long as $P_{Ob}$ is not allowed to increase. It must be noted, however, that our studies were performed on patients who had sustained trauma to the head. Our conclusions might not necessarily apply to other clinical situations.

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Anesthetic Management of a Patient with Recessive Epidermolysis Bullosa Dystrophica

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Epidermolysis bullosa dystrophica of the recessive type is a rare skin disease of congenital origin. It is characterized by extensive involvement of the skin and mucosa with bullous and dystrophic lesions, which may undergo malignant change. Recently, we encountered a severe case with multiple complications. This report documents the safety of ketamine in three consecutive administrations in this case.

REPORT OF A CASE

A 21-year-old Caucasian man with a history of epidermolysis bullosa dystrophica diagnosed shortly after birth was admitted to the hospital in 1974 because of a fungating mass on the left leg. Family history was negative. There had been repeated episodes of severe skin excoriation and necrosis resulting from any trauma, even minimal trauma. As a result of dystrophy, the patient had numerous deformities of the extremities. He was barely able to feed himself and was mainly

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confined to a wheelchair. He used his left leg to move about; the right leg was atrophic and faciced. He covered himself with plastic because clothes stuck to the skin crusts. He could not chew hard foods because blisters occurred in his mouth easily. In 1972, he had had dysphagia. X-ray studies had revealed a double-lumen esophagus and an adventitious lumen filling from below. Symptoms of this were treated with liquid diet and relieved. No history was obtained to suggest laryngotracheal involvement. The patient had long-standing hypochromic anemia due to nutritional deficiency.

Physical examination revealed that the patient was underdeveloped and cachectic, with the appearance of a 10-year-old boy. He weighed only 20 kg. Bullous lesions covered most of the body, including the face, the scalp, the mouth, and the nose. He had alopecia. Some of the lesions were necrotic, crusted, infected, and foul-smelling. The extremities were thin, erythematous, and atrophic. All digits except the thumbs were fused by webbing and had become atrophic stumps. Contracture of most major joints prevented him from lying supine. The fungating mass on the left tibia had been diagnosed as epidermoid carcinoma. The patient was anemic, (hematocrit, 24 per cent), and had a cardiac murmur attributable to the anemia. The tongue was adherent to the floor of the mouth except at its tip. Chest x-ray was within normal limits.

The patient underwent three operations at bimonthly periods: wide excision of the tumor, excision of recurrent carcinoma with skin graft, and a below-knee amputation.

Ketamine (Ketalar) was administered in a similar manner on each occasion. The induction dose was administered im: 50, 100, and 60 mg, respectively. This was followed by intravenous doses as necessary. Each operation lasted about one and a half hours. The total doses of ketamine were 350, 350, and 240 mg. Only on the last occasion was the patient premedicated (meperidine, 35 mg, and atropine, 0.3 mg, im). Physical contact was minimized. Except for hypertension (blood pressure elevated from 120/80 to 160/110 mm Hg) and tachycardia (pulse rate increased from 90 to 120/ min), the anesthetic courses were uneventful, with smooth recoveries.

**DISCUSSION**

Epidermolysis bullosa dystrophica of the recessive type presents many anesthetic problems. A variety of anesthetic agents and various techniques have been used to cope with the difficulties.

First, areas of unaffected skin are severely limited. Touching the skin may be quite painful to the patient. Application of the blood pressure cuff, adhesive tape, monitoring electrodes, airways, oropharyngeal, esophageal, or rectal probes, urinary catheters, etc., carries the risk of contaminating and severely traumatizing the skin or the mucosa.

Premedication and induction with barbiturates probably should be avoided because of the high incidence of associated porphyria. Application of the face mask and insertion of the oral or tracheal airways may excoriate, blister, or cross-contaminate the skin and the mucosa, leading to facial injuries, airway obstruction, and pulmonary infections. If endotracheal intubation is necessary, profound paralysis is indicated to facilitate atraumatic intubation. However, nondepolarizing muscle relaxants are relatively contraindicated because disused and dystrophic muscles may manifest unpredictable sensitivity. Extensive tissue injury could conceivably produce hyperkalemia following succinylcholine administration. In our case, severe anemia and malnutrition further predisposed the patient to hypotension and hypoxia. Adhesion of the tongue was a severe airway hazard and esophageal stricture increased the risk of vomiting, regurgitation, and aspiration.

Regional anesthesia is not suitable because of the likelihood of infection, contractures, and physical and chemical trauma to the skin. Suitable injection sites for the block are usually not available.

Ketamine anesthesia appears to be a viable alternative, because it usually requires no airway manipulation and minimal positioning. It characteristically preserves the reflexes and maintains the vital functions. However, it has several potential disadvantages. It is hallucinogenic. Postoperative hallucination may be accompanied by traumatic physical activities. Abnormal EEG associated with this skin disorder has been described. Theoretically, this can be exaggerated by ketamine. Despite these potential disadvantages, ketamine has been successfully utilized with gratifying results in two other reported cases, one of which was complicated by life-threatening bronchospasm. It does not depend on the patient's cooperation. This is a valuable asset because most patients are too young to cooperate and may suffer serious injuries from induction of inhalation anesthesia or injection of local anesthetics.
Comparing the results of available case reports in which the patients were anesthetized with various other methods with our experience, we come to the conclusion that ketamine is the anesthetic of choice for many procedures in patients with epidermolysis bullosa dystrophica.

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Total Spinal Anesthesia Following Intrathoracic Intercostal Nerve Blocks

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It has been shown1-4 that materials injected directly into a peripheral nerve can later be detected in the subarachnoid space and spinal cord. We are not aware of any report documenting an adverse central migration of local anaesthetic deposited with known certainty into a peripheral nerve, except for reports of transverse myelitis following the use of Elocaine® for intercostal nerve block.5 The purpose of this communication is to report the occurrence of total spinal anesthesia resulting from the instillation of 0.75 per cent bupivacaine into six intercostal nerves under direct vision at the conclusion of an open thoracotomy while the patient was under general anesthesia.

REPORT OF A CASE

A previously healthy 32-year-old man was scheduled for a left lateral thoracotomy because of a one-day history of hemoptysis of bright red blood and a chest film that showed a large (8 cm) paramediastinal mass in the left chest. Additional history and physical examination were noncontributory, and results of all other laboratory studies were within normal limits.

Anesthesia during the first three and a half hours of operation, during which a left pneumonectomy was performed, was maintained with 1 per cent halothane in oxygen, pancuronium, 12 mg, iv, in six divided doses, and fentanyl, 0.3 mg, iv, in five divided doses. Throughout the operation blood pressure was 125-100/80-60 torr, pulse 95-115 beats/min, and CVP 8-9 cm H₂O. Fluid replacement consisted of two liters of crystalloid and one unit of whole blood. Arterial blood gases were within normal limits.

Prior to closure of the chest, three ribs above and three below the incision were identified and each intercostal nerve bundle injected 1-2 cm lateral to the sympathetic chain with 3 ml 0.75 per cent bupivacaine containing 1:200,000 epinephrine.