Case Report

Vol. 5, No. 1, 30-33
http://dx.doi.org/10.15280/jlm.2015.5.1.30

Journal of Lifestyle Medicine

Difficult Intubation in Pediatric Patient with a Large Lymphangioma at the Tongue Base

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Lymphangioma is a congenital malformation of lymphatic system and often involves the oral cavity. When lymphangioma is located on the mouth floor and enlarges, it can compress the airway and make intubation difficult. The GlideScope® video laryngoscope is sometimes used in routine intubation, but is most commonly used in difficult or failed intubation. We report a pediatric patient with a difficult intubation due to a large tongue base mass. The airway was compromised due to limited intraoral space, large mass at the tongue base, and glottis distortion. Oral approach was not successful with the Macintosh laryngoscope. In this case, a rigid stylet was made to match the GlideScope® curve and the endotracheal tube was inserted through the glottis under GlideScope® guidance. We believe that, even in pediatric patients, a rigid stylet is necessary when intubation at a sharp posterior angulation to the trachea is difficult during GlideScope® approach.

Key Words: Difficult intubation, GlideScope®, Lymphangioma, Stylet

INTRODUCTION

When there is a mass such as a congenital anomaly or lymphangioma in the oral cavity of a pediatric patient, the airway can be compressed and intubation can be difficult. GlideScope® video laryngoscope (Verathon, Bothell. WA, USA) is a laryngoscope with a micro-video camera and a 7-inch display monitor. It can be used in conventional intubation, but is most commonly used when larynx exposure is difficult as in situations when there is a cervical spine motion restriction or difficulty with mouth opening.

Conventional endotracheal intubation methods can be difficult with a mass present in the oral cavity. We have successfully used a GlideScope® and a rigid stylet to perform endotracheal intubation in a pediatric patient with a mass at the tongue base that had made mask ventilation and tracheal intubation difficult.

Received: January 18, 2015, Accepted: February 5, 2015

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CASE REPORT

A 12 months-old female infant (78 cm in height, 10 kg in weight) presented to the hospital with a chief complaint of left mouth floor swelling. She was born with a mass at the tongue base but had not received treatment. The mass grew progressively, causing the neck to swell recently. The patient was therefore brought to the hospital for excision surgery of the mass. She had no significant past medical history. CT scan showed a cystic mass, 50.04 × 45.69 mm in size, at the floor of the mouth on the left side, with invasion of the right side of the tongue base (Fig. 1). The esophagus was deviated to the right and the trachea appeared compressed.

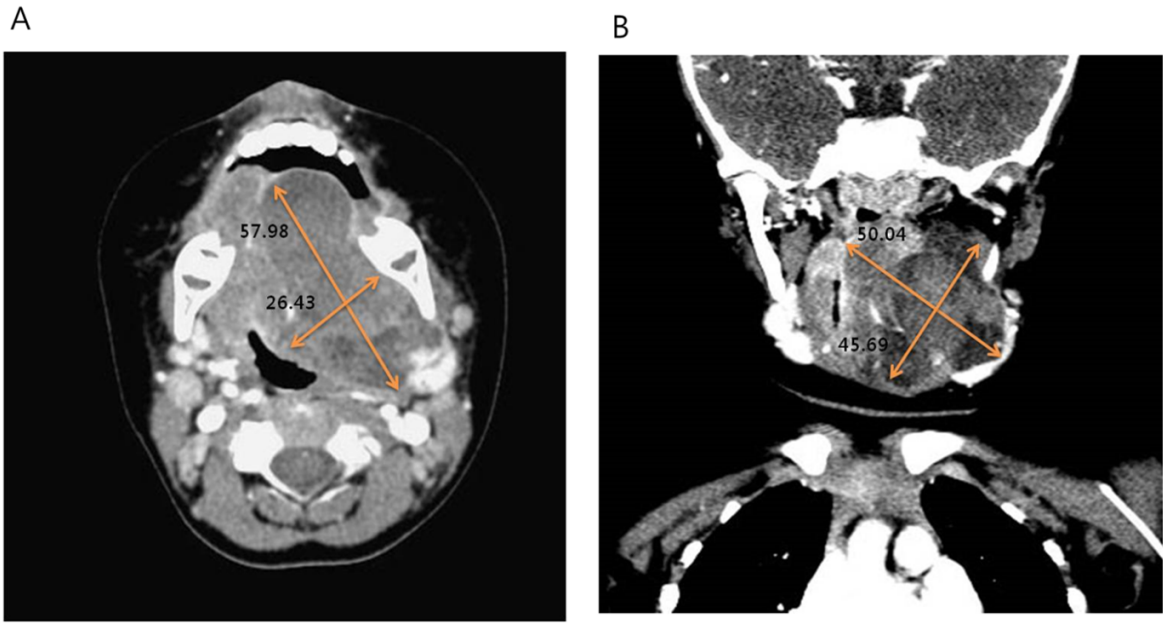

Fig. 1. Computed tomography of the pharynx demonstrates a 50.04 × 45.69 mm mass at the tongue base. There is an airway deviation on the right side due to the invasion of the mass.

On arrival at the operating room, standard monitoring including noninvasive blood pressure, electrocardiogram, pulse oximetry, end-tidal CO_2 and temperature were applied. Due to expected difficulty in tracheal intubation, a GlideScope® for pediatric patients was prepared. After the patient was preoxygenated with 100% oxygen for one minute, anesthesia induction was started with thiopental sodium 50 mg and nimbex 1.0 mg. Tracheal intubation was first attempted with a Macintosh direct laryngoscope. However, the tongue mass situated on the left was large and extended to right side of the tongue base, preventing the tongue to slide to the left during insertion of laryngoscope.

A Cormack-Lehane grade IV classification was established, therefore a GlideScope® was used to undertake tracheal intubation. We ventilated the lungs again with 100% oxygen before GlideScope® guided intubation was attempted. However, even after insertion of the oral airway and attempted ventilation, insufficient ventilation due to the mass that took up 2/3 of the oral space and airway obstruction caused by the large tongue led to arterial oxygen saturation dropping below 30% and a decrease in heart rate to 50 beats/min. After several attempts, the patient was successfully ventilated and arterial oxygen saturation was normalized. Following sufficient preoxygenation, the GlideScope® was gently inserted between the teeth at the midline and was advanced in the direction of the vallecula. However, because of the mass at the tongue base, it was difficult to expose the vocal cord and with Cormack-Lehane grade II classification established.

Tracheal intubation was first attempted by matching an endotracheal tube angulation to a GlideScope® curve using a commercialized plastic coated malleable metal stylet. However, we could not approach the laryngeal opening because the stylet could not withstand the strength and was bent, due to the limited oral cavity space and the wide angle between the GlideScope® and the laryngeal opening.

After two failed tries, an ID 3.5 mm endotracheal tube with a tracheal balloon was inserted using an OD 2.8 mm non-malleable metal stylet, which was prepared beforehand (Fig. 2). To avoid trauma from the rigid stylet, it was removed after the end of the tube passed the vocal cord and the tube was fixed. The tube was then placed under the guidance of the GlideScope®. Breath sounds in both lungs were checked by auscultation and the tube was fixed 13 cm away from the teeth. The surgery had been planned an intraoral approach, but because of concern for complications given the large mass, an external approach was used. An irregularly shaped cystic mass with bloody discharge, about

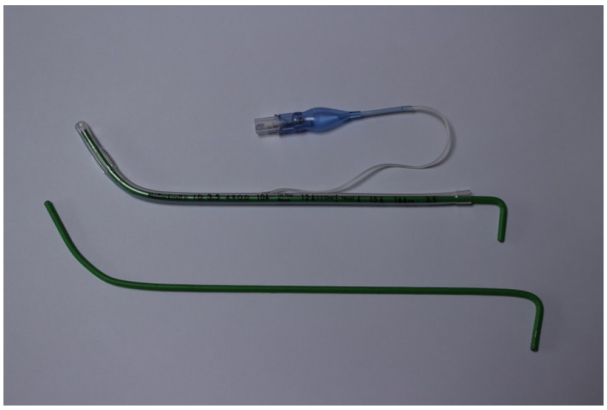

Fig. 2. Non-malleable stylet, shown individually and inserted into an endotracheal tube.

5 × 4 cm in size, was dissected. The total duration of anesthesia was 3 hours and 20 minutes. There were no respiratory problems following anesthesia and the patient was transferred to the recovery room after regaining consciousness and following extubation. The final diagnosis was lymphangioma and there were no particular complications. The patient was discharged 5 days after the operation.

DISCUSSION

Most lymphangiomas are diagnosed at birth. This patient was diagnosed with a mass on left mouth floor at birth. The mass gradually grew in size, eventually involving the right side of the tongue base, and caused the deviation of esophagus and trachea. Furthermore, the tongue became hard and enlarged such that it could not be pushed it to left side when inserting the laryngoscope. The space between laryngoscope and hard palate was so narrow that movement of intubation tube was limited. We decided to use the GlideScope® for tracheal intubation because we could not approach the vallecula with a Macintosh direct laryngoscope. Following the initial Macintosh laryngoscope approach, arterial oxygen saturation dropped below 30% due to difficulties in mask ventilation, leading to an extremely dangerous situation. The authors had considered and were prepared for the possibility of inadequate mask ventilation due to the large mass. We had anticipated that tracheal intubation could be difficult before the induction of general anesthesia. Still, we did not expect this extreme difficulty.

After injection of thiopental sodium, mask ventilation was performed without difficulty. We injected nimbex and attempted tracheal intubation. After the first failed attempt, we had difficulty with mask ventilation and arterial oxygen saturation dropped to below 30%. To prepare for this potentially catastrophic complication in a patient with a large lymphangioma, preparation of advanced airway equipment is needed before the induction of general anesthesia. Oral airways of multiple sizes and laryngoscope blades of multiple sizes need to be prepared. According to Thompson el al., number 9 adult oral airway could be needed for nine-year-old child with large tongue base [1]. When mask ventilation is inadequate, inserting an LMA to initiate ventilation before attempting endotracheal intubation is an option but may be difficult with a mass in the oral cavity and tracheal deviation.

The GlideScope® blade has a larger angle than the Macintosh laryngoscope. In particular, the distal portion of GlideScope® with a camera is 50-60° in angle. Therefore, a stylet is essential to accomplish steep passage from the mouth to the vocal cords [2]. When undertaking tracheal intubation in adults, a GlideScope®-specific rigid stylet makes the intubation tube approach much easier, however, in children, there is a greater risk of trauma and the intubation tube size is so diverse that there are no commercialized rigid stylets. The commonly used general stylets are too flexible and tend to bend easily with slight force. In this case, the tongue could not be pushed back because of the mass and thickness of the tongue. In such situations, where the vocal cords can only be exposed after the tongue is pushed far back with a GlideScope®, exerting force on the stylet is necessary for the intubation tube to reach the laryngeal inlet. Therefore a rigid stylet that can support the curve of the intubation tube is required. The new stylet for pediatrics is shaped with PVC coated non-malleable metal plant support fixture to match the curve of the GlideScope®. This stylet has an outer diameter of 2.8 mm but because it does not bend, it was much more convenient to use and much easier to approach the laryngeal opening.

One further option is available for difficult intubation in children using the GlideScope®. It is known that twisting the stylet into a spiral or a cork-screw shape and rotating it while intubation makes it simpler [3]. Although this ma-

neuver can overcome the difficult angulation, the tracheal tube has to be rotated 180°. Therefore, risk of airway injury cannot be excluded. In one case, intubation was achieved using a maneuver, in which endotracheal tube with a sharply curved malleable stylet was inserted through the glottis, and then rotated 180° to permit passage down the trachea [4]. Even when the GlideScope® glottis view is good, intractable impingement at the anterior tracheal wall can make tracheal intubation difficult and having the stylet angulation as 90° rather than 60° allows intubation to be done much faster and easier [2]. Bonefils fiberscope can also be used, particularly when the intraoral space is too confined [5].

According to Cooper et al. [6] in a study with 728 people, 4% (26 people) failed intubation even with Cormack-Lehane grade 1 view, and Cho and Kil [7] also showed that despite a good view of the larynx, there were difficulties in tracheal intubation in 25 out of 120 people. They reported that in patients with a small mouth, the space created by the blade and the mouth is narrow, causing difficulties in endotracheal tube insertion. Therefore inserting the GlideScope® near the left corner of the mouth, even if there is a slight deviation of the laryngeal inlet allows more space for tube insertion and makes tube insertion simpler. Endotracheal tubes have anterior angulation and therefore, for the tube to traverse the glottis and advance into to the trachea, the stylet has to be withdrawn several centimeters. In the case presented, tracheal intubation was performed with the stylet placed 1 cm behind the end of the tube and was fixed after the tube was 1 cm into the laryngeal opening. While confirming the position of the tube with a GlideScope®, the stylet was removed and the tube was inserted into the appropriate place.

When using a GlideScope® for tracheal intubation in pediatrics, it is recommended that a malleable metal stylet be used to prevent trachea or tissue trauma. However, a small and narrow oral cavity, a large tongue, or especially a mass in the mouth can make it difficult to manipulate the laryngoscope and ETT into the oral cavity. As in the case presented, a non-malleable metal stylet for tube manipulation may be necessary.

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