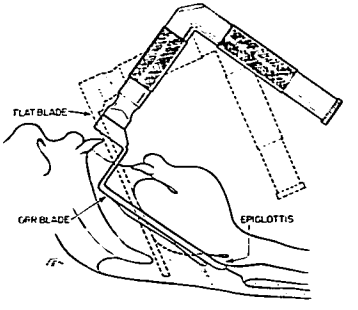

FIG. 1. Orr blade in position.

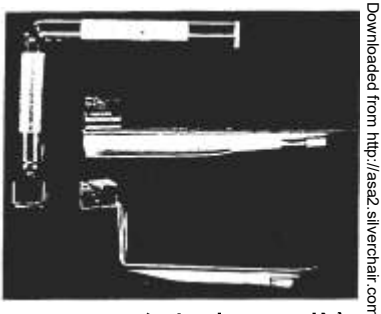

FIG. 2. Conventional and Orr laryngoscope blades.

laryngeal exposure was difficult, a comparison was made between the conventional and the new blades, and exposure seemed to be facilitated with the latter.

The new laryngoscope blade has been made in two lengths, 100 mm and 120 mm, because if it is too long for an individual patient, the tip will probably be in the esophagus, which would prevent its being withdrawn to expose the larynx because of impingement of the upper incisor teeth against the vertical portion. In this circumstance only the shorter blade can be used.

CASE REPORTS

Dilatation of the Larynx with Cole Tubes

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Use of the Cole tracheal tube in small infants and children has earned a deserved popularity. In the patient whose airway diameter is of considerable importance, this tube permits the use of tube connectors of generous dimensions. Moreover, intubation of a bronchus is prevented by the tube shoulder resting on the glottis. The following two cases show that if the shoulder of a Cole tube is allowed to press on the glottis for a prolonged period it will have pressure effects which may be dangerous.

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CASE REPORTS

Two female infants were admitted on the same day with signs of tetanus neonatorum. One was seven days and the other eight days old; both had been normal full-term babies who had flourished for the first few days of life until pharyngeal spasm and generalized muscular rigidity began to appear. During the 36 hours after admission control of muscle spasms was sought, using large doses of diazepam and small doses of barbiturate, but in both infants control was short-lived, indicating that the toxemia had worsened and management by conservative means was unlikely to succeed.

A regime of muscle paralysis and mechanical ventilation was started in each infant. To maintain an airway in such cases it had been our practice to use simple Portex tracheal tubes inserted through the mouth or nose. However, because of difficulty in securing these tubes, and the telescoping effect which occurs when the infant's

head is flexed or extended, intubation of a bronchus had occurred several times. In the hope of avoiding this complication, these two patients were intubated through the mouth with Cole tubes, size 14 French, which were inserted until the tube shoulder came to rest on the glottis. The tubes were then secured in place with adhesive tape.

All went well for a week. On the eighth day after intubation, during inspection of the mouth and tube, it was noticed that in each infant the tube moved in and out freely. Laryngoscopy revealed that the shoulder of the Cole tube had acted as a dilating cone and the wide portion of the tube (equivalent to 19 French) had passed through the larynx into the trachea. On inspection after removal of the tubes, both larynges appeared to be dilated but were without visible ulceration or other damage. The Cole tubes were immediately replaced with regular nasotracheal tubes and the treatment regime was continued.

The tetanus toxemia subsided between the third and fourth week after intubation. Administration of relaxant drugs was reduced and eventually stopped. When spontaneous respiration was adequate we set about the task of removing the nasotracheal tubes. In ordinary circumstances this maneuver is not without problems, and in these infants who had already suffered the insult of laryngeal dilatation, trouble was expected. One of the infants was extubated successfully with the help of a small-sized "weaning" tube, left in for 24 hours, and the only remaining sequela was mild stridor, which gradually disappeared. The other infant had severe stridor when the tracheal tube was removed, and through a laryngoscope this was seen to be due to collapse of the upper trachea just below the level of the cricoid.

During the ensuing two months many different methods were tried in the hope of achieving a successful extubation. Several times we thought we had succeeded. When the infant was under anesthesia or deep sedation, and breathing quietly, she would remain in satisfactory condition without a tube for several hours. But when she awoke and tried to breathe vigorously or cry, severe inspiratory stridor occurred and immediate reintubation was necessary. Repeated laryngoscopy on several occasions showed the same picture: the larynx itself was modestly dilated but otherwise normal, and the obstruction was localized at the sub-cricoid level, with side-to-side collapse of the trachea during inspiration. Tracheostomy was performed at the age of 3½ months.

Comment

Pressure from the shoulder of a Cole tube has little, if any, effect on the larynx if it lasts only for the duration of an anesthetic. But even gentle pressure can have far-reaching effects if applied for a long period. When a Cole tube rests on the glottis its further entry into the trachea is prevented by the resistance of the firm cartilaginous framework of the larynx. In small infants the laryngeal cartilages are imperfectly developed, relatively soft, and yield to prolonged gentle pressure. The most serious damage, in these two cases, was that inflicted on the cricoid and first two rings of the trachea, which were stretched and weakened and unable to support the airway after removal of the tube.

These cases illustrate that sustained gentle pressure has effects on the larynx which differ from the damage caused by inserting too large a tube. The differences hinge upon the severity of pressure ischemia. Gentle pressure causes mild ischemia, with deformation and stretching of tissues; there is dilatation but no necrosis. A tube which is too large may cause severe pressure ischemia of the mucosa and underlying structures in the region of the cricoid. If the tube remains in place only for the duration of an anesthetic, its removal will be followed by hyperemia and edema in the previously ischemic zone, causing huskiness or stridor. But if it remains for a longer period, pressure ischemia will progress to tissue necrosis and sloughing. The end result is ulceration.[1-3]

For short-term application the Cole tube has distinct advantages which recommend its use. For therapeutic intubation which may be prolonged, however, it seems advisable to use simple tubes of uniform diameter, and of such size and consistency as to have minimal pressure effects.

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