into one nostril cotton-tipped applicators soaked in either
the above solution or 4% cocaine. Cocaine provides both
the necessary anesthesia and vasoconstriction to facilitate
nasotracheal intubation.

Once the aerosol administration is completed, the no-
stril is dilated by successively inserting well-lubricated soft
nasal airways, usually starting with a 6.5 mm OD airway
and increasing by 0.5 mm. This procedure tests analgesia,
clears secretions, dilates the nasal passage, thus reducing
the possibility of the endotracheal tube causing bleeding,
and gives a good indication of how large an endotracheal
tube can be used. After dilation with the nasal airways,
either blind or fiberoscopic controlled intubation can be
performed in the usual manner.

We have used this technique without incident in more
than 70 patients. Anesthesia has been uniformly adequate.
We have not observed evidence of systemic toxicity from
the lidocaine nor have arterial blood pressure or heart
rate changes indicated undesirable systemic effects of the
phenylephrine. However, caution should be exercised in
patients who have recently eaten, since sedation and top-
ical anesthetization of the airway may obtund protective
reflexes.

This method of anesthetizing the airway does not take
longer than most other techniques and has several ad-
vantages. The patient does not cough either during the
anesthetization or during the intubation, and access to
the neck and identification of anatomic structures is not
required for successful anesthesia.

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Fatal Intraoperative Tumor Embolism in a Child with Hepatoblastoma


Despite use of chemotherapy and radiotherapy, 1 com-
plete surgical resection continues to represent important
therapy for hepatoblastoma. In one series, survival rate
was 69% when complete resection was achieved, com-
pared with a 16% survival when microscopic disease re-
mained following surgery. 2 The intraoperative mortality
rate for major hepatic resection can be as high as 33%, 3,4
mainly because of excessive hemorrhage. Fatal intra-
operative tumor embolism during hepatic surgery in a
child has not been reported previously, although its oc-
currence has been documented during surgery for neph-
roblastoma, 5 suprarenal carcinoma, 6 and in an adult with
a primary liver tumor. 7 We describe a fatal pulmonary
tumor embolism during an extended left hemi-
hepatectomy for hepatoblastoma in a child.

REPORT OF A CASE

A two-year-old boy weighing 11.5 kg presented with a 2-week history
of general malaise and an enormous upper abdominal mass. He was
anemic, with a hemoglobin of 7.8 g/dl and a platelet count of 701,000
per mm 3. Blood coagulation studies and liver function tests were nor-
mal. Serum alphafetoprotein was grossly elevated at 110,000 μg/l. A
large tumor arising from the left lobe of the liver was demonstrated
on ultrasonography, isotope liver scan, and computerized tomography
scan. Selective hepatic arteriography confirmed apparent resectability
of the tumor and defined the arterial anatomy of the liver. A chest
radiograph and computerized tomography scan of the lungs failed to
demonstrate any evidence of secondary spread. The anemia was cor-
rected preoperatively, and the child was scheduled for surgery.

Anesthesia was induced with cyclopropane following im atropine
with meperidine 0.07 ml·kg⁻¹ premedication. Anesthesia was main-
tained by inhalation of nitrous oxide, oxygen, and halothane with iv
fentanyl following succinylcholine iv and intubation of the trachea.

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embolism.
Ventilation was controlled using a Sheffield T-piece occluding ventilator. Continuous display monitoring of the arterial pressure via a radial artery line, central venous pressure via a right internal jugular line, electrocardiogram and nasopharyngeal temperature was instituted.

Laparotomy via an upper abdominal transverse incision was performed. A large tumor, 15 cm in diameter, occupied the left lobe of the liver and extended into the caudate and quadrate lobes. Resection by an extended left hemihepatectomy was considered to be feasible. Arterial blood pressure, central venous pressure, arterial blood gases, and electrolytes were normal at this stage.

The left branches of the hepatic artery and portal vein and the left hepatic duct were exposed, individually ligated, and divided. Hypotension for the surgical period involving incision of the liver was achieved with an infusion of sodium nitroprusside 50 mg in 100 ml 5% dextrose run at 1–5 ml/h (total dose approximately 2 mg). Labetalol (total dose 1 mg/kg) was used to attenuate the increase in heart rate associated with nitroprusside and to allow a lower dosage of that drug. The left hepatic vein was identified, exposed, ligated, and divided. Tumor was found to be present in the cut end of the vein, and an attempt was made to extract this from the inferior vena cava by suction aspiration.

Initially, a predictable response to sodium nitroprusside infusion resulted, and an arterial blood pressure of 60/40 mmHg was maintained. However, the blood pressure suddenly decreased precipitously. The liver edge was noted to be bleeding profusely, and the central venous pressure began to increase. Blood replacement was easily achieved, the sodium nitroprusside infusion was stopped, and cardiovascular support instituted initially using infusion of dopamine (60 mg in 50 ml 5% dextrose) up to 10 ml/hr and then 0.25 ml increments of epinephrine (1 in 10,000); despite these measures, the arterial blood pressure remained low. The lungs became very compliant and the peak airway pressure decreased from 22 cmH2O to 12 cmH2O at the same ventilator settings. The diagnosis of pulmonary embolism was made at this stage, supported by analysis of arterial blood gases, which were pH 7.25, PaCO2 62 mmHg, PaO2 31 mmHg, and a base excess of –2.5 mEq/l, despite controlled ventilation with FiO2 1.0 and normal bilateral breath sounds. Despite all these efforts, cardiac arrest supervened and resuscitation was unsuccessful.

At necropsy a large tumor embolus was found lodged in the bifurcation at the main pulmonary artery, causing total obstruction of the right pulmonary artery. Multiple tumor emboli (up to 0.5 cm diameter) were found peripherally in both lung fields. The inferior vena cava also contained tumor.

**DISCUSSION**

While surgery still offers the best chance of cure, preoperative chemotherapy and radiotherapy may not only reduce the size of metastatic deposits and even eradicate them but may also reduce the size of the primary tumor and convert an inoperable tumor to a resectable tumor. It remains difficult to diagnose early metastatic spread, and lung deposits were not seen on a preoperative computerized tomography scan, nor was the tumor embolus within the inferior vena cava visible.

Invasion of the inferior vena cava with tumor, although rare in hepatoblastoma, creates a highly dangerous situation. The diagnosis may be established on ultrasonography, computerized tomography scan, vena cavogram, or cardiac angiography. Emergency extraction of emboli using cardiopulmonary bypass has been successful in two reported cases, one of which was in a 10-year-old child. In the light of improving chemotherapeutic techniques, this technique should be considered. In our case, the tumor embolus was too extensive to permit an emergency pulmonary embolactomy (Trendelenberg procedure) or to establish cardiopulmonary bypass before an embolactomy.

When the diagnosis of inferior vena caval involvement is established preoperatively, surgical resection should be postponed while attempts to eradicate the tumor invasion with chemotherapeutic agents are made. Facilities for cardiopulmonary bypass should be available when surgery eventually is undertaken.

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