

(fig. 1), however, has alternating and easily visible silver opaque and polished 1-cm segments from the tip to a plastic winged needle hub.

The following advantages have become apparent when doing epidural anesthesia with the 18G Touhy-Schliff needle:

- 1) An accurate measurement of the distance from the skin to the epidural space.
- 2) Easy calculation of the catheter length in the epidural space.
- 3) The ability to observe millimeter-by-millimeter advancement of the epidural needle, as both operator and supervisor.
- 4) Awareness of depth of needle insertion in relation to the size of the particular patient.
- 5) The winged hub design helps control needle direction and advancement, particularly when using the hanging drop method of identifying the epidural space.

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Verapamil May Not be the Drug of Choice for Control of Hemodynamic Changes during Surgical Excision of Pheochromocytoma

To the Editor:—This case shows that iv verapamil can control the hemodynamic changes during surgical excision of pheochromocytoma. However, side effects, such as hypotension, bradycardia, and pulmonary edema, may follow excision of the tumor.

The patient was a 44-yr-old woman, who had bouts of hypertension up to 240/140 mmHg and tachycardia up to 115 bpm. Pheochromocytoma was suspected, and a CT scan of the abdomen revealed a left adrenal mass.

The patient was prepared preoperatively by administration of phenoxybenzamine (30 mg/day) and propranolol (30 mg/day). Both drugs were discontinued the evening before surgery. The morning of surgery, she was premedicated with oral diazepam 10 mg. Before induction of anesthesia, arterial blood pressure (BP) was 140/90 mmHg, ECG showed a normal sinus rhythm at a heart rate (HR) of 80/min, and the CVP was 8 cm H₂O. A bolus of verapamil 0.075 mg/kg was given iv over 2 min, to be followed by 0.01% infusion at a rate of 2 $\mu\text{g} \cdot \text{kg}^{-1} \cdot \text{min}^{-1}$. BP decreased to 100/70 mmHg, while ECG showed no change in heart rate or rhythm. Anesthesia was induced with diazepam 0.2 mg/kg, fentanyl 20 $\mu\text{g}/\text{kg}$, and vecuronium 0.2 mg/kg iv, and was maintained with N₂O:O₂, supplemented by incremental doses of fentanyl and vecuronium. Laryngoscopy, tracheal intubation, scrubbing, skin incision, and abdominal exploration caused minimal fluctuations in BP and HR. During

Introduction of this needle to residents and attendings has resulted in such enthusiasm that I would anticipate that the Touhy-Schliff needle or a similar type will be the standard for use in the future.

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manipulation of the tumor, BP was elevated up to 160/100 mmHg, and HR increased to 80 bpm. The increase in BP and HR were readily controlled by increasing the verapamil drip up to 5 $\mu\text{g} \cdot \text{kg}^{-1} \cdot \text{min}^{-1}$. Verapamil drip was discontinued immediately after ligation of the left adrenal veins. Throughout the procedure, 2 liters of lactated Ringer's solution and 2 units of whole blood were infused in order to maintain the CVP at 10 cm H₂O. Following excision of the tumor, BP decreased to 60/40 mmHg, HR to 40 bpm, and CVP to 5 cm H₂O. A norepinephrine infusion was started at a rate of 5 $\mu\text{g} \cdot \text{kg}^{-1} \cdot \text{min}^{-1}$. BP stabilized at 90/60 mmHg, HR increased to 55 bpm, and the CVP was 11 cm H₂O. Also, the patient developed pulmonary edema, and intermittent positive pressure ventilation was continued using 5 cm H₂O PEEP. The patient could be weaned off the ventilator and the norepinephrine infusion within 24 h.

DISCUSSION

Verapamil, a calcium channel blocker, may attenuate the release of catecholamines from the sympathetic nerve terminals¹ and adrenal medulla.² It can also counteract the postjunctional effects of released epinephrine and norepinephrine on both heart and blood vessels.^{3,4} In our patient, verapamil lowered significantly the control blood pressure, and could prevent the development of cardiac

arrhythmias and serious hemodynamic fluctuations during excision of the pheochromocytoma. However, following excision of the tumor, the patient developed hypotension, bradycardia, and pulmonary edema. This may be attributed to the sudden withdrawal of the circulating catecholamine,⁵ in the presence of residual effects of verapamil. Verapamil is a relatively long-acting drug.⁶ It may be advisable to select a shorter-acting calcium channel blocker with less cardiac effects, such as nicardipine,⁷ in order to minimize side effects following excision of the pheochromocytoma and withdrawal of the circulating catecholamines.

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Hetastarch Coagulopathy in a Neurosurgical Patient

To the Editor:—We wish to report a patient who developed a coagulopathy postoperatively, which we believe was most likely due to hetastarch. The patient, a 36-yr-old, 60-kg woman, underwent a subtemporal craniotomy for removal of a recurrent epidermoid cyst, the initial removal having been performed uneventfully 2 yr earlier. She had had two other operations, a cholecystectomy and a vaginal hysterectomy, within the past 5 yr without complications. Her only medication was cimetidine for a probable peptic ulcer. Her preoperative laboratory values, including a prothrombin time (PT), partial thromboplastin time (PTT), and platelet count, were normal. Anesthesia for the craniotomy consisted of nitrous oxide 60%, thiopental infusion 2100 mg iv, meperidine 100 mg iv, and a nondepolarizing muscle relaxant iv. Fluid replacement during the 7-h operation consisted of lactated Ringer's solution, 700 ml, and hetastarch 6%, 2000 ml iv.

Near the end of the operation, the surgeons noted unusual difficulty obtaining hemostasis. Coagulation studies showed a PTT 46 s (normal 34 s) with a normal PT and platelet count. Despite the administration of three units of fresh frozen plasma (FFP), the PTT increased to 56 s. Additional coagulation abnormalities included an increase

in fibrin split products to 20 mcg/ml (normal 10) and a shortened thrombin time (12 s). During the night, the patient developed a right hemiparesis and anisocoria. An emergency head CT scan showed a large hematoma in the left temporal lobe with a moderate mass effect. Because of the coagulopathy, the decision was made not to evacuate the clot. After administration of a total of 15 units of FFP over the next 2 days, the PTT returned to normal. The patient was discharged 9 days postoperatively, with her only disorder being a mild expressive dysphasia.

Hetastarch 6%, a heterogenous mixture of synthetic polysaccharides resembling glycogen, produces effective, prolonged intravascular volume expansion (24-48 h), which is clinically equivalent to, but considerably less expensive than, albumin.¹ Because of these effects, we have chosen to administer hetastarch for volume expansion in selected neurosurgical patients, where we believe that the administration of crystalloid solution might precipitate or exacerbate cerebral edema. Studies in human volunteers indicate that hetastarch may prolong the PTT, in association with a decrease in Factor VIII coagulant activity and related antigen, and a decrease in von Willebrand