ENDOTRACHEAL TUBE ATTACHMENT DEVICE

BACKGROUND AND SUMMARY

Endotracheal tubes are commonly inserted through the mouth and into the trachea of patients to maintain an open airway and to allow mechanical assistance of breathing. Such tubes are often placed prior to surgery or are used on trauma or critically ill patients that may require intubation for extended periods of time. Many instances in which a patient is intubated require that the tube remain in place for approximately 48 to 72 hours and, in some circumstances, the period of use may be extended for 7 to 14 days. The most common method for securing an endotracheal tube on a patient is by using adhesive tape to adhere the tube to the patient's mouth and face. However, this method is not believed to be particularly effective as it does not provide positive positioning of the tube, it restricts access to the mouth, and the adhesive tape may add to the patient's discomfort of being intubated. Taping the tube in place also does not allow for easy repositioning of the tube, and maintaining the tube in one position, such as against one side of the mouth, is known to cause irritation and ulcering of the lips and surrounding skin. Consequently, nurses typically reposition the tube once every 24 hours which requires stripping away the adhesive tape from the patient's face and lips, repositioning the endotracheal tube, and then reapplying adhesive tape to secure the tube in place. While repositioning the tube at such intervals may prevent sores or ulcers from forming around the mouth, the repeated stripping away and re-attaching of adhesive tape to the mouth area itself often causes irritation and can be exceedingly uncomfortable for the patient. It is also a time-consuming operation that, if performed hastily or without sufficient care, could result in improper positioning of the tube at possibly serious risk to the patient's welfare.

Many devices are known for securing an endotracheal tube on a patient but it is believed that these devices are not particularly effective due to the continued and prevalent practice of using adhesive tape to position and secure endotracheal tubes. Such devices often take the form of face plates or complicated frames that attach to the patient's face and head and provide a means for securing the endotracheal tube in place. (See U.S. Pat. Nos. 4,537,192 and 4,867,154.) In addition to the complexity, a common shortcoming of such devices is that lateral repositioning of the tube is not easily achieved. One device that does allow lateral repositioning of the tube is disclosed by Muto in U.S. Pat. No. 4,270,529. The disclosed device includes a faceplate that fits over a patient's mouth and has an elongated slot with three positions. A tubular mouthpiece is positioned in the slot of the faceplate for inserting an endotracheal tube therethrough, and the mouthpiece and tube can be laterally adjusted into one of the three positions. A pair of opposed, flexible prongs are provided between each of the positions to provide resistance against the tube holder and prevent it from inadvertently switching positions during use. While this device allows for lateral repositioning of the tube without removing the device or tube from the patient, the faceplate member totally encircles the patient's mouth and restricts access thereto which is important for maintaining oral hygiene, taking of the person's temperature, and other similar oral procedures. Another shortcoming of such a device is that the opposed prongs between the three positions do not positively lock the tube in place and a patient (or attendant) may inadvertently cause the tube to change positions. It is also believed that when a nurse periodically shifts the position of the tube, the force applied to the tube to overcome the resistance of the prongs may be unpleasant for the patient and increase the overall discomfort often associated with being intubated.

An important aspect of this invention therefore lies in providing a device for positively fixing an endotracheal tube to a patient without unduly restricting access to the patient's mouth and allowing lateral repositioning and positive locking of the tube without removing the device or tube from the patient. Briefly, the endotracheal tube attachment device of this invention comprises an elongate strip of flexible material shaped to fit on a region adjacent to and along one lip, preferably the upper lip, of a patient, and band means for encircling the patient's head and connecting the ends of the strip. The inner surface of the strip is provided with adhesive pad means for securing the strip to the patient's face, and the pad means preferably takes the form of a skin barrier material having a layer of fluid-absorbing, hydrocolloid-containing adhesive having both wet and dry tack properties. A tube holder is slideably connected to the outer surface of the strip and has an arm extending in a direction perpendicular to the strip for attaching the endotracheal tube along a length of the arm. Securement means are provided for positively fixing the tube against the arm and the securement means may take the form of a soft, flexible strap having one end attached to the arm and a free length extending transversely from the arm for encircling the tube and securing it to the arm. Such a securement means allows for longitudinal adjustment of the tube by allowing the tube to be easily released and reattached to the tube holder after the tube is adjusted. Positioning means are provided for connecting the tube holder to the strip and allowing lateral sliding and repositioning of the holder along the strip, and locking means are provided for positively locking the holder and tube in a selected position. The locking means includes restraining means positioned on the strip and engaging means positioned on the tube holder for either engaging or disengaging the restraining means and respectively locking the tube holder in the selected position or allowing lateral sliding and repositioning of the tube holder along the strip.

In one embodiment, the positioning means takes the form of track means including an elongated rail of generally T-shaped configuration having a first member extending from an outer surface of the strip and a second cross-member parallel to the strip, and shuttle means including a retainer of generally C-shaped configuration disposed on the tube holder for receiving the cross-member of the rail and allowing lateral sliding of the retainer and tube holder along the length of the rail. In that embodiment, the engaging means of the locking mechanism may take the form of a pair of lever arms positioned on opposite sides of the shuttle means and extending in a direction generally perpendicular to the strip. The lever arms comprise distal end portions that engage the restraining means on the strip when the lever arms are in an unflexed condition, intermediate portions connected by flexible webs to the tube holder, and proximal end portions that when squeezed towards each other cause the lever arms to pivot about their intermediate portions which results in their distal end portions becoming disengaged from the restraining means. Where a T-shaped rail is used as the track means, the restraining means may comprise a smooth but resilient outer face of the cross-member of the rail that frictionally engages the distal end portions and prevents lateral movement of the tube holder. A longitudinal series of transversely-extending ratchet teeth may be dis-