ies will have to be performed in patients with deglutition-induced tachycardia in order to determine whether this hypothetic mechanism is correct.

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REFERENCES


Cleft Tongue and Ulceration of Hard Palate*

Complications of Oral Intubation

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In a prospective study of the complications of endotracheal intubation and tracheotomy, we encountered an unusual complication of oral intubation. This report describes a 32-year-old man who sustained laceration and cleft of the tongue and ulceration of the hard palate as a result of the use of an oral airway in conjunction with oral intubation.

Oral complications of endotracheal intubation are common and include injury to the teeth, lips, gums, tongue, and mucosa.1 Most of these injuries result from traumatic insertion of the oral endotracheal tube, but some may occur after initial placement of the tube.2 Oral airways are widely used to facilitate oral care and to prevent trauma to the soft tissues of the mouth during orotracheal intubation; however, these devices may themselves be hazardous. We report a case of laceration and cleft of the tongue and ulceration of the hard palate from prolonged use of an oral airway, in order to make the reader aware of these potential complications of oral intubation.

CASE REPORT

A 32-year-old man was admitted to Colorado General Hospital, Denver, after sustaining an injury to the brain stem in an automobile accident. On admission, he was comatose and decerebrate and had acute respiratory failure. An oral endotracheal tube (Portex; 9.0 mm in internal diameter) was inserted without trauma, and a curved polyethylene Berman-type oral airway (length, 9.0 cm; width, 2.1 cm; and thickness, 0.8 cm) was placed in the mouth and secured with tape. Decerebrate rigidity with tense contraction of the jaw increased during the first 48 hours of hospitalization.

Five days after admission, brisk oral bleeding developed from a 2.5-cm through-and-through transverse laceration of the tongue, which had been trapped between the lower incisor teeth and the oral airway. A tracheostomy was immediately performed, and the oral airway was left in place to facilitate oral care and to prevent biting of the tongue.

On the 34th day of hospitalization, massive hemorrhage occurred from an erosion of the stoma of the tracheostomy into the inferior thyroid artery. An oral endotracheal tube (Portex; 9.0 mm in internal diameter) was again inserted and left in place, along with an oral airway, for eight days before cricothyroidotomy was performed.

On the 45th day of hospitalization, rigidity of the jaw abated, and a 3.0-cm cleft on the left side of the tip of the tongue, distal to the previous laceration, was discovered (Fig 1A). Pressure necrosis on both sides of the cleft was apparent. The cleft coincided with the position of the oral airway.

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oral care and evacuation of secretions. Oral airways are the devices most commonly used to achieve these goals. The airways are usually used in conjunction with an oral endotracheal tube, but they may be used alone. These appliances are often rigid and inflexible and are thus capable of transmitting pressures directly to the oral structures. Most oral airways are designed with a curved end to adapt to the elevation of the roof of the mouth. Propulsive movements of the tongue may dislodge the airways anteriorly so that the curved portion abuts on the hard palate. Cleft of the hard palate has been reported in infants as a result of prolonged pressure by oral endotracheal tubes.\textsuperscript{5,6} Pressure necrosis of the tongue in a two-year-old boy after use of an oropharyngeal airway for ten days has recently been reported.\textsuperscript{7} We are not aware of previous reports of injury to the palate or tongue from prolonged use of an oral airway in adults.

Biting of the tongue is of particular concern in comatose patients, since neuropathologic chewing movements of the jaw may not be coordinated with movements of the tongue.\textsuperscript{8} Rigid contraction of the jaw in decerebrate patients and uncoordinated ruminant movements of the tongue and jaw in comatose patients are very difficult to manage, but intraoral appliances remain the best means for dealing with these problems.\textsuperscript{9} We advocate caution in the use of intraoral appliances in conjunction with oral endotracheal intubation. Oral structures should be examined closely every day in the orally intubated patient. Tape holding an oral airway or oral endotracheal tube in place should be changed daily to facilitate this inspection. The oral airway and the endotracheal tube should be shifted in position frequently to prevent pressure necrosis of soft tissues of the mouth. The tongue should be positioned in such a way that it is not trapped between the teeth and oral appliances. Awareness of the hazards and limitations of oral airways may lead to earlier recognition and prevention of the complications of their use.

**DISCUSSION**

The severe injuries of the tongue and hard palate which this patient sustained were complications of the use of an oral airway. The oral endotracheal tube itself was probably not responsible for the injury to the tongue, since the tube was positioned in the right side of the mouth, opposite the site of injury. It is possible that the initial laceration of the tongue devitalized the tip of the tongue, permitting subsequent development of the cleft tongue. We believe that prolonged neuropathologic tonic contraction of the jaw generated high intraoral pressures which were transmitted directly to the tongue and hard palate through the rigid oral airway. Whether the injuries sustained by this patient were preventable is conjectural. Manual positioning of the tongue away from the occlusal surfaces of the teeth and the oral airway was only temporarily successful because of sustained tonic contraction of the jaw and protrusion of the tongue.

Intraoral appliances have been used to prevent self-inflicted trauma to the tongue from ruminant movements of the jaw in comatose patients,\textsuperscript{4,4} to prevent biting and occluding of oral endotracheal tubes, and to facilitate

![Figure 1. A (top), Inferior surface of tongue at time of surgical repair. Cleft measuring 3.0 cm is present through full thickness of tongue, and margins of cleft are necrotic. B (bottom), Bleeding necrotic ulcer on mucosa of hard palate.](http://journal.publications.chestnet.org/pdfaccess.ashx?url=/data/journals/chest/21012/)

which had been in place for 29 of the first 45 days of hospitalization. A necrotic ulcer measuring 2.0 × 2.5 cm was also found in the middle of the hard palate at the point of contact with the curved portion of the oral airway (Fig 1B). The necrotic tips of the tongue were surgically amputated, and the cleft was closed with sutures. The lesions of both the tongue and the palate eventually healed, and the patient ultimately recovered.

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