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A Case of Transorbital Intubation Guided by Light Wand

Kedi Guo[1*], Xinghe Wang[1*], Yuping Yang[1*], Tong Li[1], Jilong Guo[2], Dunyi Qi[2] and Su Liu[1,2#]

[1]Jiangsu Province Key Laboratory of Anesthesiology, Xuzhou Medical University, Xuzhou, Jiangsu, China

[2]Department of Anesthesiology, The Affiliated Hospital of Xuzhou Medical University, Xuzhou, Jiangsu, China

[*]These authors contributed equally to this work.

[#]**Corresponding author:** Su Liu, Department of Anesthesiology, The Affiliated Hospital of Xuzhou Medical University, 99 Huaihai West Road, Xuzhou, Jiangsu 221000, China. E-mail: 150040009@qq.com

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Abstract

A 44-year-old man, because of adenoid cystic carcinoma of maxillary sinus and invasion of the left eye, had underwent radical maxillary sinus surgery, radiotherapy and left orbital exenteration successively. The patient was scheduled for partial maxillectomy and skull base exploration under general anesthesia due to recurrence of adenoid cystic carcinoma of maxillary sinus. He experienced severe trismus with an oral opening less than 5mm. In addition, his right nasal cavity was narrow, and anterior nostril shrank without erosion, at the same time, his left nasal inferior and middle turbinate were absent and fresh blood was visible inside. All of these indicated that it was difficult to establish an artificial airway through conventional ways. Since the patient's contents of left orbit were absent, which was connected to the upper airway, we finally successfully established an artificial airway through transorbital endotracheal intubation guided by light wand.

Keywords: Transorbital intubation; Difficult airway management; Light wand

Introduction

Endotracheal intubation is an essential skill for anesthesiologists. However, airway management in patients with extensive oral and maxillofacial tumors can be a big challenge. The main methods of endotracheal intubation include orotracheal intubation and nasotracheal intubation. Is there any other route for endotracheal intubation? This case report presents an unusual access for endotracheal intubation through the orbit by using a light wand. The patient detailed below has given written permission for a case report detailing his medical history and anesthetic management to be published.

Case Presentation

A 44-year-old man, weighing 65 kg, due to recurrence of adenoid cystic carcinoma of maxillary sinus, associated with palatal invasion, was scheduled for partial maxillectomy and skull base exploration under general anesthesia. Ten years ago, the patient underwent radical maxillary sinus surgery (Caldwell-Luc's operation) and radiotherapy because of adenoid cystic carcinoma of maxillary sinus. Seven years ago, the patient underwent left orbital exenteration because of the tumor invasion.

Physical examination revealed that the patient experienced severe trismus with an oral opening less than 5mm. The right nasal cavity was narrow, and anterior nostril shrank without erosion, swelling and scab in the skin of nasal vestibule. The left nasal inferior and middle turbinate were absent and fresh blood was visible inside. Meanwhile, the contents of left orbit were also absent (Figure 1). CT scanning showed that adjacent bones comprising the orbital nasal side were extensively destroyed. Soft tissue mass could be seen in the left palate and maxillary sinus areas, with infiltrating growth around. Multiple craniofacial bones were destroyed and soft tissue mass invaded the left frontal lobe and cerebellopontine angle area (Figure 2).

Figure 1: State of the Patient's Head.
The patient's left orbit was absent. The right nasal cavity was narrow and the left nasal contained fresh blood inside. And he had limited mouth opening less than 5mm.

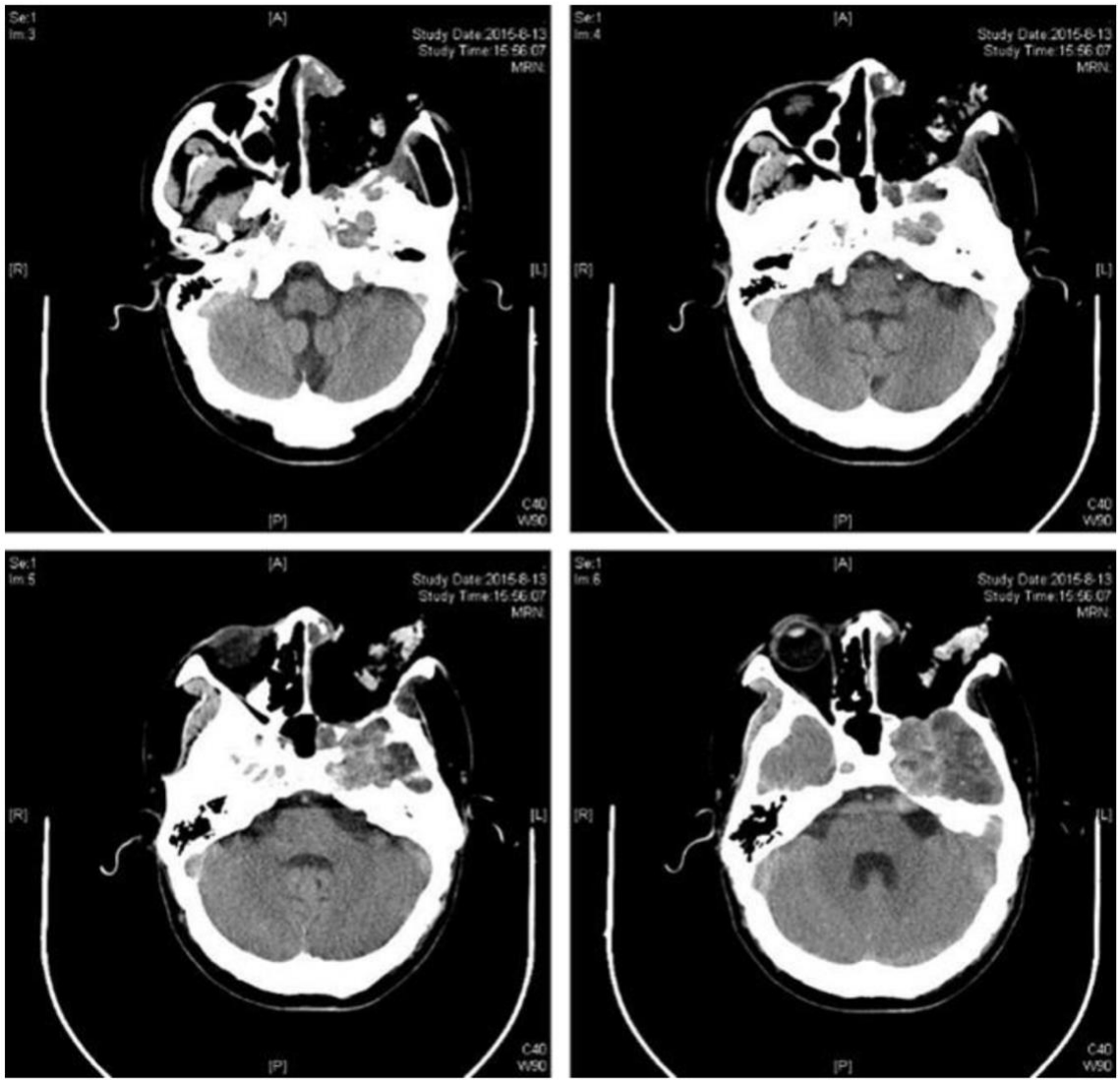

Figure 2: Head CT Scan.

CT scanning showed the left medial orbital wall and orbital contents were absent, and the left maxillary sinus wall was absent. The left skull base showed irregular soft tissue mass and multiple bone destruction.

The vital problem for this unique patient is how to establish an artificial airway and how to perform endotracheal intubation. Because of the severe trismus, orotracheal intubation was not suitable. Nasal intubation may be an alternative. However, because of the nasal new organisms resulting from tumor invasion and the potential complications resulting from radiotherapy, nasotracheal intubation was also not suitable. Considering tracheostomy would carry high incidence of complications which might cause great trauma to the patients, it was also not an optimal choice. Is there any other intubation method? Combined with the characteristics of the patient, transorbital view allowed good visualization of the superior airway as the nasal cavity was connected to the orbit, justifying the transorbital approach [1]. Because the fiberoptic bronchoscope was not available at that moment, after discussing with the surgeon, we decided to try transorbital intubation with a light wand under spontaneous breathing, and prepared the items for emergency tracheotomy in case.

In the operating room, standard monitoring was used. Oxygen was administered via a nasal cannula although it could leak through orbit cavity. The left orbit and superior airway were sprayed with 2% lidocaine for topical analgesia. Dexmedetomidine (0.7μg/kg/h) was administered intravenously to for sedation. To improve the patient's tolerance to intubation, remifentanil (1μg/kg) was slowly (10μg/min) injected intravenously. Then tracheal intubation was carried out through left orbit cavity with a light wand using the endotracheal tube size 6.0. Before intubating, the light wand was lubricated sparingly and inserted until it was just short of the distal tip of the endotracheal tube, and then bend the tube into a curve [2]. During the intubation, the assistant helps to gently lift the patient's lower jaw to let the light wand easily reach the glottis, at the same time dimming the room lights in order to see the front spot of the neck more clearly. When a bright and converging spot appeared in the cricothyroid membrane of the patient, the anesthesiologist gently pushed the endotracheal tube into tracheal along light wand, and then exit the light wand along the bending direction of the endotracheal tube (Figure 3). In the whole process, the patient showed no apparent resistance or adverse reactions. After confirming the tube position, propofol 2mg/kg, cisatracurium 0.2mg/kg, and fentanyl 0.1mg were administered intravenously. Anesthesia was maintained by 2% sevoflurane and remifentanil 0.2ug/kg/min. The intraoperative period was uneventful [3]. After operation, the patient was transferred to PACU and extubated in PACU. Forty-five minutes later, when the vital signs were stable and the Steward score was >9, the patient was sent back to ward.

Figure 3: Process of Transorbital Intubation Guided by Light Wand.
(a): push the endotracheal tube into tracheal; **(b):** exit the light wand; **(c):** cuff inflation.

Discussion

In this report, we detail a novel airway management technique for a patient with an extremely abnormal airway. To our knowledge, this is one of the few cases of transorbital intubation which has been reported. The main principle of endotracheal intubation is to choose a way with less damage and risk to the patients on the premise of ensuring the safety of the patients. This patient experienced an extremely limited mouth opening resulting from radiotherapy. It is not possible to insert laryngoscope or even a size#5 tracheal tube into mouth. Then nasal intubation seems to be an alternative. Unfortunately, because of the nasal new organisms resulting from tumor invasion and the potential complications resulting from radiotherapy, nasotracheal intubation was also not suitable. Tracheostomy or retromolar intubation [4] may be a potential option for securing the airway. However, surgical factors and patient's wishes limited these processes implementation. According to the patient's unique anatomy, a novel and rare route, transorbital intubation seems feasible. Orbit exenteration made orbital-nasal connected more directly making it possible to intubate through orbit [5].

In previous reports, a laryngoscope was used either through the orbital defect [6] or orally to visualize the glottis. However, in this case, because of severe trismus, laryngoscope can't be used to expose glottis. Another three reports used fiberoptic bronchoscope (FOB) for transorbital intubation. FOB is indeed an optional intubation tool. However, in our case, the FOB was not available at that moment. Hence, we had to choose light wand as the first intubation tool. Light wands have been used to facilitate oral and nasal tracheal intubation for many decades, especially for difficult airway [7]. The advantage is that this technique is not affected by the position of the patient's head. It allows the patient to maintain his own airway and no needed to extend the head. Besides, unlike FOB, the use of light wand is not affected by airway secretions. The disadvantage of this technique is that it is a semi-visualization technique. The operator cannot see directly that the tube went through the glottis. But this technique is short and simple and has high success rate after a minimum of practice [8].

In this case, we kept the patient's spontaneous breathing during intubation. The big orbital defects made mask ventilation impossible. In order to prevent hypoxia and asphyxia during intubation, we chose to retain the self-breathing. Previous case reported that placing a 100-ml bag of normal saline over the facial defect could block air leakage and commence standard preoxygenation. However, the defect in this case was much bigger than in previous one. 100-ml normal saline bag cannot be effective in preventing air leakage. Thus, keeping spontaneous breathing during intubation is the safest for this patient.

Conclusion

In summary, we have described a novel airway management strategy to solve an unusual airway problem. Our solution quickly and successfully established the artificial airway on the premise of ensuing patient safety, and at the same time, avoiding additional complication and damage to the patient. Light wand is a good option for patient with difficult airways. This case suggests that anesthesiologist should choose the route of intubation according to patient's own anatomical characteristics, not only limited to transoral or transnasal. The limitation of this case report is that there was no three-dimensional reconstruction of the patient's head and airway before surgery. If it was performed, the selection of intubation route and the tube size might be more accurate.

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