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Case Report

One lung ventilation for children with Pierre Robin sequence using Supreme™ LMA and Arndt endobronchial blocker: a case report

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Abstract: One lung ventilation (OLV) is a technique routinely used in thoracic anesthesia to facilitate thoracic surgery. We describe a case of pediatric with Pierre Robin sequence using Supreme™ laryngeal mask airway (LMA) and Arndt endobronchial blocker to achieve OLV.

Keywords: One lung ventilation, Pierre Robin sequence, laryngeal mask airway, Arndt endobronchial blocker, children

Introduction

Video assisted thoracoscopic surgery (VATS) is a less invasive approach for thoracoscopic surgery [1]. Over the years, the indications for VATS in children have increased exponentially. However, VATS strongly requires a successful OLV, which remains a challenge for the pediatric anesthesiologist. Currently, techniques for single lung ventilation in children have included the use of single lumen endotracheal tube (ETT), Arndt endobronchial blocker, double lumen endobronchial tubes (DLT), and Univent tubes [2]. These options all have their individual limitations and none is entirely satisfactory. Pierre Robin sequence, a congenital malformation, which is characterized by micrognathia, cleft palate, glossoptosis and a wide range of other anomalies. Patients with Pierre Robin sequence can be considered at risk of having a difficult airway during OLV and isolation. We here report a new strategy of combining use of Supreme™ LMA (**Figure 1A**) and Arndt endobronchial blocker (**Figure 1B**) for OLV in a 4-year-old child with Pierre Robin sequence.

Case report

A 4-year-old patient, who weighed 15 kg, was undergoing an extensive surgical resection of an intrathoracic ganglioneuroblastoma. General anesthesia was induced with up to 5% sevoflurane using step by step method. After confirmation of easy mask ventilation, a Supreme™ LMA (size 2, The Laryngeal Mask Company Limited, Singapore) intubation was facilitated with intravenous propofol 2 mg/kg. Then, sufentanil 1 μg/kg and cisatracurium 0.15 mg/kg were administered and the lungs were ventilated with pressure controlled mode. Anesthesia maintenance was achieved with sevoflurane 2%-3% according to hemodynamic parameters. In order to achieve OLV, an Arndt endobronchial blocker (5 French, Cook Medical, USA) was used. The 3.4 mm fibroscope (Olympus, Japan) was inserted into the right bronchus, the blocker was passed coupled with the guide-loop. After a proper cuff position was confirmed, the endobronchial blocker was leaved between the vocal cords and enough space for ventilation. The inspiratory peak pressure was not above 25 cm H_2O and the oxygen saturation level at 100% throughout OLV. Before the insertion of the thoracoscopic port, the breathing circuit was disconnected and halted for 2 min to facilitate lung collapse, and the cuff was then inflated with 2 ml of air and OLV of the left-dependent lung was started. The surgery procedure was accomplished successfully within 2 hours, and the patient recovery from general anesthesia

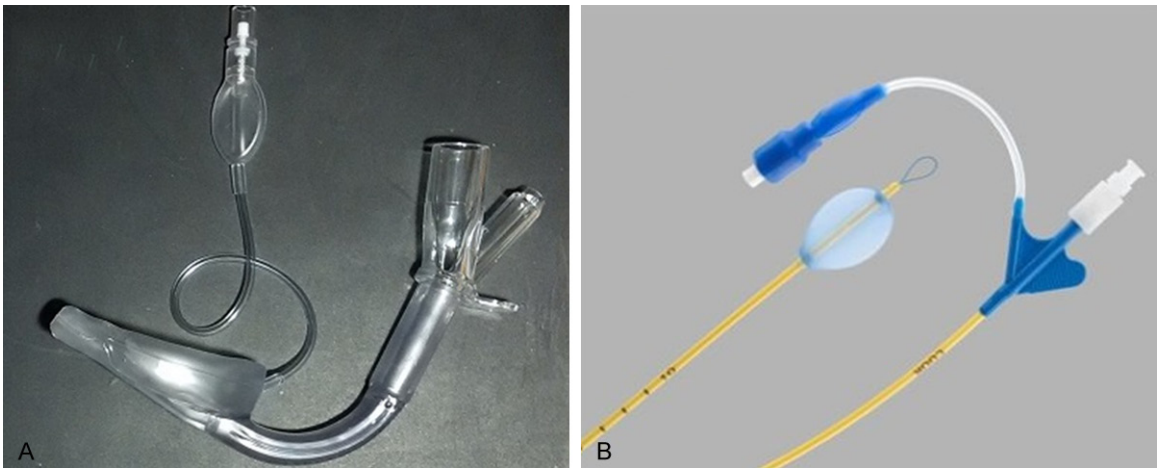

Figure 1. Supreme™ LMA (A) and Arndt endobronchial blocker (B).

smoothly with the Supreme™ LMA and discharged one week later.

Discussion

Although double lumen endobronchial tubes (DLT) remains the most popular and reliable choice for OLV, the smallest DLT is a 26 Fr, which may be used in children from about 8 years old. Therefore, a bronchial blocker could be an alternative and might be preferred over DLT in pediatric patients [3]. Currently, a variety of balloon-tipped endobronchial blockers exist but the placement is technically challenging if the size of the tracheal tube does not allow the simultaneous passage of the fibreoptic scope and the endobronchial blocker.

The Arndt endobronchial blocker has been recently reported as an elegant solution, but usually used together with a conventional tracheal tube [4, 5]. The Arndt pediatric bronchial blocker is a 5 Fr catheter with a removable string that loops over the fibreoptic scope, which can be placed only via a tracheal tube of internal diameter 4.5 mm or larger and requires an ultrathin (2.2 mm) bronchoscope. Without an ultrathin bronchoscope, we decided to place the endobronchial blocker via the Supreme™ LMA. Our report describes a new technique for endobronchial blocker insertion through Supreme™ LMA in children to achieve OLV.

The Supreme™ LMA is a relatively new device that was brought into clinical practice, which is considered to be an extremely useful alternative to the endotracheal tube (ETT) in a number of clinical scenarios. The LMA causes a decreased airway resistance, less bronchoconstrictive reflex and fewer pulmonary infections. Additionally, it may be lifesaving in patients with malformations of the upper airway. However, the application of the LMA in thoracic anesthesia has been limited due to the requirement of OLV, which appeared impossible for the LMA alone. The Supreme™ LMA has been shown to form a more effective seal and was proven to apply PEEP during pressure-controlled ventilation which leads to an improved arterial oxygenation in pediatric patients [6]. In our case, the effective seal of the Supreme™ LMA allowed adequate ventilation during OLV and the use of PEEP allowed complete reexpansion of the collapsed non-dependent lung after the surgery.

Conclusion

The use of an Arndt endobronchial blocker may overcome some of the limitations of DLT, such as difficult airway or pediatric patients. When applied in combination with Supreme™ LMA, the limitations of traditional use of end bronchial blockers can be further overcome. This novel strategy of combination can be a novel alternative for OLV in pediatric patient with difficult airway.

Disclosure of conflict of interest

None.

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