

Throughout this period, her platelet count, plasma fibrinogen levels, and prothrombin times remained normal.

DISCUSSION

Several factors may have contributed to the development and slow healing of the ulcer. An initial period of prolonged naso endotracheal intubation resulted in pressure on the inferior turbinate, despite use of a nasotracheal tube of appropriate size for the larynx. The child had nutritional debility and was in a catabolic state secondary to endocarditis and major surgery. She also had poor cardiac and pulmonary function, leading to poor tissue oxygenation. The tendency to hemorrhage was increased by her chronic cough causing venous congestion.

Necrosis of the external nares is a recognized complication of nasal endotracheal intubation in all age groups and is thought to be associated to the fixation and support of the tube.³ This case illustrates necrosis within the nose, a separate problem, more likely to be associated with the size of the tube. In the neonate a tube of appropriate size for the larynx can be inserted easily through the nose. In patients of older age groups a tube of the smallest diameter through which the patient can ventilate adequately should be used.¹ In adults a relatively small-cuffed tube is employed commonly. Another factor that may be significant is that the turbinates in a neonate are cartilaginous and deformable, but by the end of the first year of life they are replaced by bone. Furthermore, debilitated patients have an in-

creased risk of tissue damage and slow healing. From the experience of this case, recommendations can be made that are applicable to debilitated patients of all age groups. If controlled ventilation is required, a choice must be made as to the safest method of securing the airway in light of the associated clinical problems. In some patients the alternative methods of oral endotracheal intubation or tracheostomy may be appropriate early in the course of the illness. If nasal endotracheal intubation is selected, the tube used should traverse the nasal passages easily. If a difference exists, the larger nostril should be used initially when the patient is the most debilitated. Perhaps the nostril used should be alternated regularly at intervals of several days. This may reduce the amount of damage within the nose and allow some inspection of nasal mucosa.

The author thanks Mr. J. Stark, Consultant Cardiac Surgeon, Hospital for Sick Children, London, for permission to report this case, and Miss R. Hodgson for secretarial assistance.

REFERENCES

1. Allen TH, Steven IM: Prolonged endotracheal intubation in infants and children. *Br J Anaesth* 37:566-573, 1965
2. Abbot TR: Complications of prolonged nasotracheal intubation in children. *Br J Anaesth* 40:347-352, 1968
3. Zwillich C, Pierson DJ: Nasal necrosis: A complication of nasotracheal intubation. *Chest* 64:376-377, 1973
4. Battersby EF, Hatch DJ, Towey RM. The effects of prolonged naso-endotracheal intubation in children. *Anaesthetist* 32:154-157, 1977

Anesthesiology
59:149-150, 1983

Difficult Extubation of the Trachea

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Although reports and reviews of difficult endotracheal intubations are numerous, only a few reports describe difficult extubations.¹

We describe a mechanical complication that resulted in a difficult extubation of the trachea. Although this is an unusual situation, the potential of this occurring

may be increasing because the number of oral and maxillofacial surgical procedures is increasing.

CASE REPORT

A 29-year-old man who was involved in a traffic accident had a fractured zygomatic complex and multiple facial lacerations. He was scheduled for an open reduction and internal fixation of this fracture and closure of the facial lacerations. His past medical history and review of systems were normal. In addition to the injuries, the maximum opening between his upper and lower incisor teeth was less than 20 mm (normal being 40-50 mm). A nasal endotracheal tube was inserted by using sedated blind technique utilizing a tracheal indicator whistle* without complications. Anesthesia was obtained using narcotic-ni-

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Received from the Department of Anesthesiology The University of Texas Southwestern Medical School, Dallas, Texas. Accepted for publication February 18, 1983.

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Key Words: Extubation, Endotracheal: complications

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trous-oxide-muscle-relaxant technique. The surgeon previously had planned an approach through the oral vestibule and the maxillary sinus. Following examination under anesthesia, the surgeon decided to stabilize the fracture by passing a Kirshner wire (K-wire) percutaneously from the left zygoma, through the maxillary sinuses, and into the right zygoma. This was done without complication. Following placement of the K-wire, the endotracheal tube could be moved up and down freely, thereby excluding the possibility of the Kirshner wire passing through the nasal endotracheal tube. There were no anesthetic or airway problems encountered intraoperatively.

The decision was made to extubate the trachea while in the operating room after the patient was awake and responsive. The endotracheal tube cuff was deflated, and several unsuccessful attempts were made to extubate the trachea. Each time extubation was attempted, the pilot tube would move slightly inward into the nose, preventing the endotracheal tube from being removed. We then determined that the pilot tube was caught and preventing the trachea from being extubated. The patient became alarmed and began to cough vigorously. The pilot tube was cut at the nares quickly, and the endotracheal tube then was removed without difficulty. The K-wire had passed between the endotracheal tube and the pilot tube, thus preventing extubation of the trachea. The patient had no airway problems after this extubation.

DISCUSSION

Complications of this type always should be considered when oral-maxillo facial surgical procedures are being performed in the area of the endotracheal tube, whether or not an oral or nasal tube is used. Recently, another case has been brought to our attention. During a turbinectomy procedure² in conjunction with a maxillary osteotomy, the pilot tube was sutured while closing the turbinate (nonpublished information). The extubation procedure was handled in the same manner reported in this case.

The literature reports six cases of difficult extubation. One was caused by transfixation of the endotracheal tube to facial bony structure by a Kirschner wire.³ Another problem was caused by a suture placed from the pulmonary artery through the trachea and into the endotracheal tube.⁴ A third case of difficult extubation of the trachea was encountered when the pilot tube became tangled with subsequently inserted nasogastric tube.⁵ A fourth case described what the anesthesiologists considered to be a "forceful endotracheal intubation with a tube which was larger than necessary" in a 9-year-old

girl weighing 14 kg. Apparently, the enlargement at the cuff was held by tense vocal cords during extubation.⁶ A fifth case describes difficult extubation when the pilot tube was pulled out from its point of insertion into the endotracheal tube, thus making cuff deflation impossible.⁷ The sixth case reports the endotracheal tube being partially cut accidentally by an osteotome past the flexure in the nasopharynx. The partially cut tube formed a "barb" that caught on the posterior aspect of the hard palate and prevented extubation.⁸ Although the cases reviewed were of different origins, all were potentially dangerous, and only one had a fatal outcome.⁴ During a pneumonectomy, the tube was caught with a suture that ligated the pulmonary artery. When extubation was difficult, force was used, thus the artery was torn open when the suture came out with the tube.

This case report describes a difficult extubation of the trachea under circumstances that could be dangerous but were managed easily. Knowledge of facial anatomy, the surgical procedure to be performed, and the construction of the airway equipment should permit one to diagnose the cause of difficult extubation rapidly and take corrective action.

REFERENCES

1. Blanc VF, Tremblay NAG: The complications of tracheal intubation: A new classification with a review of the literature. *Anesth Analg (Cleve)* 53:202-213, 1974
2. Bell WH, Sinn DP: Turbinectomy to facilitate superior movement of the maxilla by LeFort I osteotomy. *Journal of Oral Surgery*, 37:129-130, 1979
3. Lee C, Schwartz S, Mok MS, Difficult extubation due to transfixation of a nasotracheal tube by a Kirschner wire. *ANESTHESIOLOGY* 46:427, 1977
4. Dryden GE: Circulatory collapse after pneumonectomy (an unusual complication from the use of a catheter): Case report. *Anesth Analg (Cleve)* 56:451-452, 1977
5. Fagraeus L: Difficult extubation following nasotracheal intubation. *ANESTHESIOLOGY* 49:43-44, 1978
6. Tashayod M, Oskoui B: A case of difficult extubation. *ANESTHESIOLOGY* 39:337, 1973
7. Tavakoll M, Corssen G: An unusual case of difficult extubation. *ANESTHESIOLOGY* 45:551-553, 1976
8. Schwartz LB, Sordill WC, Liebers RM, Schwab W: Difficulty in removal of accidentally cut endotracheal tube. *Journal of Oral and Maxillofacial Surgery* 40:518-519, 1982