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Brief communication: Indications and use of adjustable tracheal cannulas

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Abstract---Adjustable tracheal cannulas are effective for airway management in patients with abundant pretracheal soft tissue due to obesity, trauma, or scarcity resulting from emaciation, by adjusting their movable flange. For patients with tracheal anomalies, such as constriction, deviation, or when the tip of a tracheal cannula attaches to the tracheal wall where the innominate artery transverses, it is also useful to adjust the position of the tip. However, a loose movable flange can result in accidental extubation. Therefore, understanding these indications is necessary. Head computed tomography (CT) examination and cervical echography, which show pretracheal soft tissue, tracheal deviation, and constriction, are effective indications. Moreover, exchange for extra-length cannulas should be considered after confirming the necessary length because long-term usage increases the risk of accidental extubation.

Keywords---adjustable tracheal cannulas, indications, complications, extra-length cannulas.

Introduction

The correct choice of the tracheal cannula after tracheostomy is essential. A cannula that does not properly fit the patient can lead to critical complications such as airway obstruction or tube decannulation. Laura et al. reported that the overall complication incidence was 40%-50%, and 0.5% of patients died. Tube decannulation, obstruction, and hemorrhage are major life-threatening complications. Adjustable tracheal cannulas have a movable flange and their length in the trachea can be adjusted by changing the position of the flange. This enables adjustable tracheal cannulas to safely manage the airway in patients with extremely thick or thin pretracheal soft tissues. They also adjust for tracheal deviation if they have a spiral-wire-reinforced flexible design. However, these characteristic structures can cause specific complications. Therefore, it is essential to decide on precise indications for their effective use. It is also

important to exchange extra-length cannulas as soon as possible. Based on our previous report, we reviewed the indications for, and complications associated with, adjustable tracheal cannulas.

Indications and Use

In Japan, AdjustFit® (GB AdjustFit Tracheostomy Tube; Fuji Systems, Tokyo, Japan) is used as an adjustable tracheal cannula. Because AdjustFit is made of a silicon spiral tube, it can not only change its length in the trachea but can also adjust the tracheal deviation. We reported 13 case series that used AdjustFit over 5 years and found that it is effective for cases with extremely thick or thin pretracheal soft tissue, tracheal deviation, and deformation. In particular, cases with > 25-30 mm of pretracheal soft tissue revealed by CT examination are specifically indicated. In contrast, Vinciya et al. suggested that in patients with pretracheal soft tissue > 4.4 cm, clinicians should consider the placement of a nonstandard tracheostomy tube at the time of the tracheostomy procedure. The differences between our findings and those of Vinciya et al. may be attributed to three reasons. First, both were prospective observational studies, and the decision to use adjustable or conventional tracheal cannulas depended on the clinical physician. Second, the difference in physique between the Japanese and Americans can contribute to these results. Finally, the difference in the length of the proximal portion of the conventional tracheal cannulas used by each institution could also contribute to the results. In short, abundant pretracheal soft tissue longer than the proximal portion of conventional tracheal cannulas can be indications. Furthermore, most studies, including ours, that report how to inspect the pretracheal soft tissue recommend a computed tomography (CT) examination, but some report inspection by sonography. In cervical CT, the cervical spine is fixed to the CT table, and this position may be more extended or flexed than that on the bed. Thus, sonography may be superior to CT because it can be performed at the bedside. Sonography also has multiple advantages over CT, including lack of ionizing radiation, speed, painlessness, and low cost. Additionally, it has been reported that adjusting the tip of a tracheal cannula prevents tracheoinnominate artery fistula in the case of the tracheal cannula tip on the innominate artery throughout the tracheal wall.

However, decannulation due to flange loosening is a complication associated with adjustable tracheal cannulation. In addition to conventional tracheal cannulas, the position of the movable flange must be managed regularly. Moreover, because the locking mechanism on the flange tends to deteriorate over time, its use should be considered as a temporary solution. It has been reported that they are supposed to be used temporarily until their lengths can be determined. For long-term use, they should be replaced with cannulas with a fixed flange and extra length. Extraproximal-length cannulas facilitate placement in patients with large necks, and extradistal-length cannulas facilitate placement in patients with tracheal anomalies. Rumbak et al. reported a series of 37 patients in whom substantial tracheal obstruction (tracheal malacia, tracheal stenosis, or granulation tissue formation) resulted in failure to wean off mechanical ventilation. In 34 of the 37 patients, obstruction was relieved using a longer tube, which effectively bypassed the tracheal obstruction. Longer tracheal cannulas are effective in cases with a large neck and airway constriction. However, extra-length

tracheal cannulas are available in various sizes and styles, and selection of the most suitable cannula depends on the specific case. Furthermore, it is difficult to prepare for all types of cannulas. Therefore, it is desirable to order an appropriate extra-length cannula after confirming the necessary length in the cases that are unsuitable for conventional tracheal cannulas.

Conclusion

Adjustable tracheal cannulas are useful in cases with extremely thin or thick pretracheal soft tissue. However, they should only be used temporarily because of specific complications. After confirming the necessary length, the required appropriate extra-length cannulas should be inserted.

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