

Correspondence

Antiseptic solutions for central neuraxial blockade: which concentration of chlorhexidine in alcohol should we use?

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Editor—We read the article on the national audit conducted by the Royal College of Anaesthetists by Cook and colleagues¹ and congratulate the group on an outstanding piece of work which has enlightened the whole anaesthetic community and no doubt will lead to improved patient safety.

We note that the NAP3 audit reinforces that sterile technique in regional anaesthesia is an important aspect of reducing complications from infection of neuraxial blockade. In Chapter 9, it states that ‘chlorhexidine in alcohol is the solution of choice for regional anaesthesia’, although the concentration of chlorhexidine is not stated. A review article from 2006 also considered that its use be considered a Grade A recommendation.² A photo in the text shows a bottle of chlorhexidine 0.5% with alcohol 70% solution. In our trust, we have been using this chlorhexidine 0.5% with alcohol 70% solution for more than 14 yr without complication and understand the importance of letting the alcohol dry before attempting regional anaesthesia.

As of 2008, some chlorhexidine-based topical cutaneous skin antiseptics have the warning ‘do not use for lumbar puncture’ or ‘do not use in contact with the meninges’. In our trust, we have recently been asked to introduce Chloraprep[®] chlorhexidine 2% in alcohol 70% to use as a cleaning solution before spinal and epidural insertion rather than 0.5% with alcohol 70% after the recommendations of the EPIC study.² We are concerned that if the policy of using chlorhexidine 2% in alcohol 70% is introduced around the country that we may see an increase in complications of arachnoiditis secondary to chlorhexidine contamination. A recent publicized case of arachnoiditis due to chlorhexidine contamination was settled for £5 million with the suggestion that only chlorhexidine 0.1 ml was needed to cause the problem. Our concern is that with the introduction of higher concentrations of chlorhexidine solution, there will be more chlorhexidine residue left on the skin after the alcohol has dried. This may be introduced into the cerebrospinal fluid (CSF) on the tip of the spinal or epidural needle causing potential arachnoiditis secondary to chlorhexidine contamination.

Can the authors please comment on whether they reached any conclusion after their audit on which concentration of chlorhexidine in alcohol is the safest antiseptic solution to use?

Editor—We thank Dr Scott and colleagues¹ for their kind comments regarding the Royal College of Anaesthetists’ 3rd National Audit Project (NAP3). Their primary point does not relate directly to the audit, but is both topical and important. We cannot provide a definitive answer, but would offer an overview of the relevant information.

The US Physician’s Desk Reference Manual, a commercially published compilation of manufacturers’ prescribing information, has (since 1984) warned that ‘chlorhexidine gluconate (CHG) is for external use only. Keep out of eyes and ears and avoid contact with meninges’. Two studies are relevant: in 1955, Weston-Hurst³ reported that CHG (and also other detergents) produced neurotoxicity when injected into the CSF of monkeys. In 1984, Henschen and Olson⁴ showed that injection into the anterior chamber of the eye produced adrenergic nerve degeneration in rats, and suggested that neurotoxic effects on thin myelinated fibres should be investigated. Both studies used much larger amounts of CHG than are likely to contaminate neuraxial block equipment, and obviously there are no equivalent human data. Studies of the use of CHG antiseptic solution or CHG-impregnated dressings for epidural insertion sites have reported clinically important reductions in bacterial colonization of skin and catheter without any adverse effects, but the numbers of patients studied were small as far as safety issues are concerned.^{5,6}

Conversely, the evidence regarding the anti-septic efficacy of this compound is not in doubt and an American Society of Regional Anesthesia and Pain Medicine Practice Advisory Panel considering ‘The Infectious Complications Associated with Regional Anesthesia and Pain Medicine’ concluded that CHG is the most effective one.² In spite of this, the product characteristics summary for ChloroPrep (Chloraprep[®] instruction leaflet, Entura Inc., Leawood, KS, USA, http://www.enturia.co.uk/pdf/9886_SPC_vfinal_290908.pdf) states quite clearly that the product should not be used for lumbar puncture and that ‘contact with the brain (and) meninges... must be avoided’. We contacted the manufacturers about this. Their helpful response confirms the current guidance, but does indicate that there are plans to seek removal of the lumbar puncture exclusion from the licence for tinted chloraprep and replace it with the statement ‘do not bring into contact with the

meninges'. Some product literature refers extensively to the EPIC study, but this related only to the use of CHG in vascular access and urethral catheterization.⁷

However, the evidence of CHG actually causing adhesive arachnoiditis is weak. A review listing all the possible causes included 'detergents and contaminants' as one of eight groups of causes⁸ elicited five strongly worded letters to the Editor, but none referred specifically to CHG as a cause. In the 12 month period of our audit, we received 26 reports (not all meeting audit criteria) of infective complications, but only one report of adhesive arachnoiditis (for which we could only speculate about the aetiology): of note where the specific antiseptic used was specified, it was CHG in all cases. In the medico-legal case referred to by Scott and colleagues, no evidence was presented that CHG contamination was responsible for the arachnoiditis: the diagnosis was, rather, one of exclusion. In the words of Sherlock Holmes 'When you have eliminated the impossible, whatever remains, however improbable, must be the truth'. On this occasion, that conclusion may have been wrong.

An effective antiseptic is only one of the required elements of a good aseptic technique. It is recognized that anything which kills bacteria is potentially harmful to nerves, so the user must be meticulous in taking measures to prevent CHG from reaching the CSF. CHG solution (and any alternative for that matter) must be kept well away from the drugs and equipment to be used, and the solution must be allowed to dry first. The use of a concentration of CHG >0.5% cannot be supported; this concentration is evidently effective, but a greater one might increase the risk of neurotoxicity from inadvertent contamination, and should be avoided. Whichever antiseptic agent is chosen, it should be used in a manner that minimizes the risk of it entering the neuraxis.

It is our opinion (a poor level of evidence!) that, on the limited evidence available to us, chlorhexidine 0.5% in alcohol 70% is the optimal skin preparation for neuraxial procedures. It is an 'off label' indication. In the absence of guidance from central authorities, clinicians must judge how best to balance the very rare risk of neurotoxicity against the more likely, although still rare, hazard of vertebral canal sepsis. Departments may choose to formally identify CHG for discretionary off-label use and then audit the occurrence of any problems.

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Management of hypotension in obstetric spinal anaesthesia

Editor—The recent editorial by Sharwood-Smith and Drummond¹ provides important insights into the mechanism of hypotension during spinal anaesthesia in pregnant women. The authors highlighted that strategies aimed at mitigating the effects of aortocaval compression are relatively ineffective for preventing hypotension and, using evidence gleaned from studies in pre-eclamptic women, emphasized the key importance of the use of sympathomimetic vasopressors to sustain arteriolar tone.

Research from our group supports these conclusions. In several studies, we have demonstrated the efficacy of aggressive use of vasopressors for maintaining maternal arterial pressures during spinal anaesthesia without evidence of detrimental effects on the fetus.^{2–3} The use of crystalloid prehydration made little extra contribution to haemodynamic stability,⁴ although the use of colloid was slightly more effective.⁵ On the basis of the results of these studies, we have largely abandoned the use of i.v. prehydration in our practice.