INTUBATING VIDEO ENDOSCOPE

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates in general to an endoscope, and, more particularly, to an endoscope having a sheath member with a controllably bendable distal or forward sheath portion and a generally rigid proximal or rearward sheath portion, which sheath member further includes an image transmitting system therethrough.

2. Description of the Related Art

When a surgical technique requires that a patient be placed under a general anesthesia, the anesthetic is usually administered to the patient by inhalation. To accomplish this, a endotracheal tube with an inflatable cuff is introduced into the patient's trachea after the patient is sedated or "put to sleep". Once the endotracheal tube is properly positioned, the cuff is inflated to seal the trachea passageway from ambient gases, and the anesthetic is introduced to the patient for inhalation through a lumen in the endotracheal tube.

When this technique is used to introduce an anesthetic, the ventilation of the patient is carefully controlled and monitored by the surgical team. The lumen in the endotracheal tube is connected to an anesthetic machine, thus forming a closed inhalation/anesthetic system between the sleeping patient and the anesthetic machine. Both the volume and cycle of the respiration of the patient during the surgical procedure is closely controlled and monitored continuously by the anesthetist.

One problem with the closed inhalation/anesthetic system technique using an endotracheal tube in association with an endoscope (which is widely used in inhalation-induced general anesthesia), is that the introduction of the endotracheal tube, that is, a plastic tube with an inflatable cuff, is not always an easy, successful or non-traumatic procedure for the patient.

Specifically, an anesthetist is usually taught that in commencing this technique, a surgical instrument, such as a laryngoscope, is first introduced into the patient's mouth and the patient's tongue is elevated so that the patient's epiglottis and vocal cords (forming the entrance to the trachea) can be visualized.

In practice, however, there are many anatomical anomalies and physical variations among patients which do not permit observation of this vital tracheal area, so that the medical practitioner attempting to perform this procedure is reduced to operating blindly, by feel, relying on his prior experience to provide him with general guidelines.

Even in the case of a "standard" intubation that proceeds without difficulties in the visualization of these vital tracheal areas, two major problems must be met and overcome by the medical practioner.

First, when the endotracheal tube approaches the patient's vocal cords, the precise location of the distal, or forward end of the endotracheal tube becomes obscured by the endotracheal tube itself. This situation requires that any further advance of the endotracheal tube through the patient's vocal cords by the medical practitioner be done semi-blindly, relying on feel.

If the endotracheal tube abrades or otherwise injures the patient's vocal cords, such inadvertent injuries can result in a number of problems ranging from a "sore throat" with transient speech impairment to a "husky voice" or even vocal cord paralysis.

Secondly, after the endotracheal tube is advanced past the vocal cords and into the patient's trachea, the distal end of the endotracheal tube should be in the range of 2 to 4 cm (about 1 to 2 inches) in front of the bifurcation of the trachea in order to ventilate both of the patient's lungs equally.

In practice, this positioning of the endotracheal tube with respect to the tracheal bifurcation is partially determined by gradation markings on the endotracheal tube itself, and by prior experience on the part of the medical practitioner. However, there are many variations in the length of the trachea of individual patients, and although such tracheal length is usually classified and determined by a patient's teeth-bifurcation distance, no absolute standard exists.

If the distal or forward tip end of the endotracheal tube is mislocated, and the patient's lungs are unequally ventilated during the general anesthesia state (half-lung ventilation), the patient may develop a post-operative pneumonia problem.

Currently, the anesthetist employs techniques such as auscultation (the process of listening for sounds emanating from the patient's chest) to determine if the patient's lungs are being ventilated equally. Such a technique as auscultation requires broad experience on the part of the practioner and some guess work, providing for a wide margin of error. Also, auscultation by the anesthetist to hear both lung excursions is not always accurate, mainly in obese patients with a large chest cavity.

The problems and complications resulting from an unsuccessful intubation attempt can be largely overcome by precise visual control of the endotracheal tube throughout the actual intubation process, that is, guiding the passage of the endotracheal tube through the patient's vocal cords and into the trachea, and, by proper positioning of the distal or forward end of the endotracheal tube in front of the patient's tracheal bifurcation so as to ventilate his lungs equally.

The following instruments and techniques of the prior art have been used to assist in the intubation process:

(1) An endotracheal tube stylet instrument which consists of a wire, generally copper, having a plastic covering. This endotracheal tube stylet is inserted into a central lumen of the endotracheal tube to straighten the natural curvature of the endotracheal tube so as to accommodate a patient having a narrow mouth.

Specifically, the distal or forward tip end of the endotracheal tube can be bent or formed by using the stylet so as to enable it to follow a shorter exterior radius, thereby facilitating the intubation of the endotracheal tube in cases requiring the elevation of an "overhanging" epiglottis.

These endotracheal tube stylets are also available with a small battery operated electric bulb located at their distal tip end that provides transillumination of the trachea.

(2) Another approach is the completely flexible fiber optic bronchoscope used in association with an endotracheal tube, siilar to that endoscope of U.S. Pat. No. 3,788,304 to Takahashi.

Completely flexible bronchoscopes were previously used for transnasal or even oral intubations. The completely flexible nature of the instrument, its extreme length, and the tiny monocular image seen in its eye-