Anaesthetic Management in Obstructive Sleep Apnoea Syndrome for Adenotonsillectomy

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The anaesthetic management of adenotonsillectomy in children with obstructive sleep apnoea syndrome is characteristic due to respiratory and cardiac side effects. A detailed physical examination in the preoperative period should be performed, including children's respiratory and cardiac systems. If they have an active infection, surgery should be postponed until the end of medical treatment. Preparation for difficult airway management should be done in the preoperative period. In this case, we presented a report of two children who had obstructive sleep apnoea syndrome, with airway management performed at the right lateral position to prevent the pharyngeal collapse and rapid sequence intubation performed using a short-acting muscle relaxant.

Key Words: Obstructive sleep apnea syndrome, adenotonsillectomy, intubation

Introduction

Adenotonsillar hypertrophy is a very frequent cause of obstructive sleep apnoea (OSA) syndrome in children. Obstructive sleep apnoea is seen in 1-3% of children and it is among the main indications for adenotonsillectomy (1). Because of upper airway obstruction, management of anaesthesia and providing airway patency is a challenge for the anaesthetist (2). The prevalence of laryngospasm during anaesthesia induction and recovery is high in these patients, as these patients frequently suffer from upper respiratory infections, and have increased upper airway reactivity even though if the infection is completely treated.

As there is pharyngeal collapse during sleep and anaesthesia, tracheal intubation and maintenance of airway patency during anaesthesia is difficult in patients with obstructive sleep apnoea. Therefore, a detailed anaesthetic assessment and preparation for difficult airway management is necessary in patients undergoing elective adenotonsillectomy.

In this case report, along with the literature, we aimed to discuss the contribution of performing airway manoeuvres (chin lift, jaw thrust) in the right lateral position and rapid sequence intubation to airway safety in the anaesthetic management of two children with OSA undergoing adenotonsillectomy surgery.

Case Presentations

Case 1

During the examination of a two-year old (78 cm, 8 kg) girl with complaints of respiratory distress, restlessness and growth retardation, it was observed that her upper airway passage was obstructed. Her history revealed that respiratory distress worsened while feeding, she could not lie on her back, was snoring and she suffered from intermittent cessation of breathing during sleep. Evaluations done with a fiberoptic endoscope revealed that nasal passages were totally obstructed. On examination, she had cyanotic lips, severe respiratory distress and apneic spell while crying. In arterial blood gas analysis PaO₂ was 67 mmHg, and PaCO₂ was 52 mmHg. Electrolyte (sodium and chloride) imbalance determined in biochemistry tests was corrected before surgery. Her white blood cell count was 15.10³/mL, and after she received ampicillin plus sulbactam treatment for 10 days, she was taken to surgery.

Case 2

An eight-year-old (114 cm, 22 kg) boy was admitted to the Ear Nose and Throat clinic with a complaint of difficulty breathing through nose. His history revealed that he was snoring and suffered from intermittent cessation of breathing during

sleep. In the examinations performed with a fiberoptic endoscope, nasal passages were observed to be 90% obstructed.

Written and verbal informed consents were obtained from the mothers of both children. Difficult airway assessment performed before the surgery revealed that none of the children had micrognathia, retrognathia and mandibular hypoplasia. Head and neck movements, and mental-hyoid bone distance was normal. Stridor score used for the clinical evaluation of cases with obstructive sleep apnoea was 3 and 2, respectively [Stridor score: 1=normal breathing sounds detected by auscultation over the trachea, 2=stridor over the trachea detected by stethoscope, 3=stridor detected without auscultation (audible), 4=no airway sound detectable over the trachea] (3, 4). Operating room was warmed to 24°C beforehand. The patients did not receive any premedication. One hour before the surgery, EMLA (Lidocaine 25 mg, Prilokain 25 mg, Astra-Zeneca) cream was applied to the dorsum of the left hands of the patients and covered with a patch. While their parents were still near them, IV cannulas were placed on the dorsum of the left hands of children in sitting position. Intubation tubes and laryngeal mask airways appropriate for age and fiberoptic bronchoscope were kept near at hand. Non-invasive arterial blood pressure, ECG, pulse oximetry and skin temperature monitoring were initiated after the cases were taken into the operating room. Baseline vital signs of case 1 and 2 were as follows; SpO₂: 89% and 96%, normal sinus rhythm, pulse: 125 and 105 beats/minute, blood pressure: 63/45 and 94/51 mmHg, body temperature by skin probe: 38 and 36.7°C. After the patients were delivered 100% oxygen by face mask for 5 minutes in the sitting position, anaesthesia was induced. During induction, while an experienced anaesthetist (working as a specialist for more than 10 years) was standing behind the patient in a position where she could reach the head of the patient easily, another anaesthetist was standing close to the vascular line. After lidocaine was given at a dose of 1 mg/kg, prophylactic atropine sulphate was administered at a dose of 0.02 mg/kg. While administering IV propofol (2 mg kg⁻¹), chin was lifted front and upwards and the patients were placed in right lateral position. Oral or nasal airways were not used in order not to trigger laryngospasm. Thereafter, succinylcholine (Lystenon, 100 mg/10 mL amp) at a dose of 1 mg kg⁻¹ was rapidly injected. After the head and the body were placed in controlled supine position, intubation was started. Intubation was achieved in a single attempt by performing BURP manoeuvre consisting of backward, upward and rightward pressure of larynx. During laryngoscopy, the intubation scores of both patients were grade 2 [Ease of intubation: Grade 1: Easy intubation, Grade 2: Intubation requiring an increased anterior lifting force and assistance to pull the right corner of the mouth upwards to increase space, Grade 3: Intubation requiring multiple attempts and the use of a curved stylet, Grade 4: Failure to intubate with the laryngoscope] (5). The patients were ventilated with positive pressure ventilation maintaining the tidal volume at 8-10 mL kg⁻¹ min⁻¹. Airway pressure was maintained at 12-14 cmH₂O

and 16-20 cmH₂O in Case 1 and 2, respectively. After securing the tracheal tube in midline position, anaesthesia was maintained with 2-4% sevoflurane in 50% oxygen and air mixture. Case 1 and 2 received 2.5 and 5 mg Dexamethasone (Dekort amp), and 2 and 4 mg Ondansetron (IV) at a single dose (Zofer 8 mg, 4 mL amp, Adeka) for reducing postoperative nausea and vomiting, and esmeron at a dose of 0.3 mg kg⁻¹, 12 and 8 minutes after reversal of neuromuscular block, respectively. After surgery, 2 mg/kg sugammadex (Bridion 200 mg/2 mL IV flacon, Schering-Plough) was used to antagonize the neuromuscular block, thereafter the subjects were again placed in right lateral position and extubated after 5 minutes. No complications (laryngospasm, aspiration, vomiting etc.) occurred in the intraoperative and postoperative period. Paracetamol (Perfalgan 1 g/100 mL, Bristol Myers) was infused at a dose of 15 mg kg⁻¹ for postoperative analgesia. The patients, who were kept under close monitoring and applied cold vapour treatment in the postoperative care unit approximately for an hour, were transferred to the ward. While Case 2 was discharged at postoperative 2 days, Case 1 was referred to the paediatrics clinic to be investigated for weight loss and growth retardation.

Discussion

Obstructive sleep apnoea, mainly an adult disease, may also be seen in childhood, although there may be discrepancies in the aetiology, diagnosis and treatment, and if not treated, it may lead to cardiac and respiratory dysfunction (6). It has nocturnal symptoms, including snoring and intermittent apnoea lasting for 10 seconds and day symptoms including problems in perception and behaviour, growth and developmental retardation and cor pulmonale and hypertension in case of delayed treatment. Despite the advances in medical science, its diagnosis is debatable. The basic treatment method of OSA in children is adenotonsillectomy (6). Late presentation for adenotonsillectomy may lead to difficulties in symptom relief (7). Although all symptoms of OSA were present in Case 1, nocturnal symptoms were more apparent in Case 2.

It has been determined that airway management can be eased by lateral positioning in adults with morbid obesity, OSA and difficult airways, because supine position increases the compression of the pharynx and leads to cessation of oral and nasal airflow (8). Arai and colleagues (9), in their study on children undergoing adenotonsillectomy for OSA, intubated the children in supine position and performed chin lift (forwards and upwards) manoeuvres to provide a safe and successful airway. Different from us, local anaesthesia of the upper airways was achieved by 4% lidocaine in the study of Arai and colleagues, and they performed intubation in both lateral (right lateral) and supine positions with sevoflurane mask induction without using neuromuscular blocker agents (9).

Rapid sequence intubation (RSI) is a method of intubating patients by using potent induction agents and rapidly acting

neuromuscular blockers after necessary preparations (10). It is commonly used in emergency departments, but may also be used in selected cases likely to have difficult mask ventilation. RSI should be performed after a good preoxygenation, so that it will allow 3-4 minutes of apnoea (10). The most frequent problem in OSA patients after anaesthesia induction is that adequate ventilation cannot be achieved due to pharyngeal collapse. This situation is life-threatening, and if RSI is performed before appropriate preparations, it may lead to complications such as intubation failure and laryngospasm. We used IV lidocaine for the suppression of airway reflexes for RSI. Propofol (reduces the incidence of postoperative laryngospasm) (11) was given as a potent anaesthetic agent and succinylcholine for rapid neuromuscular blocker effect. A successful intubation was achieved at a single attempt in both cases. In order to avoid laryngospasm in the postoperative period, sevoflurane with negligible airway irritant effects was used for anaesthesia maintenance. Performing extubation under deep or superficial anaesthesia is not recommended in adenotonsillectomy (12). Deep extubation increases the risk of aspiration and airway obstruction, while extubation under superficial anaesthesia increases the probability of laryngospasm particularly in cases with OSA syndrome. A rapid and safe recovery was achieved in our cases by right lateral positioning and using sugammadex that rapidly reverses the effects of rocuronium-induced neuromuscular block.

The most frequent side effect after paediatric adenotonsillectomy is nausea and vomiting (70%). Although many pharmacological agents are used for this purpose; the most commonly used are dexamethasone and antiserotonergic agents (13). We also used dexamethasone and ondansetron after intubation. Providing a good postoperative analgesia is important in that it decreases agitation and complications. Narcotic analgesics are not recommended for this purpose as they may lead to respiratory depression. Paracetamol infusion may be used as a component of multimodal analgesia (12) and dexamethasone, besides its antiemetic effects, was found to contribute to analgesia (14). Local anaesthetic infiltration to the wound site is also a frequently used method (15).

Conclusion

A safe airway was provided by rapid sequence intubation in the right lateral position in two cases with obstructive sleep apnoea syndrome undergoing adenotonsillectomy.

Informed Consent: Written informed consent was obtained from the parents of the patients who participated in this case.

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