result in the catheter and needle hitting the dura at different points. This would explain the low incidence of subarachnoid catheterization when the needle is not turned.

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Intra-tracheal adrenaline

Sir,—McCrirrick and Monk [1] provided interesting data on the effect of adrenaline given by the i.v. and tracheal routes in the beating heart after coronary artery bypass surgery.

However, to draw the conclusion that if tracheal adrenaline has little effect on the circulation in the spontaneously beating heart it therefore has little effect in the arrested heart, is clearly not justified. In doing so, they propose that the European Resuscitation Council should abandon its recommendation to give intra-tracheal adrenaline to patients with cardiac arrest if a vein cannot be cannulated [2].

It may be true that intra-tracheal adrenaline is ineffective in some patients with cardiac arrest, but this is not proven in this particular study. Other drugs such as lignocaine [2, 3] have been shown to be effective when administered by the tracheal route in cardiac arrest. There are mixed clinical experiences with adrenaline, possibly because it causes local pulmonary vaso-constriction and impedes its own absorption into the circulation. The dose administered via the tracheal tube must be higher than the i.v. dose [4–7]. If i.v. access is impossible in cardiac arrest, the use of intra-tracheal adrenaline is really a last resort. While there is anecdotal evidence of success in a number of patients, it is not justified to abandon the guidelines of the European Resuscitation Council until the case for or against is definitely proven. Intra-tracheal adrenaline does no harm and there is nothing to lose in a desperate situation. Further human studies are required in patients with cardiac arrest, but logically this is likely to prove very difficult.

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Sir,—The primary action of adrenaline used for resuscitation is on alpha receptors [1, 2], increasing systemic vascular resistance and coronary artery perfusion pressure. We believe there is no logic in an argument which suggests that intra-tracheal adrenaline may be more vasoactive at cardiac arrest than when the heart is still beating. In addition, uptake of tracheal adrenaline is likely to be impaired significantly when pulmonary blood flow is dependent solely on effective external cardiac massage. The pharmacokinetics of intra-tracheal adrenaline cannot be compared with those of lignocaine and atropine which have no significant vasoactive properties.

We have used a highly sensitive human bioassay and found i.v. adrenaline to have a marked effect on systolic arterial pressure in doses as small as 0.07 μg kg⁻¹. The bioassay was unable to detect any response to intra-tracheal adrenaline in doses up to 140 times greater (10 μg kg⁻¹). Ethical considerations prevented us from increasing the tracheal doses even further.

We are not alone in finding tracheal adrenaline ineffective. Recent animal researchers have been similarly unimpressed [3, 4].

The human study conducted by Quinton, O’Byrne and Aitkenhead at cardiac arrest and quoted by Dr Baskett also found intra-tracheal adrenaline to be of no benefit [5].

Recommending a treatment that is almost certainly of no value should be avoided, even if it is recommended only as a last resort. Such a recommendation detracts from the consideration of other therapeutic manoeuvres that might be more effective in desperate circumstances, such as intraosseous or intracardiac injection.

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Sir,—I read with interest the article by McCrirrick and Monk [1] comparing intra-tracheal and i.v. adrenaline. I agree that the optimal route for administration of drugs in resuscitation is i.v., although on occasion this may be difficult, especially in the context of resuscitations outside hospital.

In my role as one of the medical officers at Wembley Stadium in 1993, I was involved in the management of a cardiac arrest in the royal box. An elderly male spectator in his eighties was in 1993, I was involved in the management of a cardiac arrest in the royal box. An elderly male spectator in his eighties was