Perioperative management of thyroglossal duct cystectomy in a pediatric patient: a case report

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Abstract

Thyroglossal duct on the dorsum of the tongue in the pediatric patient can cause a difficult airway due to the large mass and risk of airway obstruction associated with a swollen tongue after surgery.

Key Clinical Message

Careful airway management in the perioperative period contributed to the prevention of the occurrence of respiratory complications.

1 INTRODUCTION

Thyroglossal duct cysts arise from remnants of the embryonic thyroglossal duct, and they commonly develop in the median cervix. The basic treatment is to resect the cyst along with the fistulous tract.[1] Herein, we report perioperative management of a pediatric patient with thyroglossal duct on the dorsum of the tongue for thyroglossal duct cystectomy that was predicted to cause dyspnea in the perioperative stage.

Written consent was obtained from the patient's parents for this report.

2 CASE REPORT

The patient was a 5-year-old boy with a height of 110 cm and a body weight of 18 kg. In July 2016, a mass was identified in the middle of the dorsum of the tongue, and the patient was referred to the Department of Oral Surgery of Nagoya City University Hospital by a family dentist. The patient would snore when laid on his back while sleeping. Detailed examination revealed a 35 × 25 × 25-mm mass lesion on the dorsum of the tongue (Figs. 1 and 2). Regarding medical history, although the patient was being followed up by a local pediatrician for congenital adrenal hyperplasia, the follow-up had been completed at the time of this operation. The patient had no allergies or any family history, and preoperative examination revealed no particular findings. Under general anesthesia, resection of the mass lesion located on the tongue was planned.

Regarding anesthesia management of the patient, there were following two concerns: 1) A difficult airway due to the large mass present on the tongue and

2) Risk of airway obstruction associated with a swollen tongue after surgery.

Before the patient was anesthetized, an intravenous route was secured on the left forearm to prepare for the difficult airway that was expected after the induction of anesthesia. Prior to the induction of anesthesia, oxygenation was performed with 100% oxygen for approximately 3 min. Anesthesia was induced with 6 L/min

of oxygen and 6% sevoflurane. After the onset of anesthesia, mask ventilation temporarily became difficult due to the effects of the tongue mass and glossoptosis; however, mask ventilation was feasible after administering 15 mg of rocuronium and using an oral airway. A decrease in peripheral capillary oxygen saturation associated with temporary dyspnea was not observed. Subsequently, 30 μg of fentanyl was administered, and after the muscle relaxant showed its effect, nasotracheal intubation was performed using McGRATH^{TM} MAC (Minneapolis, MN, USA). Because the tongue mass was mobile, the tongue could not be completely excluded; however, the view using the McGRATH was of a Cormack–Lehane Grade 2, and intubation was successfully performed in the first attempt. Anesthesia was maintained at 1 L/min of oxygen, 2 L/min of air, 2% sevoflurane, and 0.1–0.2 μg/kg/min of remifentanil. During the surgery, 2 mg of dexamethasone was administered to prevent postoperative swelling of the tongue, and 200 mg of acetaminophen was administered for postoperative analgesia. Intraoperative findings included no swelling of the tongue at the end of the surgery. Therefore, extubation was considered possible in the operating room. After completion of the surgery, 50 mg of sugammadex, a muscle relaxant antagonist, was administered and the patient was extubated after body movement, eye opening, and sufficient spontaneous respiration were confirmed. After extubation, there were no issues with the patient's respiratory condition. The duration of surgery was 1 h 27 min, time spent under anesthesia was 2 h 13 min, and the amount of blood loss was 6 g.

In the postoperative intensive care unit (ICU), Dexmedetomidine (0.4μg/kg/hr) was used for sedation, and additional dexamethasone was administered to prevent tongue swelling. The patient was managed in the ICU until the next morning, but no swelling of the tongue was observed. The patient was then discharged from the ICU because the respiratory status and vital signs were stable.

3 DISCUSSION

Cysts on the tongue are one of the major diseases that cause upper airway obstruction in pediatric patients.[2] The origin of the cysts varies including those derived from the thyroglossal or lingual ducts, those derived from the cystic degeneration of the lingual thyroid, retention cysts arising from the mucous glands at the base of the tongue, and cysts generated from remnant cells during the embryonic stage.[3] In the present report, the cyst was a thyroglossal duct cyst as revealed by the histopathological diagnosis after the surgery, and the common sites are shown in Figure 3.[4]

The first concern of this case is a difficult airway management. Kumanomido et al.[2] described that the necessity of tracheostomy, subglottic space, presence/absence of a tracheal shift, mandibular size, and necessity of fiberscope-guided intubation should be assessed when evaluating the difficulty of tracheal intubation according to the cyst size. The possibility of tracheostomy was excluded in our patient because the cyst was near the dorsum of the tongue, anterior to the typical site of origin, and snoring was the only daily symptom reported. Furthermore, the patient aged only 5 years; therefore, fiberscope-guided intubation while conscious was not considered to be feasible. Moreover, preoperative computed tomography images revealed no subglottic space or tracheal deviation, and the patient did not present with micrognathia. Therefore, slow induction with sevoflurane was performed as usual, with the preparation for emergency airway maintenance. A route was secured prior to the induction to prepare for the difficult airway that was expected after the induction of anesthesia. After the onset of anesthesia, mask ventilation temporarily was difficult due to the effects of the tongue mass and glossoptosis; however, mask ventilation was sufficiently performed with the use of muscle relaxants and an oral airway. Mask ventilation would have still been difficult if the cyst would have been localized near the base of the tongue.

For tracheal intubation, McGRATH was used in our patient and its utility has been reported in pediatric patients.[4, 5, 6] Airway scope with pediatric Intlock blades are useful in pediatric patients with difficult airways.[7] However, in our patient, McGRATH was used for intubation because the blade of the McGRATH was thin and had good operability. Although the tongue could not be completely excluded using McGRATH, the Cormack–Lehane view was Grade 2, and intubation could be performed in the first attempt without any issues.

The second concern of this case is airway obstruction associated with tongue swelling after surgery. In our

case, intraoperative findings included no fistulous tract connected to the cyst, no resection of the hyoid bone, and no tongue swelling at the end of the surgery. Therefore, the patient was extubated in the operating room; however, as a precaution, the patient's respiratory condition was observed under sedation with Dexmedetomidine in the ICU. In Japan, Dexmedetomidine for the sedation of non-intubated pediatric patients is being used since 2018. Without intubation, respiratory depression is a major issue, particularly in pediatric sedation; Dexmedetomidine does not have a less respiratory depressant effect and is also used for postoperative sedation in pediatric patients.[8] In our patient, we were concerned about respiratory depression by sedation, but it was necessary to keep the patient on bed rest to avoid tongue swelling after surgery. Therefore, Dexmedetomidine was used. In addition, Dexmedetomidine has analgesic effects; the analgesic effects, to some degree, seem to have contributed to the patient being on bed rest.

4 CONCLUSION

Thus, we report our experience gained from thyroglossal duct cystectomy of a pediatric patient who was predicted to experience perioperative airway maintenance and respiratory management difficulties due to a thyroglossal duct cyst. Although a difficult airway was anticipated due to the large tongue mass, there were no issues with airway maintenance. Based on the surgical findings, extubation in the operating room was feasible and appropriate sedation using Dexmedetomidine in the ICU prevented the occurrence of airway obstruction associated with tongue swelling.

ACKNOELEDGMENTS

Not applicable

CONFLICT OF INTEREST

The authors declare that we have no conflict of interests.

AUTHOR CONTRIBUTIONS

AS, NO and EK helped with writing this manuscript and the anesthetic management.

NK, YK, YS, MS and MT helped with the anesthetic management and development of the overall anesthetic plan. MH, SK and MK helped with the operation and writing this manuscript. YS helped with the operation and the supervision of the manuscript.

KS helped with the supervision of the manuscript and development of the overall anesthetic plan.

ETHICAL APPROVAL

Not applicable

CONSENT FOR PUBLICATION

Written and signed consent was obtained from the patient's parents.

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Figure legends

Figure 1. Magnetic resonance images

Sagittal section /a cystic lesion with clear margins is observed.

Figure 2. A large mass on the dorsum of the tongue was observed.

Figure 3. Vertical site of onset of thyroglossal duct cyst, adapted from reference [4] with modifications. 1. Mentum-type, 2. Hyoid bone-type, 3. Sublingual-type

4. Thyroid-type, 5. Base-of-the-tongue type