation at this level and is an unreliable test for regional anaesthesia.

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An unusual cause of postpartum collapse or a red herring?

A 39-year-old-lady was found collapsed 9 h after delivering twins. She was apnoeic and deeply cyanosed, but her

colour rapidly improved with basic airway manoeuvres. Her pulse was maintained throughout. Neurological assessment showed her Glasgow coma score (GCS) to be 8 (eyes 1, verbal 2, motor 5) with no lateralizing signs, but she had brisk reflexes throughout, 20 beats of ankle clonus bilaterally and up-going plantars. Her blood pressure was 156/95. Over the next 30 min her GCS improved to 15.

Reviewing her history she had been admitted electively at 37 weeks for induction of her twins. It was her first pregnancy and there were no symptoms or signs of either pre-eclampsia or raised intracranial pressure. An epidural had been sited during the first stage of labour for pain relief prior to commencing a syntocinon infusion for augmentation. Following a failed epidural top-up she received a spinal injection to facilitate the delivery of both twins by uneventful ventouse extraction.

The immediate postdelivery period was complicated by nausea and a mild headache that settled with paracetamol. Her blood pressure had been documented as 140/90.

Blood results were unremarkable with the exception of an urate level of 0.55 mmol.l^{-1}. Urinalysis yielded a trace of protein.

The diagnosis at this stage was a likely eclamptic fit of which 44% occur postnatally [1], but with alternative possibilities of a syncope attack, saggital sinus thrombosis, or other intracranial vascular event. A magnesium sulphate infusion was commenced [2] and a brain CT scan requested as a matter of urgency.

Contrast enhanced CT scan (Fig. 9) revealed a large arachnoid cyst occupying the left frontal, temporal and parietal areas, with significant mass effect and midline shift. There was compression of the left lateral ventricle and left hemisphere sulcal effacement. Due to these findings she was urgently transferred to our regional neurosurgical centre for assessment and possible endoscopic fenestration of her arachnoid cyst [3].

However, over the following days she remained stable, with no fits or residual neurology. Blood markers confirmed HELLP syndrome (*H*aemolysis, *E*levated *L*iver Enzymes, *L*ow *P*latelets) [4].

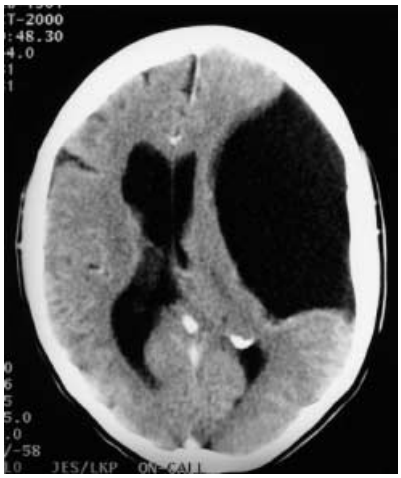

Figure 9

There is a possibility that central neuraxial blockade caused acute alterations in cerebrospinal fluid pressure precipitating a seizure. However, if this were the case, we might have expected to see the onset of symptoms of raised intracranial pressure or fitting immediately after central blockade. Had we been aware of the underlying pathology, including CT evidence of possible raised intracranial pressure, our management would not have included epidural or subarachnoid injection because of the risk of causing brain stem herniation. It seems likely that the arachnoid cyst was a coincidental finding, having probably been present for many years.

Our patient remains well 18 months after delivery of her twins having undergone no intervention.

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Uncommon cause of itchy back in pregnancy

A 28-year-old-woman, gravida 2, presented in labour a day before her elective lower segment Caesarean section (LSCS). As the fetal heart rate pattern was sub optimal and liquor had grade III meconium staining, an urgent (category II) LSCS was planned [1].

This patient had a previous LSCS following an epidural top-up and was keen for her surgery to be performed under neuroaxial block again. She weighed 74 kg, was 152 cm tall and gave a history of scabies infestation affecting mainly her trunk. She had completed a course of treatment comprising chlorphenamine and topical malathion. However, she had persistent, severe pruritus, especially on her back. On examination, we found an extensive crop of skin lesions (burrows) over her arms and back extending from the L1 to L4/5 intervertebral space. These lesions were small, macular and crusted but with no evidence of superimposed bacterial infection. She was obviously suffering from severe pruritus causing her to scratch continuously.

The skin over the L5/S1 interspace was the only area free of burrows, with the closest lesion 2 cm distant. Because of this, we chose this interspace despite palpation being difficult. Following standard practice at our institution for elective and emergency Caesarean section, we performed a 'needle through needle' combined spinal epidural (CSE) with epidural volume extension [2] (EVE). The skin was prepped twice with chlorhexidine gluconate 0.5% in denatured ethanol 70% (Hydrex® DS, BN762082, Leeds, England). The epidural space could not be identified in the left lateral position, but loss of resistance to saline was easily accomplished at a depth

of 7.5 cm from the skin in the sitting position. A 27G Whitacre spinal needle was inserted through the Tuohy needle. Hyperbaric bupivacaine 10 mg and fentanyl 25 μg were injected intrathecally after free flow of clear CSF was ascertained. The spinal needle was withdrawn and the Tuohy needle was flushed with 6 ml of normal saline 0.9% (EVE). A block to touch sensation from S5 to T3/4 with bilateral sympathetic block had developed by 12 min. As common with the EVE technique, there was incomplete motor block with S1 sparing. Surgery proceeded uneventfully, lasted for 50 min and no supplemental analgesia was required.

The patient was discharged home on the third postpartum day. The pruritus was improving but still present and she was otherwise well. At one-month follow-up, the patient was fine and there were no complications.

Scabies, an infestation of the skin with mite *Sarcoptes scabei*, has plagued mankind for at least 2500 years. It is found worldwide and affects people of all social classes and races. The rash or burrows caused by adult mites are usually found on warmer areas of body such as the webbing between fingers, the folds of wrists, elbows or knees [3]. Other areas less commonly affected include the face, buttocks, thighs and the lower back as in this case.

Following treatment for scabies, the dead mites are still present intradermally and can cause itching to persist for several weeks without re-infestation or secondary skin infections. Thus one possible hazard of neuraxial blockade, even after successful treatment of the infestation, is the risk of introducing mite particles into the epidural or intrathecal space. Such particles can cause an allergic response, the consequences of which are unknown. We opted to perform the block at the more technically difficult L5/S1 interspace because there was a 2-cm area clear of lesions. However, as adult mites can move at a rate of 2.5 cm per minute, a 2-cm 'clean' margin may not have been adequate.

Although scabies is a common infestation, we could find no information about the suitability or otherwise of neuraxial blockade in a patient with lesions over the lower back. Having not come across this before, we would be interested to hear from colleagues with similar experiences. Incidentally, no anaesthetist or midwife has contacted scabies so far.

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Blocked epidural catheter: time to look beyond the catheter

The recent report of a blocked epidural catheter connector (Nagi. *Anaesthesia* 2002; **57**: 1236). We report another case where the cause was traced to a defective component of the connector assembly.

A 22-year-old-woman was scheduled for lower segment Caesarean delivery under epidural anaesthesia. An epidural catheter (Portex Limited, Hythe, Kent, England) was inserted without any difficulty with the patient in left lateral decubitus position. The connector assembly was attached, but the catheter came off with a gentle pull. It was repositioned into the connector, but the catheter came off again. On the next attempt it was felt that the length of the catheter disappearing into the connector was less than usual, but tightening it held the catheter inside. On positioning the patient supine, however, the test dose of the drug could not be injected in spite of moderate force. The catheter was abandoned and after discussing with the patient, surgery was conducted under general anaesthesia.

The catheter was removed after surgery and closely examined. No visible defect was noted but saline could not be injected into the catheter. However, when the connector was changed, saline could be injected freely. Some defect in the connector was therefore, suspected. The normally functioning connector was opened up to examine the parts. It consisted of a body, which houses a rubber cylinder and two circular metal discs, one on each end. All are centrally perforated to establish a continuous lumen that extends deep into the central projection of the retaining cap to lodge the proximal end of the catheter (Fig. 10). When the retaining cap is screwed, the central projection exerts pressure on the disc and the rubber cylinder that squeezes on the catheter and holds it firmly. In the malfunctioning connector, it was seen that the proximal metal disc was broken into two halves which were lying alongside each other in such a manner that one of the pieces was overlying the central lumen of the rubber

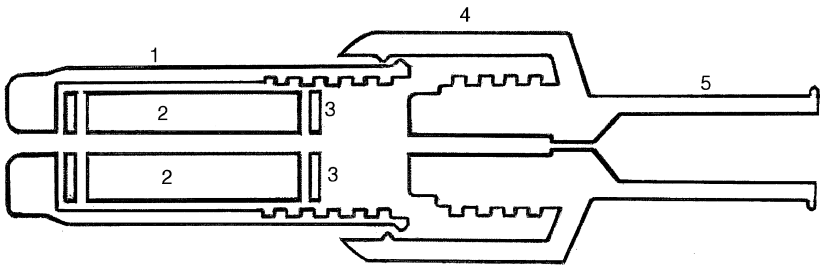

Figure 10 Parts of a connector assembly. 1. Body; 2. rubber cylinder; 3. metal disc; 4. retaining screw; 5. injection port.

Figure 11 Catheter assembly (opened up) showing Left: normal disc and central lumen of the rubber cylinder; Right: two pieces of the disc; one overlying the central lumen of the rubber cylinder.

cylinder (Fig. 11). The feeling of partial insertion and failure to fix the catheter initially may be due to the failure of the catheter to advance beyond the rubber cylinder to the proximal end of the lumen in the retaining cap. Although excessive screwing of the retaining cap subsequently succeeded in holding the catheter, the lumen remained obstructed by the broken disc.

It is difficult to explain how the proximal metal disc broke into two. We hypothesise that when the retaining cap was unscrewed to let the catheter in, the free space between the disc and the central projection of the retaining cap allowed the disc to fall off its position on the cylinder to lie obliquely. As the retaining cap was screwed, the disc folded up on itself in the middle and eventually broke into two.

We report this case to create awareness about the possibility of failure to inject drug into an epidural catheter even when the catheter is inserted smoothly. The procedure may be saved from being abandoned by examining and if needed, changing the catheter connector. This problem can be prevented if the disc is glued to the rubber cylinder during manufacturing so that it does not fall off. Placement of a mark on the proximal end of the catheter that should disappear into the connector assembly (as on the tip of some tracheal tubes) has already been proposed [1]. This would ensure that the catheter has reached the desired depth into the connector. Failure of the mark to disappear can suggest the possibility of some defect. The authors are of the opinion that failure to inject drug in the epidural catheter is often because of some fault in the catheter assembly. It is time we look beyond the catheter, which generally, though mistakenly, gets the blame.

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Difficult airway Society web address

As an anaesthetist with a considerable practise in management of the difficult airway, I found the recent article (Barron *et al. Anaesthesia* 2003; **58:** 73–7) very interesting and informative. I agree wholeheartedly with their concept of an airway alert issued to patients, primary care practitioners, anaesthetic departments and medical notes, but in their appendix describing the alert document they have incorrectly identified the difficult airway society website. Any of your readers trying to open the website www.das.org.uk will be met by the homepage of The Duxford Aviation Society, which is a little off-putting, even though we liken anaesthesia to flying in terms of risk management. The Difficult Airway Society webpages seem to have been a rather moveable feast in the recent past, but now are resident at www.das.uk.com, and it is a very useful development.

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Teeth jewellery

The trend of oral body art is increasing in the west. Teeth jewellery is a form of oral body art and it involves decoration of the teeth with white and coloured jewels made in gold and silver. Since the site of piercing involves the oral cavity, it is a potential concern to the anaesthetist, should these patients present for surgery and general anaesthesia. I would like to report my experience of a patient with dental jewellery presenting for a routine anaesthetic procedure.

A 16-year-old-female patient was scheduled for examination and submucous diathermy of the nose on an elective ENT list. She was ASA grade 2 with mild asthma controlled with inhalers. At the pre-operative visit she denied having any orthodontic appliances (caps or crowns) on her teeth. On arrival at the anaesthetic room, it was noted that the patient had dental jewellery in the form of a white crystal, which was bonded onto the centre of her second right upper incisor. The patient clarified that it was a fashion accessory and had been *in situ* for the last 6 months. We considered removal of the jewellery but the patient was reluctant to remove it due to the cost involved in replacing it. Following a discussion with a colleague, it was considered to be safe to proceed with the anaesthetic. Anaesthesia was induced with fentanyl, propofol, and maintained with oxygen, nitrous oxide, and isoflurane breathing spontaneously through a laryngeal mask. The anaesthetic was uneventful, and care was exercised during the insertion and removal of the laryngeal mask. The recovery staff were warned of the presence of the dental jewellery. Before the patient was discharged to the ward, the oral cavity of the patient was re-examined, to ensure that the accessory was *in situ* and was documented on the anaesthetic chart.

Oral body art jewellery is usually applied to the lips and the tongue [1]. The new practice has now extended to the teeth. This involves sticking small accessories onto the surface of teeth on single or multiple sites. Gold, silver or crystals in different shapes and sises are used. Traditionally, the gold and the diamond ornaments were drilled by the dentists, but most of the latest accessories are temporary and are be applied to the surface of the teeth with dental adhesive. They can last anytime from 1 week to 6 months.

Oral jewellery worn during the perioperative period poses a number of potential hazards. Of particular relevance to the anaesthetists is the increased interference with the airway management due the presence of a foreign body in the oral cavity. Dislodgement of the jewellery, aspiration and swallowing, pressure necrosis, snagging on the airway equipment, oral or dental trauma, and burns are the potential concerns [2,3].

The dental jewellery is very similar to chin and cheek piercing and could potentially cause damage to intraoral soft tissues from the pressure of an anaesthetic facemask during induction of general anaesthesia [4]. Recently, Dr Wise reported a serious incident related to a tongue stud [5] where a female patient developed severe postoperative laryngospasm and hypoxia in the recovery room secondary to a tear in the tongue shortly after an elective laparoscopic gynaecological procedure.

When a patient presents for a general anaesthetic with dental jewellery *in situ*, it can be controversial whether the appliance should be removed before induction of anaesthesia. In our patient, we had a successful outcome, but to avoid injury to the patient, careful consideration needs to be given whether or not to remove the jewellery before a general anaesthetic. With the current fashionable trend for dental jewellery, we are likely to be presented with an increasing number of patients sporting these accessories.

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Chancre very much!

We have recently had the privilege of anaesthetizing a young man on the emergency theatre list, who was referred to the surgical team from his general practitioner with painful bilateral inguinal swellings. These swellings, after careful surgical examination, were thought to be incarcerated inguinal hernias, consistent with his history of a labourer having worked in the garden over the weekend. As anaesthetists we were concerned that a man of 24-year-old should have been so unlucky as to have bilateral hernias, and incarcerated too! With much suspicion we examined the young man and studied his blood results looking for possible haematological carcinomas and also examined him for a connective tissue disorders. Needless to say neither turned out to be positive on clinical examination.

Remaining suspicious, after induction of anaesthesia, we examined the patient further in the anaesthetic room and found him to have a characteristic chancre on his penis with a rash on his trunk and face. After highlighting the anaesthetic differential diagnosis to the surgical team, the operation changed to a lymph node biopsy and the rash seemed to be transferred to their faces instead.

Syphilis is not new and has now emerged in the medical journals again. We read with interest a recent article by Doherty [1] and a letter by Clark [2] of the sudden re-emergence of syphilis in Manchester. It has also been noted in last month's acclaimed medical journal 'Big Issue' [3] that teenagers and people in there twenties are generally unaware of the risks associated with unsafe sexual practice. We believe that it is not just the general public who have to be more aware but also ourselves.

It would be foolish for us to believe that Manchester, which has reported an increase in double the caseload of syphilis in the past 3 years, is the only place in the UK with such an increase in syphilis. We believe that syphilis should be considered as an ever-present problem, which may prevent young men having general anaesthetics when penicillin would have been more appropriate.

So in Wales at present the treatment of syphilis may need you to have an anaesthetic, which is not quiet as eccentric as in the sixteenth century when mercury was thought of as a cure for this disease: 'A night with Venus and a lifetime with Mercury', as was once quoted.

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