1. In the absence of antibiotics, the effect of pancuronium, 2.4 mg/m², is readily antagonized by pyridostigmine, 14.5 mg. Possibly, administration of these acetylcholinesterase inhibitors actually prolonged the pancuronium–polymyxin B neuromuscular block. The prompt initial improvement after administration of calcium chloride (increase in the twitch height from 45 per cent to 80 per cent of control) suggests partial antagonism of this antibiotic-pancuronium neuromuscular blockade.

Since tetanus (50 Hz) normally is sustained approximately 2.5 hours after pancuronium, the prolonged block might have resulted from Polymyxin B alone. This seems likely, since urinary levels of Polymyxin B (excretion in urine is the major route of elimination) peak about 24 hours after an intramuscular injection.

If administration of antibiotics to patients with nondepolarizing neuromuscular blockade is indicated, perhaps alternative antibiotics, such as the cephalosporins which are devoid of neuromuscular blocking properties and have both gram-positive and gram-negative antibacterial activity, might be administered.

In summary, we have reported a prolonged block from pancuronium in the presence of Polymyxin B. Acetylcholinesterase inhibitors did not antagonize, and perhaps increased, that block. Calcium chloride partially antagonized the block.

REFERENCES


Improper Oxygenation during Bronchofiberscopy

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A flexible bronchofiberscope was introduced by Ikeda in 1968. The instrument has been utilized during both general and topical anesthesia. The relative ease with which this flexible instrument may be inserted into the airway has led to increased use of bronchoscopy by less experienced personnel.

Troubled by episodes of hypoxia during performance of bronchofiberscopy using topical anesthesia, Harken et al. advocated insufflating oxygen through the cuff hose of an endotracheal tube in which a window had been cut into the cuff. The bronchofiberscope was then introduced down the central lumen of the endotracheal tube, which had been previously inserted under topical anesthesia following the method of Ikeda.

At our institution a nasopharyngeal airway, rather than an endotracheal tube as advocated by Wanner et al., is used to pass the bronchofiberscope.

The following case led us to look into a safe, reliable method for oxygen administration during bronchofiberscopy through a nasopharyngeal airway using local anesthesia.

REPORT OF A CASE

A 75-year-old man was scheduled for bronchofiberscopy because of persistent pneumonitis and atelectasis of the right lower lobe.
a month after a cecostomy. Previous sputum cultures had been positive for *Klebsiella pneumoniae* as well as *β*-hemolytic staphylococcus. Bronchoscopy was performed utilizing an Olympus type 5B-2 bronchofiberscope with local anesthesia (fig. 1). Supplemental oxygen was administered by nasal catheter in the opposite nostril. The procedure was well tolerated, and post-bronchoscopy roentgenograms showed some resolution of the atelectatic area.

The following evening the procedure was repeated by a less experienced bronchoscopist. Using the same instrument, supplemental oxygen was administered through the cytology and suction channel of the bronchofiberscope directly from a wall-mounted oxygen flowmeter. The flow rate on the oxygen rotameter was more than 10 l/min. Oxygen delivery was discontinued for short periods during suctioning. The patient appeared to tolerate the procedure relatively well, but the post-bronchoscopy roentgenogram revealed about a 40 per cent pneumothorax on the right side. The pneumothorax was treated successfully by insertion of a chest tube and negative-pressure drainage.

**DISCUSSION**

That pneumothorax can occur with high endobronchial pressures is well known and has been demonstrated in experimental animals. The pressure necessary to cause this is even less when atelectasis is present, as was the case with this patient.

Even low oxygen flows would seem inappropriate when administered through the central core of the bronchofiberscope. As the scope passes distally to the point where endobronchial lumens become totally occluded, a 2-l/min flow rate, for example, would mean that the small segment of lung supplied by that particular bronchial division would have to expand by 1 l in 30 seconds or develop tremendous pressure.

A means of oxygenation during bedside bronchofiberscopy that we find safe and effective involves using a disposable oxygen mask with attached plastic bag (Hudson Model 24T) (fig. 2). A small hole is cut over the nostril; through this, the bronchofiberscope is passed, and a nasopharyngeal airway is placed in the nostril through which the instrument is inserted. Measurements of inspired oxygen concentrations at mid-inspiration in seven patients using a Beckman oxygen analyzer revealed FIO2 values of 0.6–0.8 at a flow rate of 10 l/min.

If an endotracheal tube is first inserted

**FIG. 1.** Olympus model 5B-2 bronchofiberscope.

**FIG. 2.** Method of oxygenating utilizing a disposable oxygen mask with hole cut for bronchofiberscope.
An Equation System and Programs for Obtaining Base Excess Using a Programmable Calculator

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The calculation of base excess (BE) from blood-gas values gives information useful in the care of critically ill patients. This calculation has been done by an alignment nomogram, a slide rule, a general-purpose digital computer, or a small laboratory computer. We have devised an alternative method to take advantage of the many unique features of the modern programmable calculator.

METHOD

The procedure follows the standard use of the Siggaard-Andersen nomogram (fig. 1). The values of pH, PaCO₂ and hemoglobin determine the position and the slope of the buffer line on the pH—log PaCO₂ coordinates. The slopes, which depend on BE as well as on hemoglobin concentration, are obtained by fitting the data of Siggaard-Andersen:

\[ \frac{0.0204}{s} = 0.01434 \text{ BE} \]

where Hb is hemoglobin concentration in g/100 ml. The algorithmic portion of the calculator enables us to use a second unknown variable, BE, in this formula (see below). Once the slope is known, the buffer line is expressed as:

\[ y - y_0 = s(x - x_0) \]

where x and y are pH and log PaCO₂, and \( x_0 \) and \( y_0 \) are the observed values of pH and log PaCO₂.

On inspection, the base-excess line (fig. 1) appears to resemble a hyperbolic function, whose general form may be expressed as:

\[ y = ax + b + \frac{c}{x - d} \]

where x, y, \( x_0 \), and \( y_0 \) are as in equation 2. Subsequent calculation and plotting of the curve confirmed this impression. The four coefficients (a, b, c, and d) were determined by trial and error: