The change of tube tip position for tracheotomy during head and extension

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〈 Background 〉

In the case of head and neck surgery for oral cancer including neck dissection and/or reconstruction with free flap, tracheotomy is occasionally performed to prevent postoperative airway obstruction. In tracheotomy under general anesthesia for oral cancer, the tracheal tube is first intubated through the nasal cavity, and it is exchanged to the tracheostomy tube.

We experienced some cases of rupture of tube cuffs, and they made the ventilation almost impossible.

We have to pay attention to the cuff of the tracheal tube not to be ruptured during incision to the trachea.

We hypothesized that the tube tip might move backward relatively in the trachea and the cuff end get close to the incision site during neck extension for tracheotomy.

In this study, therefore, we investigated the changes of the position of the tube tip during neck extension.

〈 Conclusion 〉

Tracheal tube tip moved back to oral side by about 20 mm from the carina when the neck extension for tracheotomy. This result suggests that the cuff end also may backed to the oral side by around 20 mm.

The cuff end may get close to the incision site and it might be risk for rupture of the tube cuff. Therefore, it is important to keep the cuff end away from the incision site. We should advance the tube tip close to the carina by fiberscope, if necessary.

Fig.1 Distance between nares and tube tip (①), and distance between tracheal tube tip and carina (②).

〈 Method 〉

After obtaining approval from the Ethics Committee of Kyushu University Hospital (No.28-145).

The patients were 40 - 80 yrs who underwent tracheotomy for oral cancer surgery including neck dissection and reconstruction with free flap under general anesthesia. Anesthesia was induced with propofol, fentanyl, remifentanyl, atropine and rocuronium. Nasotracheal preformed tube with ID 6.5-7.5 mm (Mallinckrods, Inc., St Louis, MO, USA) were intubated using fiberscope, and the tube was fixed at the nares.

Assessments of the tube positions were performed with fiberscope (Pentax FB-15, HOYA, Japan). Fiberscope was advanced to the first carina and a first mark was placed on the fiberscope (Fig.1). Subsequently, fiberscope was drawn back to the tube tip, and a second mark was placed on the fiberscope. The distance between these marks was evaluated as the distance between the tube tip and the first carina.

First measurement;

After intubation the patient's head was placed in a neutral position at an angle of 110° between a line from the external auditory meatus to the superior orbital margin and the horizontal surface.

Second measurement;

Patients were positioned for tracheotomy by placing a pillow under the shoulders to extend the neck at an angle of 140°.

The change from the first measurement to the second measurement of the distance between the tube tip and the first carina was assessed.

Clinical characteristics	N=12
Gender (Male/ Female)	7/5
Age (yrs)	69.5 ± 9.0
Height (cm)	157.6 ± 8.4
Weight (kg)	56.0 ± 11.0

The distance between the tube tip and the first carina	
An angle of 110° (neutral) (mm)	16.1 ± 9.6
An angle of 140° (extension) (mm)	38.2 ± 10.7

〈 Results and Discussion 〉

The distance between the tube tip and the first carina at the second measurement (38.2 ± 10.7 mm) was significantly longer than that at the first measurement (16.1 ± 9.6 mm) (p<0.001). The change was 22.0 ± 7.8 mm (range: 9-40 mm). In three cases, the cuff was ruptured during incision of the trachea.

These data suggested that the cuff end might backed to the oral side by around 20 mm and might become close to the incision site. Therefore, the tube should be advanced again after neck extension sufficiently to avoid rupture of the tube cuff during tracheostomy.