tomic and clonic response were very similar to that produced after administration of suxamethonium 30 mg. The effect of the neuromuscular blocking drug was then immediately and completely antagonized with neostigmine 2.5 mg and atropine 0.6 mg.

Others in a similar situation may find this technique useful.

M. E. Dodson
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USE OF VECURONIUM IN CARCINOID SYNDROME

Sir,—Anaesthesia for two patients with carcinoid syndrome is described, including the management of a patient in whom emergency surgery was required.

A 55-year-old woman presented for laparotomy with a gastrointestinal carcinoid tumour and multiple liver metastases. Oral premedication consisted of diazepam 5 mg and promethazine 25 mg, and anaesthesia was induced with fentanyl 100 μg, etomidate 15 mg (and pancuronium 6 mg). Intubation produced no adverse cardiovascular effects, but slight inspiratory wheezing developed which persisted throughout the operation. Anaesthesia was maintained with 66% nitrous oxide in oxygen with increments of fentanyl 50 μg and vecuronium 2 mg. Hemicolecotomy, hepatic dearterialization and portal vein cannulation were performed. Glycopyrrolate 0.6 mg and neostigmine 2.5 mg produced prompt and complete recovery from neuromuscular blockade, verified by the use of a nerve stimulator. The patient made an uneventful recovery, and was discharged from hospital 2 weeks later.

A 63-year-old lady presented with acute bowel obstruction caused by an ovarian carcinoid tumour. Hepatic dearterialization and portal vein cannulation had been performed on a previous occasion. She was rehydrated and premedicated with diazepam 5 mg and promethazine 20 mg by mouth. After preoxygenation, anaesthesia was induced with etomidate 15 mg, suxamethonium 75 mg was administered and the trachea intubated. Cricoid pressure was performed. After a few minutes the patient became flushed, but there was no bronchospasm and the arterial pressure and heart rate remained at their preoperative values. Ventilation was continued by hand using a mixture of 66% nitrous oxide in oxygen, and the flushing decreased over the next few minutes. Anaesthesia was maintained with fentanyl 100 μg, vecuronium 6 mg and the same gas mixture. Heart rate and arterial pressure remained stable, except during manipulation of the tumour when the arterial pressure increased briefly. One increment of fentanyl 50 μg and vecuronium 2 mg was needed. Surgery lasted 1 h and revealed widespread inoperable tumour. Reversal of neuromuscular blockade, using glycopyrrolate 0.6 mg and neostigmine 2.5 mg, was confirmed using a nerve stimulator. The patient recovered well from anaesthesia and surgery, but her condition gradually deteriorated, and she died 10 days later.

In 1976, Mason and Steane reviewed the problems of anaesthesia for patients with secreting carcinoid tumours and stressed the importance of reporting anaesthetic management, the choice of neuromuscular blocking drugs requiring careful consideration in such patients.

The use of suxamethonium is hazardous, as the fasciculations increase intra-abdominal pressure and release tumour hormones (Dery, 1971; Mason and Steane, 1976). Protection of the airway was the primary concern during induction of anaesthesia in the patient with bowel obstruction. The severe flushing which occurred after intubation was attributed to release of tumour mediators. Pretreatment with a small dose of a competitive neuromuscular blocker to reduce fasciculations may have been useful.

The patient for elective surgery was starved, therefore a non-depolarizing neuromuscular blocker could be given at induction. The ganglion-blocking and histamine-releasing properties of tubocurarine are undesirable (Sniper, 1952). It has been suggested that pancuronium is the drug of choice (Mason and Steane, 1976), and it was therefore used for the first patient, but it can cause tachycardia, hypertension and histamine release (Kelman and Kennedy, 1971; Bodman, 1978). In view of this, the newer neuromuscular blocking agents were considered. Atracurium has a novel mode of elimination and less cumulative, but it can also cause histamine release (Basta et al., 1982), and may be unsuitable for patients with carcinoid syndrome. Vecuronium lacks histamine-releasing properties (Basta et al., 1983), is relatively free from cardiovascular effects and is antagonized readily (Fahey et al., 1981). As the first patient’s condition was stable when a supplementary dose of relaxant was needed, vecuronium 2 mg was given. Good relaxation was produced, with no adverse effects, and reversal at the end of the procedure was prompt and complete. It was therefore chosen for the second patient, again with no adverse effects and prompt reversal. Perhaps the properties of vecuronium make it the drug of choice in these cases.

K. H. Simpson
Leeds

REFERENCES


HYPOGLYCAEMIA IN CHILDREN UNDERGOING OUTPATIENT PROCEDURES

Sir,—Dr Padfield (1984) in his study of blood glucose concentrations in children undergoing dental procedures concludes “that the young dental outpatient over the age of four years is not at risk from hypoglycaemia during anaesthesia.”
Such may be the case, but the group shown by Thomas (1974) to be at risk in a study of inpatients, were those younger than the age of 47 months and weighing less than 15.5 kg. Only four such patients were included in Padfield's study (1984). I have had personal experience that would indicate that outpatients are at risk from hypoglycaemia.

A 30-month-old Caucasian female with a tooth root abscess underwent removal of a right upper quadrant D as an outpatient. She had nil by mouth for 12 h and had no previous medical or anaesthetic history. Anaesthesia was induced with nitrous oxide and halothane in oxygen and was maintained with the same mixture via a nasal mask. Total anaesthetic time was 7 min.

The recovery phase was prolonged. After 12 min the patient was noted to be well oxygenated with good tidal excursions but was unrousable, sweaty and had a tachycardia in excess of 140 beat min⁻¹. A Dextrostix (Ames) at this time recorded a blood sugar of less than 1.4 mmol litre⁻¹. Later laboratory analysis revealed the blood sugar to be 1.1 mmol litre⁻¹. After the administration of 50% glucose 15 ml she awoke within 90 s, with no neurological sequelae.

Senior (1973) has discussed whether children who became hypoglycaemic during starvation have a separate biochemical abnormality or are purely the extreme of a normal distribution. The combined number of patients younger than 4 yr in the studies of Graham (1979) and Padfield (1984) is 28. This is not enough to exclude a low but significant incidence of hypoglycaemia, as the example quoted above suggests.

The lesson is clear. Even in outpatients, when children are being anaesthetized, adequate carbohydrate intake may have to be ensured. Hypoglycaemia should be considered as one possible cause of unexplained alterations in conscious level in this age group.

R. P. Harpin
Toronto

REFERENCES

Sir,—Thank you for the opportunity to respond to Dr Harpin's letter. I am pleased that he has emphasized the fact that hypoglycaemia can occur in outpatients younger than 4 yr. However, children of this age group are naturally uncommon as dental outpatients, hence the small number in my study.

On checking my original data, I find that the four patients younger than 4 years had all eaten within the previous 5–8 h and thus had not starved for as long as Dr Harpin's patient.

It might be wise to defer patients younger than 4 yr to afternoon sessions, allowing them to have breakfast and thus curtailing the long overnight period of fasting.

A. Padfield
Sheffield

METASTATIC CARCINOMA IN THE EXTRADURAL SPACE

Sir,—The long-term cannulation of the extradural space in the management of pain is new, and the literature on possible complications sparse. We would like to draw the attention of your readers to a hitherto undescribed complication.

A previously healthy young man was found, at operation, to have an inoperable adenocarcinoma of the rectum with retroperitoneal spread. Scintigraphy demonstrated metastases in the skull, ribs, sternum, vertebral column and liver.

After operation his condition deteriorated rapidly, and he was managed with blood transfusion, systemic steroids and extradural morphine for the relief of pain.

An extradural catheter was inserted at the second lumbar intervertebral space. The insertion was easy and without complications. Morphine 8 mg was injected two to four times per 24 h, resulting in relief of pain without side-effects.

After 35 days of treatment increasing resistance to injection was experienced, and after 42 days (and a total of 115 injections) further injection was impossible. On examination the catheter seemed to be in situ, without any sign of kinking or other apparent reason to explain the loss of function. The catheter was removed and found to be intact.

Because of the poor condition of the patient a new catheter was not inserted, and he was managed with analgesics by mouth and subcutaneously until death occurred 6 days later.

At autopsy the skeleton was found to be infiltrated widely by metastases, in the spine located to the cancellous bone of the vertebral bodies. Histological examination of tissue from the site of the extradural catheter showed the extradural side of the dura mater covered with cell-masses of metastatic carcinoma, and the extradural space and the soft tissue between the two opposing spinous processes was infiltrated by cancer tissue. No cancer tissue was demonstrated in the central nervous system.

Loss of function of an extradural catheter in long-term therapy is usually caused by kinking, or external pressure to, the catheter. Also, gradual closing of the side-holes has been reported, possibly caused by local changes in temperature. Other well known complications that might cause occlusion of the catheter are extradural haematomas and abscesses, but occlusion by metastatic cancer tissue has, to our knowledge, never been described.

What caused the presence of metastatic cancer tissue in the extradural space is uncertain. Our investigations seem to indicate that these metastases were not present at the time of cannulation. Nothing has suggested that cancer cells were implanted by the cannulation procedure from osseous metastases, but perhaps by implantation of cells from nearby soft tissue metastases. Another explanation might possibly be lodgement of tumour emboli around the catheter, the soft tissue being already affected by non-specific inflammatory or foreign-body reactions.

Whatever the pathogenetic mechanism, one should remember that metastatic cancer invasion of the extradural space is possible and can cause obstruction of the catheter.

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