ADJUSTABLE STOP FOR ENDOTRACHEAL TUBE GUIDE

BACKGROUND OF THE INVENTION

The present invention relates to endotracheal tube or catheter guides, and in particular to adjustable stops for use with such guides to set the depth of penetration of the guide into the endotracheal tube or catheter.

A variety of guides and stylets are available for use with flexible endotracheal tubes and catheters to aid the physician in intubating such instruments with a minimum of trauma to the patient. The guide or stylet is usually inserted within the endotracheal tube or catheter before intubation into the patient. After intubation, the guide or stylet is carefully withdrawn.

Of considerable importance to the physician is the ease by which the guide can be configured along with the endotracheal tube or catheter into a semi-permanent shape best suited for intubation; the necessity for adjustably setting and permanently maintaining the depth of penetration of the distal end of the guide within the tube or catheter; and the ease with which the guide can be withdrawn from the tube or catheter after intubation.

One type of stylet or guide in wide use consists of a long thin wire of maleable metal, such as soft iron, copper, or aluminum, which has been completely encapsulated and hermetically sealed with a tough layer of elastomeric polymer, such as nylon, polyolefin, polypropylene, or the like. While such guides have been relatively easy to configure into a desired shape and can be withdrawn from an intubated endotracheal tube or catheter without difficulty, some problems have been encountered in setting and maintaining a predetermined depth of penetration of the guide into the tube or catheter.

One method employed to preset the depth of penetration has been to form a right-angle or ninety-degree bend near the proximal end of the guide for abutment against one side of the opening to the endotracheal tube or catheter. Another method has been to form a small closed or circular loop with the proximal end of the guide with a portion of the loop abutting the open end of the endotracheal tube or catheter. Neither of these methods has been found to be completely satisfactory, nor do they offer any satisfactory way by which the physician can grasp the proximal end portion of the guide or stylet for manipulation without the risk of accidentally rebending or altering the shape of the proximal end, thereby causing the distal end to dangerously penetrate beyond minimum safe limits.

To alleviate this serious problem, an improved endotracheal tube stylet has been introduced employing an adjustable stop of tough synthetic rubber mounted upon and slidable along the length of the stylet for setting the desired depth of penetration. A description of this new stylet appears in the March-April 1974 issue of *Journal of the International Anesthesia Research Society,* Vol. 53, No. 2, pages 341–342.

A further solution to the above-mentioned problems appears in U.S. Pat. No. 3,957,055, wherein an adjustable stop has been described which performs not only the function of setting and maintaining the desired preset depth of penetration but also serves the additional function of providing an anchor for the proximal end of the guide, thereby enabling the proximal end portion of the guide to be formed into a convenient and useful handle. The present invention is concerned with further

improvements in adjustable stops for use with endotracheal tube or catheter guides to overcome the above-mentioned problems.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of the preferred embodiment of the invention.

FIG. **2** is an end view of the adjustable stop invention of FIG. **1**.

FIG. **3** is a perspective view of the invention used with an endotracheal tube or catheter guide.

FIG. **4** is a perspective view of the adjustable stop installed in the reverse position upon the endotracheal tube or catheter guide.

FIG. **5** is an alternative embodiment of the invention.

DESCRIPTION OF THE INVENTION

Referring to FIG. **1**, a cylindrically-shaped body **11** of resilient polymer material, such as natural or synthetic rubber, polyvinyl chloride, or the like, is shown having a first flat end surface **12** and a second flat end surface **13**. A disk-shaped shoulder portion **14**, having a diameter approximately fifty percent larger than the diameter of the cylindrical body **11**, is formed at the second flat end surface **13**. A portion **15** of the cylindrical body **11** adjacent the first end surface **12** is slightly tapered or cone-shaped, as shown, while the portion **16** adjacent the shoulder portion **14** is substantially straight.

A central bore **17** extends coaxially through cylindrical body **11** from end surface **12** to end surface **13**. The diameter of bore **17** is sufficient to permit the adjustable stop of FIG. **1** to slide easily over the surface of an endotracheal tube guide.

In the preferred embodiment illustrated in FIG. **1**, two cylindrical holes **18** and **19** extend partially into the cylindrical body **11** from end surfaces **12** and **13** respectively, as shown, and these holes **18** and **19** are approximately parallel to and laterally offset from central bore **17**. The holes **18** and **19** are diametrically disposed with respect to central bore **17**. By providing the two holes **18** and **19**, as shown, the adjustable stop may be used in either one of two possible configurations, as will be discussed below. However, only one such hole is necessary to the invention.

The diameter of holes **18** and **19** is smaller than the outside diameter of the endotracheal tube guide for which the adjustable stop is designed to be used, and is smaller than the diameter of central bore **17**. The depth of each of the holes **18** and **19** is approximately one-half the distance between end surfaces **12** and **13**, as shown.

The adjustable stop of FIG. **1** may be manufactured by any suitable conventional molding process, and in one example it was composed of polyvinyl chloride having a length of approximately 1.7 centimeters between end surfaces **12** and **13** and a diameter of approximately 1.7 centimeters at shoulder portion **14**. The diameters of central bore **17** and holes **18** and **19** will vary depending upon the sizes of endotracheal tube or catheter guies to be used. The diameter of cylindrical body **11** at end surface **12** and the taper or portion **15** is determined by the inside diameter of the connector used with conventional endotracheal tubes or catheters.

FIG. **2** illustrates the adjustable stop as viewed from the flat end surface **13**, and better illustrates the relative diameters of central bore **17** and hole **19**.