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Short Communication

A new diagnostic approach to congenital stridor using a laryngeal mask airway and rigid endoscope

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Abstract
Neonates with symptoms of stridor from birth, present a difficult diagnostic problem. We have demonstrated that by the use of a laryngeal mask airway in an anaesthetized baby breathing spontaneously, we are able to reach a diagnosis. This is accomplished by the introduction of a rigid fibre-optic endoscope through a Portex swivel connector and visualizing the glottis and larynx.

Key words: Respiratory sounds, stridor; Airway, laryngeal mask; Bronchoscopy, fibre-optic

Introduction

The laryngeal mask airway (LMA) – a new concept in airway management has been in general use in the UK since 1988 and was approved by the USA FDA in 1991 (Brain, 1991).

Its use for diagnostic laryngo-bronchoscopy has become attractive (together with a rigid or flexible fibre-optic bronchoscope), since the patient is able to breathe spontaneously whilst anaesthetized, thus allowing careful examination of the larynx, trachea and bronchi (McNamee *et al.*, 1991; Briggs *et al.*, 1992; Maroof *et al.*, 1992).

Congenital stridor may be due to numerous causes, the most common of which is laryngo-malacia. This diagnosis has in the past always been made by exclusion of other pathologies.

We present two cases in which the diagnosis was made by direct vision of the larynx during spontaneous respiration under general anaesthesia (Lawson and Thomas, 1993).

Case reports

Case 1

Inspiratory stridor was heard immediately after the birth of a male child (birth weight 2.9 kg; Apgar 7/7). This was coupled with central cyanosis and respiratory distress. The baby was ventilated and placed in an oxygen tent and despite this, he remained cyanosed (SpO_2 75–80 per cent). Arterial blood gas analysis at the time was pO_2 31 mmHg, pCO_2 99 mmHg, pH 6.9, Bicarbonate 19, BE–17.

After intubation and ventilation, the respiratory acidosis was corrected to pH 7.33, PCO_2 33 mmHg, but only after 24 hours of ventilation was it possible to correct the hypoxaemia. During this period, supportive IV therapy was maintained with antibiotics, dopamine and tolazoline. After 24 hours, oxygenation improved and the baby was assisted by continuous positive airway pressure (CPAP) for a period of a few hours. However, cyanosis and respiratory distress, returned and reintubation was considered necessary. This process was repeated several times.

Direct laryngoscopy with an infant Magill blade revealed the absence of a laryngeal web and the presence of vocal folds which appeared to have limited movement. However, the diagnosis was neither clear nor satisfactory.

It was decided to anaesthetize the baby using an inhalational technique N_20, 0_2 and halothane) and when a sufficient depth of anaesthesia was achieved, a No. 1 LMA was introduced and connected via a Portex swivel connector to the anaesthetic circuit (Maekawa *et al.*, 1993). The baby continued to breathe spontaneously whilst examination under anaesthesia was performed by introducing a 2 mm fibre-optic rigid endoscope (Hopkins rod, 2 mm diameter – zero degrees) via the swivel connector (see Figure 1). The procedure was recorded by the use of a video camera attached to the eye-piece of the endoscope.

Vital signs were monitored continuously by means of an ECG monitor, capnograph and pulse oximeter. The endoscope was introduced into the larynx via the serrations on the LMA under direct vision. The false and true vocal folds were oedematous but were seen to approximate during inspiration. It was also noted that the laryngeal wall was seen to be indrawn during inspiration. This was conclusive of the diagnosis of laryngo-malacia.

Case 2

A male child (birth weight 3.4 kg) was born at 35 weeks gestation. He developed respiratory difficulty at birth with lower rib indrawing during inspiration. Air entry to both lungs was normal. He was placed in a tent and breathed 40 per cent oxygen. Intubation was not considered to be necessary. Four days after birth stridor developed and it was decided to perform examination of the larynx and vocal folds under anaesthesia, using the LMA and a rigid endoscope.

In this child oedematous arytenoids and mild hypertrophy of the false vocal folds were seen. No evidence of laryngo-malacia was found.

Again the procedure was recorded on video tape and the endoscopy was performed via the examination opening of the Portex swivel connector. The baby breathed spontaneously during the procedure and was maintained with Sp02 97–100 per cent throughout.

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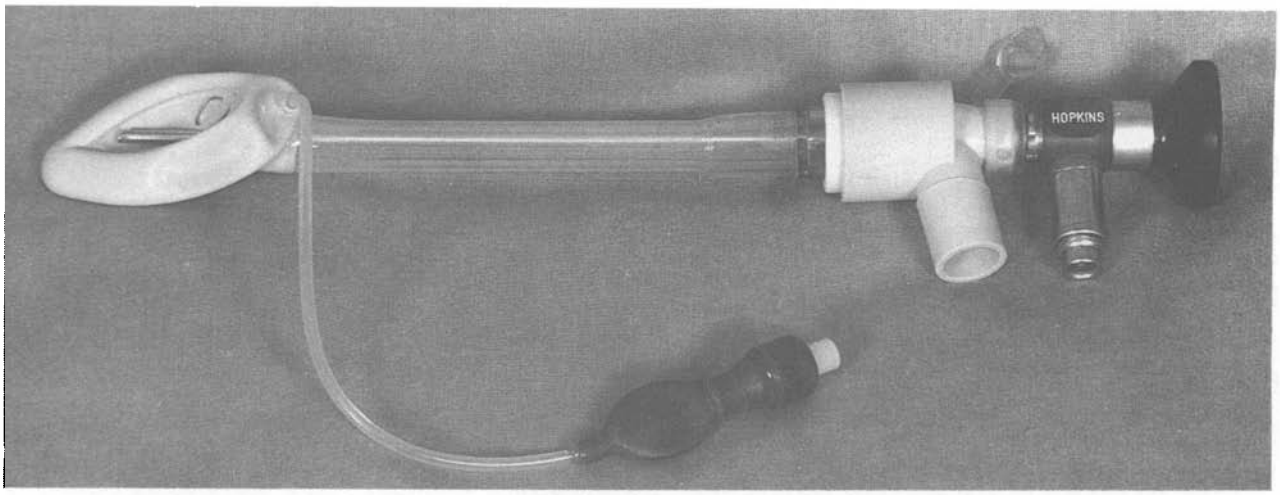

FIG. 1
Rigid endoscope – Hopkins Rod (2 mm diameter – 0 degrees).

Discussion

Laryngo-malacia refers to flaccidity of the cartilaginous suprastructure of the larynx. Characteristic symptoms are inspiratory stridor with suprasternal and intercostal retraction during inspiration.

The traditional method of diagnosis was by direct laryngoscopy and inspection of the epiglottis and larynx during inspiration. The very process of introducing a rigid laryngoscope blade into the vallecula caused discomfort to the patient and distortion of the tissues which were to undergo examination. An added problem was maintenance of adequate oxygenation in a patient who might already tend towards hypoxaemia because of his basic pathology.

The literature describes methods for using both rigid and flexible bronchoscopy in making this diagnosis. In order to be certain of the diagnosis, it is necessary to view the larynx under normal physiological conditions and spontaneous respiration which allows the examiner to see movement of the epiglottis, vocal folds and laryngeal walls. The methods described do not satisfy these conditions completely and in many cases depend upon speed of action and versatility on the part of the examiner who is forced to complete his examination under less than ideal conditions.

The LMA has been widely used in the UK and in the USA for several years. It provides a very useful alternative to endotracheal intubation in patients who are fasting and where muscular relaxation is not essential. It sits in the hypopharynx with its opening directed towards the laryngeal entrance. The epiglottis ideally rides up towards the base of the tongue, but may also be folded downwards and partially cover the glottic entrance. This does not usually cause any respiratory problems.

In the cases we have described, it was essential to maintain good oxygenation and at the same time allow examination of the larynx and trachea under spontaneous respiration.

Use of the LMA enabled us to maintain anaesthesia sufficiently deep to allow insertion of the endoscope without producing any laryngeal reflexes. In the two cases we have reported, a No. 1 LMA was used. In order to allow free respiration during the examination, we decided to use the 2 mm, diameter rigid endoscope and not the marginally wider flexible bronchoscope which has a diameter of 3.5 mm (Pennant and White, 1993).

We wish to point out that both patients examined were neonates weighing less than 5 kg and only as a result of the use of the LMA was it possible to make a firm diagnosis at such an early stage.

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