Our study was designed to assess the clinical efficacy of postoperative continuous epidural infusion of ropivacaine 0.1% *vs* 0.2% both combined with 1.5 $\mu g \cdot mL^{-1}$ sufentanil. After written informed consent, ten patients ASA I–III undergoing elective TKR were enrolled in the investigation. Lumbar epidural anesthesia using 0.75% ropivacaine was combined with either propofol sedation or general anesthesia for surgery. On arrival in the recovery room, five patients received ropivacaine 0.1% with 1.5 $\mu g \cdot mL^{-1}$ sufentanil (Group A), and five patients received ropivacaine 0.2% with 1.5 $\mu g \cdot mL^{-1}$ sufentanil (Group B) at a rate of 5–9 $mL \cdot hr^{-1}$. All patients had access to ***iv*** piritramide via a patient-controlled analgesia device. Patients were examined eight hours, 20 hr, 32 hr, and 44 hr postoperatively by the same anesthesiologist blinded to group assignment. Repeated measurement ANOVA was performed for pain scores and opioid consumption. Data are presented as mean ± SEM.

Cumulative opioid rescue medication was tenfold less in Group B than in Group A (6 ± 3 *vs* 65 ± 23 mg, $P = 0.001$). Patients in Group B had lower visual analogue scale scores on a scale from 0–100 mm at rest (4 ± 6 mm *vs* 38 ± 6 mm, $P = 0.007$) and on movement (9 ± 7 mm ***vs*** 53 ± 7 mm, $P = 0.003$) than patients in Group A. Motor block was negligible in both groups. Three patients (two in Group A, one in Group B) experienced nausea, one patient in Group A experienced vomiting and itching. This patient rated quality of pain management as fair, the other nine patients rated quality of pain management as excellent or good. No severe side effects, such as respiratory depression were observed over our study period of 44 hr.

Our pilot data indicate that ropivacaine 0.2% with 1.5 $\mu g \cdot mL^{-1}$ sufentanil seems to be more effective than 0.1% ropivacaine with 1.5 $\mu g \cdot mL^{-1}$ sufentanil for preventing pain after TKR.

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Increased S-100 B protein levels in a patient undergoing Cesarean delivery in the presence of prolonged hemorrhagic shock

To the Editor:

Serum S-100 B protein is an early and sensitive marker of hypoxic brain damage.[1,2] Consequently, levels of this protein may be correlated to neurological outcome after severe bleeding and anemia that decrease cerebral oxygen delivery to critical levels. Since the peak levels of S-100 B protein occur on the third day after a stroke,[3,4] we measured S-100 B protein levels three days after severe hemorrhagic shock and immediately thereafter. Two women (one with an anterior placenta previa and the other with anterior vasa previa) at risk from hemorrhage were scheduled for Cesarean delivery under combined spinal-epidural anesthesia. On admission, their hemoglobin concentrations were 11.1 and 9.6 $g \cdot dL^{-1}$, respectively. In both patients, massive bleeding started immediately after amniotomy. The patient with a placenta previa suffered from decreased systolic blood pressure in the range of 35–55 mmHg, which persisted for 125 min. In contrast, the systolic blood pressure of the patient with vasa previa decreased to 65 mmHg for only two minutes, followed by rapid recovery to 80 mmHg. Although blood had been cross-matched prior to the operation, the hemoglobin level immediately before blood transfusion in both patients was similarly very low (39 $g \cdot L^{-1}$) because the blood was sent for irradiation after massive bleeding was observed. When hemorrhagic shock occurred, both cases were intubated and ventilated mechanically, and hysterectomy was performed because the uterus failed to contract. In the patient with prolonged shock, S-100 B protein levels analyzed by chemiluminescent immunoassay (SRL Inc., Tokyo Japan) immediately after the operation and on the third postoperative day were 0.24 and 1.04 $ng \cdot mL^{-1}$, whereas in the patient without shock, these levels were 0.1 and 0.07 $ng \cdot mL^{-1}$, respectively. The S-100 B protein level in the patient with prolonged shock was above that reported in patients with unilateral supratentorial cerebral infarction (0.5 $ng \cdot mL^{-1}$).[2] Slight extrapyramidal symptoms were noted postoperatively only in the patient with prolonged shock. Brain damage was undetectable by computerized tomography or by magnetic resonance imaging. Our preliminary observation warrants further studies to clarify the significance of increased levels of serum S-100 B protein in severe shock.

Measurement of this protein may be useful as a predictor of neurological outcome after life-threatening anemia and hypotension.

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Breakage of epidural catheters in two parturients

To the Editor:
We wish to report the separation and breakage of the internal stainless steel wire of two Arrow Flextip Plus® epidural catheters (Reading, PA, USA). Both patients requesting epidural labour analgesia had uneventful identification of epidural space at L3–L4 intervertebral space.

In the first case, on attempting to thread the catheter, resistance was met in passing the catheter beyond the needle tip. The attempt was abandoned and the needle and catheter were removed together. On removing the catheter from the needle, without any resistance, it was noticed that a 10-cm segment of the flexometallic spiral had unravelled and was protruding from the patient end of the intact catheter sheath. The most distal 4.5 cm segment had broken off from the rest of the spiral (Figure).

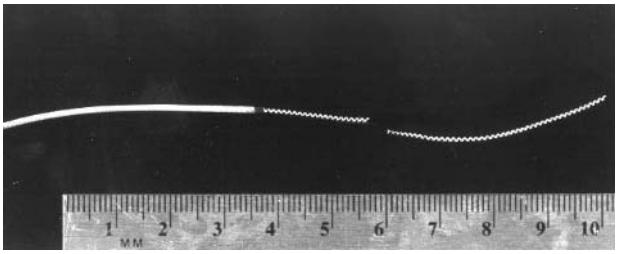

FIGURE Catheter from case #1 with broken off wire.

Following delivery the patient had an *x-ray* of her spine to ensure a fragment of the wire had not been left in her back.

In the second case, the catheter was threaded easily through the needle and 3 cm into the epidural space. After removing the needle, the proximal (nonpatient) end of the catheter was noted to be unravelled, exposing 5 cm of the metal coil. The catheter was trimmed 5 cm from the end, an adapter was attached and the block was initiated. After delivery, the shortened catheter was removed intact.

Asai *et al.* reported breakage of a trapped Arrow catheter when traction was applied to remove it.[1] The metal coil was removed intact along with the catheter but the distal part of the catheter broke. They compared the tensile strength of Arrow catheters with nonreinforced Perifix, Perisafe and Portex catheters and concluded that the Arrow catheters are more likely to break.[1] Woehlck reported uncoiling of the wire in a trapped Arrow catheter during removal. The catheter came out and the uncoiled wire remained in the patient but could be removed intact with gentle traction.[2] In our two cases, the metallic spiral unravelled without undue force or traction being applied and without any apparent preexisting defect of the catheter sheath itself. Should fragments of epidural catheters break off, the recommendation is to leave them and monitor the patient for any signs of delayed complications due to granuloma formation, like lumbar stenosis[3] or nerve root lesions.[4] In conclusion, we report the separation of the stainless steel wire of two Arrow Flextip Plus® epidural catheters, which were otherwise intact.

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