Journal of Anesthesiology & Clinical Science
ISSN 2049-9752 | Volume 4 | Article 3

HOAJ
Herbert Open Access Journals

Special Section | Pediatric Anesthesia | Case report Open Access

Awake fiberoptic nasal intubation in an infant with a malignant rhabdoid tumor occupying the oral cavity: a case report

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Abstract

Malignant rhabdoid tumors develop in infants up to 1 year old. These tumors area very progressive pediatric cancer that is difficult to treat. We experienced a case involving anesthetic management for tracheostomy of an infant with a high risk of airway occlusion due to a rapidly growing malignant rhabdoid tumor on his tongue. The patient was successfully intubated using an endotracheal tube with a 3.0-mm inner diameter; this was accomplished by awake nasal intubation using a flexible rhinolaryngoscope with a 2.2-mm outer diameter. Awake nasal fiberscopic intubation is an alternative choice for difficult airway management in infants.

Keywords: Anesthesia induction, awake nasal fiberscopic intubation, malignant rhabdoid tumor, oral cavity tumor, pediatric difficult airway management

Background

Malignant rhabdoid tumor (MRT), which was first reported in 1978, is one of the most progressive pediatric cancers and develops in infants up to 1 year old [1]. We experienced a case involving anesthetic management for tracheostomy in an infant with a high risk of airway occlusion due to a rapidly growing MRT on his tongue. Awake fiberoptic nasal intubation was carried out using a flexible rhinolaryngoscope with an ultra-thin diameter.

Case presentation

A 5-month-old, 4.9-kg male infant developed a rapidly growing tumor on his tongue and was hospitalized 3 months after birth. Chemotherapy was started after admission; 2 weeks later, pathological analysis revealed an MRT. Although the tumor decreased in size with early chemotherapy, it began to grow aggressively again, and his oral cavity was almost completely occupied by the tumor 8 weeks after admission (**Figure 1A**). He exhibited difficulty swallowing saliva, and preoperative magnetic resonance images showed that he was at a high risk of airway occlusion (**Figures 1D** and **1E**). Emergent tracheotomy by otolaryngology under general anesthesia was planned. However, the tumor occupying his oral cavity almost completely blocked the approach route for tracheal intubation via the mouth. Because we were not sure whether any airway devices can improve the unexpected airway occlusion and there was a high risk of "cannot ventilate, cannot intubate" (CVCI) during asleep anesthesia induction, we decided to keep spontaneous breathing of the infant and perform awake nasal tracheal intubation, instead of taking alternative anesthetic considerations, such as sedative induction using intravenous ketamine or dexmedetomedine, or asleep intubation utilizing volatile anesthetics, First, without any sedation, by using a suction catheter, topical anesthesia (approximately 1 mL of 4% lidocaine/epinephrine, 50ng/mL) was administered to the nasal mucosa, the lower pharynx, and the larynx to control the airway reflexes. Next, we advanced an uncuffed 3.0-mm-ID endotracheal tube into the lower pharynx through his nose, and inserted aflexible rhinolaryngoscope (ENF-XP®; Olympus) with a 2.2-mm outside diameter (OD) and 30-cm working length into the endotracheal tube (**Figures 2A** and **2B upper**), checked the location of the larynx, and advanced the tip of the scope into the trachea. Then, we successfully advanced the endotracheal tube into his trachea using the scope as an insertional guideline for the nasal intubation (**Figures 2C** and **2D**). Anesthetic induction was then carried out with sevoflurane inhalation and rocuronium intravenous injection, and tracheotomy and

doi: 10.7243/2049-9752-4-3

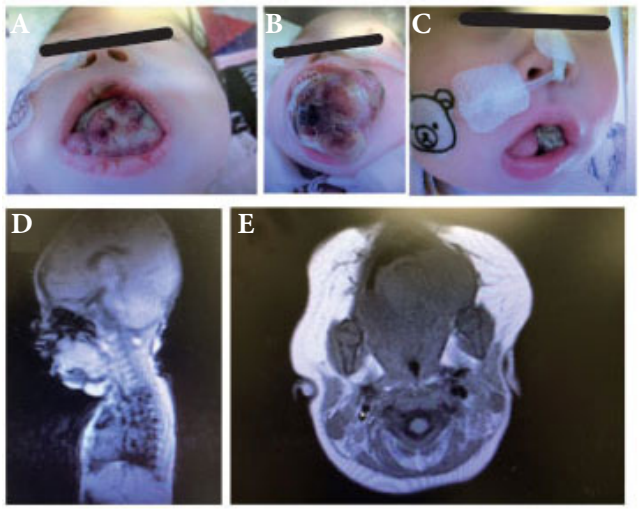

Figure 1. Malignant rhabdoid tumor in the oral cavity and preoperative magnetic resonance (MR) images.
A: The tumor in the oral cavity 1day before the tracheostomy.
B: The tumor in the oral cavity 2days after the tracheostomy.
C: Three months after the tracheostomy.
D: Preoperative MR image (sagittal view).
E: Preoperative MR image (horizontal view).

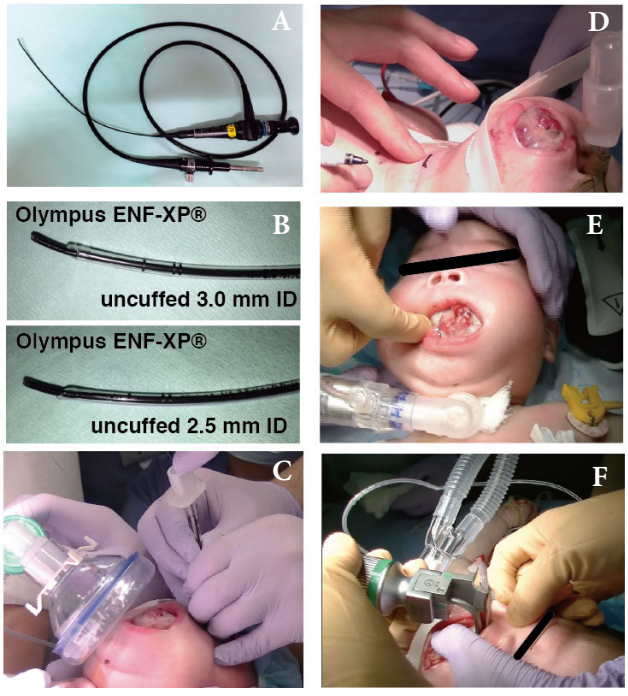

Figure 2. A: Flexible rhinolaryngoscope ENF-XP®, Olympus with a 2.2-mm outside diameter (OD) and 30-cm working length. **B**: (upper) uncuffed 3.0-mm-ID endotracheal tube with rhinolaryngoscope ENF-XP®, (lower) uncuffed 2.5-mm-ID endotracheal tube with rhinolaryngoscope ENF-XP®.
C: Fiberscope-guided awake nasal intubation.
D: Nasally intubated. **E**: After tracheostomy.
F: The laryngoscope could not reach the pharynx.

Broviac catheter insertion were performed. The surgery was completed in about 1hour (**Figures 2E** and **2F**). One day after the surgery, the tumor mass had increased in size and was extruded to the outside of the oral cavity, suggesting that the patient would have developed complete airway occlusion if the surgery had been delayed (**Figure 1B**). The tumor gradually regressed with subsequent chemotherapy (**Figure 1C**). Three months later, resection of the residual tumor on his tongue was performed under general anesthesia. The patient's condition was still well controlled at the time of this writing.

Discussion

MRT is a very aggressive tumor that occurs mainly in children [1]. In 1989, Weeks et al., [2] reported 111 cases of MRT. They showed that although it was originally described as a variant of Wilms' tumor, which is primarily a kidney tumor, many types of rhabdoid tumors outside the kidney have been reported in various tissues including the liver, soft tissue, and central nervous system. In addition, they reported that regardless of location, all MRTs are highly aggressive, have a poor prognosis, and tend to occur in children less than 2 years of age [2]. In our infant patient, a tumor originated from his tongue and aggressively increased in size within his oral cavity during several weeks, almost occluding his airway. Only two infant cases of oral MRT have been previously reported. First, in 1997, Pizer et al., [3] reported a case involvinga large MRT arising from the mouth of an infant. In their case, the oral tumor was associated with a mass in the posterior cranial fossa. Second, Patron et al., [4] reported an MRT of the tongue in a 10-day-old boy who developed severe respiratory distress, had an aggressive clinical course, and died 17 days after the initial diagnosis.

In 1999, White et al., [5] described the clinical, pathologic, and immunohistochemical features of a widely disseminated tumor with a rhabdoid phenotype in nine infants under 3 months of age. Five neonates had tumor evident at birth, two of which had placental metastases, and the average survival duration following diagnosis was <6 weeks. In four cases, the dominant mass involved the head and neck region, and in two cases, the primary mass was paraspinal. Genetic information was available from eight of the nine cases. Karyotype analysis revealed abnormalities of chromosome band 22q11-12 in three of six tumors, and in situ hybridization studies or molecular studies demonstrated 22q11.2 deletions in all five cases [5]. More recently, an abnormality in the hSNF5 (INI1) gene in 22q11.2 was demonstrated [6]. Because MRT grows very aggressively, if the tumor is associated with the patient's airway as in our case, a decision regarding the surgical procedure is required before critical obstruction and respiratory distress occur. Note that although previous reports have implied an aggressive disease course and poor prognosis of this tumor, the original oral tumor in our case was diminished by postoperative chemotherapy at least at the time point 1 year after the first admission.

With the recent development of flexible fiberoptic scopes

doi: 10.7243/2049-9752-4-3

with small diameters for pediatric patients, flexible fiberoptic scope-assisted nasal intubation has become another tool for managing difficult airways, even in infants [7-9]. In such cases, an ultra-thin intubation fiberscope with a 2.2-mm OD and 60-cm working length is useful for intubation of an endotracheal tube with a 2.5-mm ID and 3.0-mm ID as reported previously [10,11]. During oral fiberoptic laryngoscopy and tracheal intubation, supralaryngeal airway devices such as laryngeal mask airways can provide an excellent direct channel to the vocal cords while allowing for either spontaneous or controlled ventilation and oxygenation, simultaneously shielding the bronchoscope from secretions and bleeding. However, an adequately large mouth opening and working space in the oral cavity are required to place a supralaryngeal airway device before insertion of an endotracheal tube. Therefore, awake nasal intubation is sometimes valuable when the patient's mouth opening is limited and when an obstruction exists in the patient's oral cavity. In general, it is suggested that the OD of the fiberoptic bronchoscope should be 1 mm smaller than the ID of the endotracheal tube (**Figure 3**, **Table 1**) [7] while fiberoptic bronchoscopes as small as 2.2-mm in OD, such as the Olympus laryngoscope LF-P®, Olympus Rhinolaryngoscope ENF-XP®, and Pentax nasopharyngo-laryngoscope FNL-7RP3®, can be used for endotracheal tubes as small as 2.5-mm in ID (**Figure 2B lower**). Disadvantages of fiberscopes with a small diameter previously included a limited field of vision and no instrumental channel, but all of the above-mentioned fiberscopes have relatively superior optical performance and break through 120-130° up/down angulation capabilities (**Table 1**). In the present case, we used the Olympus ENF-XP®, which has a 2.2-mm OD and 30-cm working length (**Figure 2A**). The major difference among the Olympus LF-P®, Olympus ENF-XP®, and Pentax FNL-7RP3® is their working length; the Olympus LF-P® has a 60-cm working length, while the Olympus ENF-XP® and Pentax FNL-7RP3® have a 30-cm working length. Our impression is that for nasal intubation in infants, fiberscopes with a 30-cm working length are more advantageous than those with a 60-cm working length in terms of the ability to handle the flexible shaft of the scope.

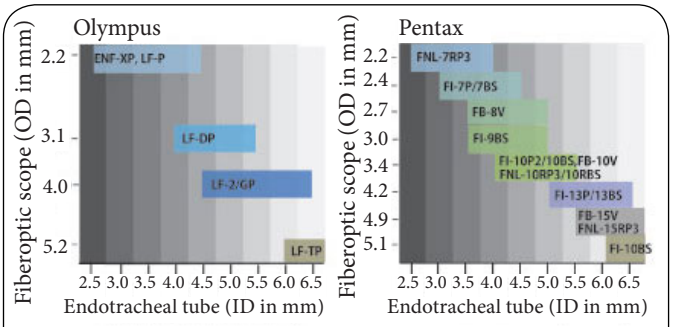

Figure 3. Size of endotracheal tubes (ID in mm) and compatible fiberoptic bronchoscopes (OD in mm).

Conclusions

In summary, in our experience with this case involving an infant with a difficult airway due to a large malignant rhabdoid tumor in the oral cavity, an appropriate choice was awake nasal fiberoptic intubation of an endotracheal tube with a 3.0-mm ID using an ultra-thin fiberscope with a 30-cm working

Table 1. List of commercially available fiberoptic scopes and their outer diameter and working length.

OD (mm)	Vendor	Name	Product type	Working length (cm)	Channel (Port)	Tip deflection up/down
2.2	Olympus	Laryngoscope	LF-P	60	-	120°/120°
	Olympus	Rhinolaryngoscope	ENF-XP	30	-	130°/130°
	Pentax	Nasopharyngo Laryngoscope	FNL-7RP3	30	-	130°/130°
2.4	Pentax	Intubation scope	FI-7P/7BS	60	-	130°/130°
2.7	Pentax	Bronchoscope	FB-8V	60	+	180°/130°
3.0	Pentax	Intubation scope	FI-9BS	60	+	130/°130°
3.1	Olympus	Laryngoscope	LF-DP	60	+	120°/120°
3.4-3.5	Pentax	Intubation scope	FI-10P2/10BS	60	+	130°/130°
	Pentax	Bronchoscope	FB-10V	60	+	180/°130°
	Pentax	NasopharyngoLaryngoscope	FNL-10RP3/10RBS	30	-	130°/130°
4.1-4.2	Olympus	Intubation/Laryngoscope	LF-2/GP	60	+	120°/120°
	Pentax	Intubation scope	FI-13P/13BS	60	+	160°/130°
4.9	Pentax	Bronchoscope	FB-15V	60	+	180°/130°
	Pentax	NasopharyngoLaryngoscope	FNL-15RP3	30	-	130°/130°
5.1-5.3	Olympus	Laryngoscope	LF-TP	60	+	180°/130°
	Pentax	Intubation scope	FI-16BS	60	+	160°/130°

OD: Outer diameter

length (Olympus Rhinolaryngoscope ENF-XP®).

Additional files

Supplement video 1
Supplement video 2

List of abbreviations

ID: Inner diameter
MRT: Malignant rhabdoid tumor
OD: Outer diameter

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

Authors' contributions	AT	HK	FT	MS	YK	TS	YN
Research concept and design	--	--	--	--	--	✓	✓
Collection and/or assembly of data	✓	✓	✓	✓	--	✓	--
Data analysis and interpretation	✓	--	--	--	--	✓	--
Writing the article	--	--	--	--	--	✓	--
Critical revision of the article	--	--	--	✓	--	--	✓
Final approval of article	✓	✓	✓	✓	✓	✓	✓
Statistical analysis	--	--	--	--	--	✓	--

Acknowledgement

The authors would like to thank Dr. Ryuichi Hirota, Assistant Professor, Department of Otolaryngology, Kyoto Prefectural University of Medicine, for his technical assistance with fiberoptic bronchoscopy, and Dr. Yasumichi Kuwahara, Assistant Professor, and Dr. Hajime Hosoi, Professor, Department of Pediatrics, Kyoto Prefectural University of Medicine, for their educational discussion.

Publication history

Editor: Arvind Chandrakantan, Stony Brook University Medical Center, USA.
Senior Editor: Davide Cattano, UT Medical School, USA.
Received: 26-Aug-2015 Final Revised: 17-Sep-2015
Accepted: 21-Sep-2015 Published: 30-Sep-2015

References

1. Beckwith JB and Palmer NF. **Histopathology and prognosis of Wilms tumors: results from the First National Wilms' Tumor Study**. *Cancer*. 1978; **41**:1937-48. | Article | PubMed
2. Weeks DA, Beckwith JB, Mierau GW and Luckey DW. **Rhabdoid tumor of kidney. A report of 111 cases from the National Wilms' Tumor Study Pathology Center**. *Am J Surg Pathol*. 1989; **13**:439-58. | Article | PubMed
3. Pizer BL, Ashworth M, Berry PJ and Foreman NK. **Congenital malignant rhabdoid tumour of the gum margin**. *Oral Oncol*. 1997; **33**:447-50. | Article | PubMed
4. Patron M, Palacios J, Rodriguez-Peralto JL, Burgos E and Contreras F. **Malignant rhabdoid tumor of the tongue. A case report with immunohistochemical and ultrastructural findings**. *Oral Surg Oral Med Oral Pathol*. 1988; **65**:67-70. | Article | PubMed
5. White FV, Dehner LP, Belchis DA, Conard K, Davis MM, Stocker JT, Zuppan CW, Biegel JA and Perlman EJ. **Congenital disseminated malignant rhabdoid tumor: a distinct clinicopathologic entity demonstrating abnormalities of chromosome 22q11**. *Am J Surg Pathol*. 1999; **23**:249-56. | Article | PubMed
6. Biegel JA, Fogelgren B, Wainwright LM, Zhou JY, Bevan H and Rorke LB. **Germline INI1 mutation in a patient with a central nervous system atypical teratoid tumor and renal rhabdoid tumor**. *Genes Chromosomes Cancer*. 2000; **28**:31-7. | Article | PubMed
7. Stackhouse RA and Infosino A. **Airway management**. In Miller RD, Pardo M (**Eds.**) Basics of anesthesia. **6th edition.** 2011; 219-251.
8. Kaddoum RN, Ahmed Z, D'Augsutine AA and Zestos MM. **Guidelines for elective pediatric fiberoptic intubation**. *J Vis Exp*. 2011; **47**:2364. | Article | PubMed Abstract | PubMed Full Text
9. Jagannathan N, Sequera-Ramos L, Sohn L, Huang A, Sawardekar A, Wasson N, Miriyala A and De Oliveira GS. **Randomized comparison of experts and trainees with nasal and oral fibreoptic intubation in children less than 2 yr of age**. *Br J Anaesth*. 2015; **114**:290-6. | Article | PubMed
10. Roth AG, Wheeler M, Stevenson GW and Hall SC. **Comparison of a rigid laryngoscope with the ultrathin fibreoptic laryngoscope for tracheal intubation in infants**. *Can J Anaesth*. 1994; **41**:1069-73. | Article | PubMed
11. Stevenson GW, Roth AG, Wheeler M and Hall SC. **Use of the Olympus LF-P fibreoptic laryngoscope by trainees in paediatric anaesthesia**. *Anaesthesia*. 1996; **51**:201-2. | Article | PubMed

Citation:
Tatsuno A, Katoh H, Taniguchi F, Shibasaki M, Kato Y, Sawa T and Nakajima Y. **Awake fiberoptic nasal intubation in an infant with a malignant rhabdoid tumor occupying the oral cavity: a case report**. *J Anesthesiol Clin Sci*. 2015; **4**:3.
http://dx.doi.org/10.7243/2049-9752-4-3