threading of only 3–4 cm of catheter[3] and the previous injection of bupivacaine through the epidural needle.[4]

Crosby advises that it may be prudent to remove the catheter as soon as possible after delivery. If the epidural has been placed for vaginal delivery, the patient may have developed a coagulopathy with the catheter *in situ*. To my knowledge, there is no objective evidence as to whether the catheter should be removed or left in the space in this situation. Rao and EL-Etr[5] favour leaving the catheter until the coagulopathy has resolved and this advice is echoed by Stanley and Lunn.[6] Their recommendations follow therapeutic heparin administration and the situation of a rapidly developing coagulopathy in the context of HELLP syndrome may be different.

However, one could envisage that if there were epidural venous trauma on insertion of the catheter, its subsequent removal in the presence of a coagulopathy might dislodge a clot and lead to an expanding haematoma with disastrous consequences.

More information is needed, but my present practice is to leave the epidural catheter in position until any coagulopathy has resolved. It would be interesting to know if this practice is followed by your readership.

Peter D. Collins MB FCAnaesth.
RGH Hollywood,
Nedlands
W. Australia

REFERENCES

1 Crosby ET. Obstetrical anaesthesia for patients with the syndrome of haemolysis, elevated liver enzymes and low platelets. Can J Anaesth 1991; 38: 227–33.
2 *Gillilan LA.* Veins of the spinal cord. Anatomic details; suggested clinical applications. Neurology 1970; 20: 860–8.
3 *Odoom JA, Sih IL.* Epidural analgesia and anticoagulant therapy. Experience with one thousand cases of continuous epidurals. Anaesthesia 1983; 38: 254–9.
4 *Verniquet AJW.* Vessel puncture with epidural catheters. Experience in obstetric patients. Anaesthesia 1980; 35: 660–2.
5 *Rao TLK, EL-Etr AA.* Anticoagulation following placement of epidural and subarachnoid catheters: an evaluation of neurologic sequelae. Anesthesiology 1981; 55: 618–20.
6 *Stanley TH, Lunn JK.* Anticoagulants and continuous epidural anaesthesia (letter). Anesth Analg 1980; 59: 394–5.

REPLY

I would like to thank Dr. Collins for his interest in the review and his comments regarding the use of epidural anaesthesia in this patient population. I would suggest that, in patients at high risk of developing a consumptive coagulopathy, it would seem prudent to limit the use of epidural blockade. Careful assessment of the risks and benefits is emphasized and I would suspect that, the as yet undefined risk of bleeding into the epidural space probably outweighs the apparent benefits of epidural blockade in the majority of patients with HELLP syndrome. The incidence of epidural blood vessel trauma has recently been estimated to be as high as 12% but I am not aware of data that suggest or confirm that the paramedian approach to the epidural space is associated with a higher incidence of vessel trauma.[1] Although I agree with the recommendation for threading the catheter 3–4 cm only, it is because the incidence of unsatisfactory block appears to increase as excess length of catheter is placed into the epidural space. Again, I am not aware of data that confirm a higher incidence of vessel trauma with increasing length of catheter thread into the epidural space. Although injection of 10 ml of bupivacaine through the needle before passing the catheter has been shown to decrease the incidence of vessel trauma from 9% to 3%, this technique would result in total spinal anaesthesia if accidentally injected intrathecally or local anaesthetic toxicity if injected intravascularly.[2] Smaller volumes of local anaesthetic or saline have not been demonstrated to be efficacious in reducing the incidence of vessel trauma.[3] Larger volumes of saline could be employed but the diluting effect on the subsequently injected local anaesthetic would have to be considered.

With respect to the advisability of removing the catheter and the optimum time to do so, opinions vary. We are in agreement that, with respect to an epidural catheter placed before heparin anticoagulation, there seems to be little rationale to removing the catheter during the transient period of controlled anticoagulation. However, the scenario of the patient with HELLP syndrome and a consumptive coagulopathy that is usually short-lived but that may persist for days may not parallel that of the heparinized patient. If the diagnosis of HELLP syndrome was made before there was evidence of clinical coagulopathy, then I would remove the catheter immediately postpartum. If there was clinical evidence of coagulopathy, then my decision whether to remove the catheter or not would be influenced by whether or not there was an obvious therapeutic benefit to maintaining the epidural analgesia. That is, I would maintain the catheter in situ *if I was going to use it. It is well documented that epidural catheters do migrate in a large proportion of patients and both inward migration with latent blood vessel and dural puncture and catheter migration out of the space do occur.[4,5] Although it is speculative, this uncontrolled catheter movement may represent a greater risk of aggravating previous vessel trauma or initiating new trauma than a careful and controlled removal of the catheter from the epidural space. Therefore, if I had no plans to use the catheter I would remove it.*

E.T. Crosby BSc MD FRCPC
Ottawa

REFERENCES

1 *Rolbin SH, Hew E.* A comparison of two types of epidural catheters. Can J Anaesth 1987; 34: 459–61.
2 *Verniquet AJW.* Vessel puncture with epidural catheters. Anaesthesia 1980; 35: 660–2.
3 *Rolbin SH, Halpern SH, Braude BM, Kapala D, Unger R, Radhakrisnan S.* Fluid through the epidural needle does not reduce complications of epidural catheter insertion. Can J Anaesth 1990; 37: 337–40.

4 *Crosby ET.* Epidural catheter migration during labour: a hypothesis for inadequate analgesia. Can J Anaesth 1990; 37: 789–93.
5 *Phillips DC, Macdonald R.* Epidural catheter migration during labour. Anaesthesia 1987; 42: 661–3.

Safety of alfentanil

To the Editor:

Mulroy *et al.*[1] and their publication entitled "Safety and efficacy of alfentanil and halothane in paediatric surgical patients" have declared that alfentanil is a safe anaesthetic, whether combined with nitrous oxide alone or with nitrous oxide and halothane. They have not specified in their methods their measure of safety nor have they identified the threshold used for declaration of safety of an anaesthetic agent.

The acceptability of an anaesthetic relates not only to the severity of minor adverse events associated with its use, but also to the frequency of major adverse events, such as anaphylaxis, late respiratory arrest, and severe metabolic derangement. I would contend that the safety of an anaesthetic agent is more frequently viewed in relation to the incidence of severe adverse events. The number of patients monitored in the aforementioned investigation is insufficient to demonstrate that the frequency of severe adverse events associated with the use of alfentanil is acceptably low.

When used in a scientific publication, the term safety must be defined both in terms of the type of complication studied and the threshold of acceptable frequency for the specified complication. Alfentanil may be a "safe" anaesthetic; safety, however, was neither measured nor demonstrated in the study by Mulroy *et al.*

G.V. Goresky MD FRCPC
Department of Anaesthesia
Alberta Children's Hospital, Calgary

REFERENCE
1 *Mulroy JJ Jr, Davis PJ, Rymer DB, Chaitoff KA.* Safety and efficacy of alfentanil and halothane in paediatric surgical patients. Can J Anaesth 1991; 38: 445–9.

REPLY

Dr. Goresky raises a pertinent and valid point about the use of the term "safe" in evaluating a medical therapy. Defining safety is not a simple task. If the dictionary definition "free from harm" is the criterion applied, perhaps no medical therapy is safe. The definition of safety of any agent or procedure cannot be reduced to a single factor but is based on a multitude of hazards balanced as a risk/benefit judgement by the practitioner.

We would agree that the size of the study that we reported is too small to analyze the incidence of uncommon events such as anaphylaxis and severe metabolic derangements. Therefore, we performed no such analysis. The size of a study needed to examine this aspect of safety and provide a statistically acceptable result for such rare events is dependent on the incidence of the events and on the definition of an acceptable incidence of these complications. For example, we have never observed a case of anaphylaxis, late respiratory depression, or severe metabolic derangement attributable to the use of alfentanil suggesting that it is an infrequent occurrence in our population.

The contention that the safety of an anaesthetic agent can only be measured in relation to the incidence of severe adverse events may be modelled using anaesthetic-related mortality as the ultimate indicator of safety. Tiret reported a 1 in 40,000 incidence of anaesthetic-related mortality in children.[1] One would have to study an enormous number of patients to confirm the null hypothesis that there were no statistically significant differences in mortality among anaesthetic techniques. The relative risk of anaesthetic-related mortality between two different anaesthetic techniques could only be estimated by performing a case control study after both techniques had been used enough to produce mortality.

In order to demonstrate conclusively no statistical difference in the incidence, rare events among different techniques would require patient numbers far in excess of those in our study. Our goals were more modest. We focused on one aspect of the safety question. We attempted only to compare haemodynamic effects (using clinically relevant measures of heart rate and blood pressure) of alfentanil with those observed using halothane, an anaesthetic agent frequently employed in paediatric practice. We found that alfentanil was as safe (free from harm) to the patients as halothane was in the period studied.

The information that alfentanil in the doses studied may be safely administered to paediatric patients without producing haemodynamic depression greater than halothane is a small piece of the mosaic that defines the agent's safety and utility.

John J. Mulroy Jr. MD
University of Washington School of Medicine
Peter J. Davis MD
D. Ryan Cook MD
University of Pittsburgh School of Medicine

REFERENCE
1 *Tiret L, Nivoche Y, Hatton F, Desmonts JM, Vourc'h G.* Complications related to anaesthesia in infants and children. Br J Anaesth 1988; 61: 263–9.

SIADH following minor surgery

To the Editor:

Soroker *et al.* presented a case of the postoperative syndrome of inappropriate antidiuretic hormones (SIADH).[1] We have had a similar case and others have been reported.

Our patient was a 33-yr-old woman with pelvic adhesions secondary to endometriosis. Laparotomy was scheduled and anaesthesia was induced with thiopentone and maintained with O_2:N_2O, and isoflurane. Surgery was uneventful. Estimated blood loss was 150 ml, intravenous