Cuffed Oropharyngeal Airway for Difficult Airway Management

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Difficulties with airway management are often caused by anatomic abnormalities due to previous oral surgery. We performed general anesthesia for a patient who had undergone several operations such as hemisection of the mandible and reconstructive surgery with a deltopectoralis flap, resulting in severe maxillofacial deformation. This made it impossible to ventilate with a face mask and to intubate in the normal way. An attempt at oral awake intubation using fiberoptic bronchoscopy was unsuccessful because of severe anatomical abnormality of the neck. We therefore decided to perform retrograde intubation and selected the cuffed oropharyngeal airway (COPA) for airway management. We inserted the COPA, not through the patient's mouth but through the abnormal oropharyngeal space. Retrograde nasal intubation was accomplished with controlled ventilation through the COPA, which proved to be very useful for this difficult airway management during tracheal intubation even though the method was unusual.

Key Words: Cuffed oropharyngeal airway; Difficult airway management.

Anatomic and functional changes after oral surgery often cause difficulties with airway management because of maxillofacial deformation, mandibular defect, and trismus. The cuffed oropharyngeal airway (COPA; Mallinckrodt Medical, Athlone, Ireland; Figure 1A), a modification of the Guedel oropharyngeal airway^{1,2} with an asymmetrical cuff, fits the peripheral pharyngeal tissue for a proper seal. The COPA is one of the airway devices that can be inserted through the mouth under spontaneous respiration (Figure 1B). This report deals with a patient with a large defect and anatomical abnormality of the neck that made fiberoptic intubation

unsuccessful. The COPA, inserted through the neck defect, proved to be useful for controlled ventilation during retrograde nasal intubation.

CASE REPORT

A 76-year-old male (49 kg, 157 cm) was scheduled for partial excision of the mandible under general anesthesia because of mandibular myelitis. Diagnosed with mandibular carcinoma, he had undergone hemisection of the mandible, total neck dissection, and reconstructive surgery with a deltopectoralis flap 5 years previously. His medical history was noncontributory. Opening of the mouth was limited to 15 mm and his mandible was partially exposed. His neck was severely deformed and showed a large defect (Figure 2A and B). It seemed he would be impossible to ventilate through a face mask and difficult to intubate endotracheally in the usual way.

Received September 21, 2012; accepted for publication May 21, 2014.

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Anesth Prog 61:107–110 2014

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ISSN 0003-3006/14
SSDI 0003-3006(14)

Figure 1. A: The cuffed oropharyngeal airway (COPA). B: A diagram of the COPA in the usual anatomical position.

Because the patient refused to undergo tracheotomy, we planned a procedure that would avoid tracheotomy by using a fiberoptic bronchoscope for intubation while the patient was conscious and under spontaneous respira-

Figure 2. The patient had a large defect in the anterior part of his neck. The back of the pharynx can be seen through the defect and the mandible was partially exposed. A: Frontal view. B: Lateral view.

tion. However, several trials of awake intubation were unsuccessful because the angle of the fiberoptic bronchoscope did not fit that of the pharynx, and the manipulation of intubation was difficult because of persistent reflex gagging. The surgery was temporarily cancelled so that another attempt at intubation could be made later. The next plan was to perform retrograde intubation guided by fiberoptic bronchoscopy under anesthesia with the aid of the COPA for airway management during intubation.

For this procedure, the patient received no premedication. The intravenous (IV) administration of fentanyl (100 µg) and midazolam (1 mg) produced the desired level of conscious sedation. The COPA for airway management was 80 mm in diameter, the smallest of the 4 available sizes (80, 90, 100, and 110 mm), and was inserted with minimal discomfort not through the mouth but through the defect in the neck. The cuff was

Figure 3. A: The cuffed oropharyngeal airway was inserted through the defect in the patient's neck. A guide wire was advanced through the Tuohy needle into the nasal airway. B: The nasal endotracheal tube in proper position following retrograde guide wire–assisted fiberoptic intubation.

then inflated with 25 mL of air, the volume recommended by the manufacturer. When the COPA was connected to the breathing system, an adequate tidal volume could be obtained without leakage. After a second IV administration of fentanyl (50 µg) and midazolam (3 mg), anesthesia was maintained with 1% sevoflurane in oxygen. A nasal airway was inserted and a 17-G Tuohy needle with a syringe was used to puncture the cricothyroid membrane. The position of the trachea was confirmed by aspirating it with air, after which the membrane of the trachea was topically anesthetized with 2% lidocaine. A J-tipped guide wire was then passed through the Tuohy needle and advanced into the pharynx, passing between the inflated cuff and the posterior wall of the pharynx, and moved along the outside of the COPA without

resistance. When the wire became partially visible in the mouth, it was inserted into the nasal airway by means of Magill forceps and out through the nose (Figure 3A). A cuffed endotracheal tube, 7.0 mm in diameter, was advanced over the wire into the pharynx after the nasal airway was removed, and a fiberoptic bronchoscope was then inserted into the endotracheal tube and advanced along the wire between the cuff of the COPA and posterior wall of the pharynx until the cricothyroid membrane was identified. The COPA was then removed. After the guide wire had been removed, the endotracheal tube, guided with fiberoptic bronchoscopy, was advanced further into the trachea. Throughout the procedure, the patient's arterial oxygen saturation was maintained above 99% and cardiovascular parameters hardly changed. Once the endotracheal tube was secured (Figure 3B), neuromuscular blockade was achieved with vecuronium and anesthesia was maintained with 50% nitrous oxide and 1–2% sevoflurane in oxygen. The surgery was uneventful. Operating time was 2 hours and total anesthesia time was 3 hours and 5 minutes. Extubation was performed without problems, and no complications were observed either intraoperatively or postoperatively.

DISCUSSION

In the case reported here, oral fiberoptic intubation in the usual manner resulted in failure owing to the severe anatomical abnormality of the neck. We therefore decided to use a guide wire and to perform retrograde intubation. Because it was expected that retrograde intubation for this patient would require much time, we selected the COPA for airway management during the intubation. There was almost no obstruction of movement of the guide wire and the fiberoptic bronchoscope between the cuff of the COPA and the pharyngeal wall during retrograde intubation. Uezono et al also reported that the presence of the cuff of the COPA in the pharyngeal space did not interfere with the advancement of a fiberscope.³ The advantage of ventilation by a COPA in this case was that more time was available for inserting the fiberoptic bronchoscope into the trachea. In fact, it has been suggested that use of the COPA is especially advantageous during prolonged fiberoptic^{3–6} and nasotracheal intubation sequences.⁷ However, we should be alert to potential trauma caused by retrograde intubation.

One of the reasons we selected the COPA, which has been used for difficult airway management⁸ or in emergencies,^{9,10} rather than the laryngeal mask airway for this patient was that ventilation by laryngeal mask airway through the patient's mouth seemed to be

impossible because of trismus and the defect of his neck. In addition, the laryngeal mask airway was too large to be inserted through the defect. The COPA, however, proved to be the appropriate airway device when inserted not through the mouth, but through the large defect of the neck. The soft cuff of the COPA easily filled the abnormal pharyngeal space, thus reducing the risk of pharyngeal trauma and tissue damage.¹¹ Its large air volume and low-pressure cuff helped to keep his airway clear. It has been reported that the COPA is useful for standard nasal fiberoptic intubation,^{3–6,12} and, compared with the laryngeal mask airway, placement of the COPA caused hardly any cardiovascular changes or pharyngeal trauma after airway insertion.¹³

The COPA is an airway device suitable for use under not only spontaneous¹⁴ but also controlled respiration, because it has been reported that the COPA is effective for providing satisfactory manual ventilation¹⁵ even though it was originally designed for spontaneous respiration. It has also been reported that using the COPA for providing anesthetized adults with mechanical ventilation is as effective and safe as use of the laryngeal mask airway, in spite of the fact that the latter allows for positive-pressure ventilation at slightly greater peak inspiratory pressures.¹⁶

In conclusion, we used the COPA in an unusual manner, which was to insert it through the abnormal oropharyngeal space for use as the airway device during retrograde fiberoptic nasal intubation under general anesthesia. The COPA thus proved to be useful for this patient with a problematic and sensitive airway due to previous maxillofacial surgery.

ACKNOWLEDGMENT

We are deeply indebted to Prof. Emeritus Nobuyoshi Nakajo for his advice and technical support.

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