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Adenoid hypertrophy; unusual cause of respiratory distress

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ABSTRACT

Enlarged adenoids may cause upper-airway-obstruction, sleep-disturbed breathing, mouth-breathing, ear infections, and adenoid facies. American-academy of otolaryngology describe adenoidectomy for sleep-disturbed breathing, airway-obstruction and for repeated ear infections; however, it does not describe intervention timing in presence of airway-obstruction. Managing a child with acute respiratory distress secondary to airway-obstruction, is challenging due to possibility of airway collapse and inability to ventilate following anesthesia induction.

Keywords: Airway-obstruction; Child; Anesthesia-induction

INTRODUCTION

Enlarged adenoids are known to cause airway obstruction, sleep disturbed breathing, mouth breathing, ear infections like otitis media, and adenoid facies including small thin nostril, overcrowding of teeth, high arch palate, and hypoplastic maxilla.[1] Hypertrophied adenoids obliterating choana in association with craniofacial abnormalities can cause severe respiratory distress. American academy of otolaryngology and Anthem guidelines describe adenoidectomy for sleep disturbed breathing, airway obstruction and for repeated ear infections[2]; however, the guideline does not describe when to intervene in case of airway obstruction. Managing a child who is in severe respiratory distress secondary to airway obstruction is challenging due to the possibility of inability to ventilate following administration of sedative agents or induction of anesthesia. Anesthesia in such children is generally induced with sevoflurane as it offers a spontaneously breathing patient and a possibility of rapid return to consciousness and control of airway if intubation fails. However, it is often difficult to induce anesthesia with inhalational anesthetic agents in a child with severe respiratory distress as reasonable ventilation is necessary for achieving appropriate concentration of the inhalation anesthetic agent in the alveoli and anesthetic induction usually result in ventilatory depression. Alternatively, intravenous or intramuscular ketamine is used for inducing anesthesia. We describe

perioperative management of a two and a half year old male child presenting with chronic severe respiratory distress suspected to be secondary to chronic airway obstruction.

Case report

A two and a half year old child weighing 7.5 kg presented to our institute with severe respiratory distress. The respiratory distress was present for last eight months and a stertor was heard during inspiration. The child had spastic cerebral palsy since birth. The developmental mile-stones of the child were delayed; earlier, the child was investigated by echocardiography for congenital heart disease and no abnormality was detected. There was no history of ear infection or sinus infection. On repeated medical consultations, the parents of the child were told that the disease will resolve once the child grows. On examination, the child was breathing through mouth, the chin was receding, the chest wall and the sternum were severely sucked-in during inspiration, and the sternum showed severe pectus excavatum deformity (Fig 1). Pulse rate was 150 beats per minute and the blood pressure in right upper arm was 80/50 mmHg, the respiratory rate was about 18 per minute. On auscultation, breath sounds were poorly heard. The chest expansion appeared better in right decubitus during inspiration. Soft tissue neck X-ray (Fig 2) showed narrow-air-path in supraglottic region and a normal air tracheogram. It was possible to insert a 6F catheter through both the nostrils and a choanal atresia was ruled out. In view of presence of features of upper airway obstruction and narrowed air path, a mass lesion was suspected in supraglottic region. Computed tomography (CT) scan of neck was considered for further evaluation, but, in view of severe respiratory distress, sedation or anesthesia for CT scan was considered life threatening and the attending anesthetist as well as otolaryngologist felt that a tracheostomy would be an appropriate and safer option before further evaluation. The child was scheduled for direct laryngoscopy evaluation and elective tracheostomy for relieving the severe respiratory distress. No premedication was given.

In the operating room, monitoring started with pulse oximetry, non-invasive blood pressure, and electrocardiogram (ECG), the measured values were 94%, 85/50 mmHg; the ECG showed sinus rhythm and the heart rate was 160 per minute. Before starting anesthesia, endotracheal tubes (2.5, 3.0, 3.5, 4.0, 4.5 mm), suction catheters (6F, 8F, 10F) straight blade and curved blade laryngoscopes, and Magill's' forceps were kept and arrangements for emergency surgical tracheostomy were made.The child was preoxygenated for 5 minutes, intravenous atropine 0.2 mg was administered; thereafter, anesthesia was induced with intravenous ketamine 10 mg and manual ventilation was started. On confirming, acceptable manual ventilation, 10 mg succinylcholine was administered. On laryngoscopy, the laryngeal view graded as Cormac Lehane Grade III; in view of expected narrowing of airway, initially, trachea was intubated with a 2.5 mm ID endotracheal tube (ET); however, the ET could be inserted easily and there was significant air leak around the ET tube and it was replaced by a 4.0 and then by a 4.5 mm ET tube. Thereafter, the child was put on controlled ventilation using a tidal volume of 70 ml and a ventilatory rate of 20 per minute. Anesthesia was maintained with 2% isoflurane in 50% O2 in nitrous oxide.The end-tidal CO2 was 55 mmHg which later decreased to 40 mmHg. Atracurium 4 mg was administered for muscle relaxation which was maintained by intermittent boluses of 1 mg. During endotracheal intubation, no obvious abnormality was noted in the oropharynx and in the region of glottis.The oropharyngeal findings were further confirmed during direct laryngoscopy examination. To further explore the site of airway obstruction, bilateral nasal endoscopy was performed which showed severely hypertrophied adenoids (Fig 3). The child underwent endoscopic microdebrider assisted surgical excision of adenoids. 1 mg dexamethasone was administered in view of repeat airway handling. After completion of surgical procedure hemostasis was ensured, the anesthetic agents were discontinued and ventilation was continued with 100% oxygen. After ensuring washout of anesthetic gases, the muscle relaxation was reversed with atropine 0.2 mg and neostigmine 0.5 mg. After return of spontaneous breathing and consciousness, the trachea was extubated. Additionally, preparations were made for reintubation, if required. The breathing pattern became unobstructed, the chest showed expansion and sternal retraction decreased drastically. Before discharge the breathing pattern became almost normal (Fig 4) and the pulse rate decreased to 104 per minute. At one month follow up child gained

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almost 1 kg weight and remained free of respiratory distress.

Discussion

The causes of chronic severe respiratory distress secondary to airway obstruction in a child include chronic papillomatosis of upper airway, enlarged adenoids, laryngeal hemangioma, laryngomalacia, foreign body impaction in the upper airway, choanal atresia, bronchitis, chronic upper airway obstruction as occur in a slow growing mass, broncho-pulmonary dysplasia, and congenital heart diseases, etc.[3] In the present patient, the history and clinical examination ruled out the presence of congenital heart disease and foreign body impaction. The presence of stertor, mouth breathing and the soft tissue x-ray of neck were supporting the possibility of presence of an obstructive lesion in the upper airway; however, the possibility of enlarged adenoids causing such a severe airway obstruction was not considered as we were able to pass a soft catheter into oropharynx through both the nostrils.

The adenoids are part of the immune system, which helps fight infection and protects the body from bacteria and viruses. The adenoids grow from birth and are biggest when child is six years old. By age seven to eight they start to shrink and by the age of 12 year they regress to an insignificant size.[4] Moreover, adenoids are not an essential part of an adult's immune system. Hence, presently, surgical removal of adenoids is not recommended routinely in children. Adenoiditis is treated with antibiotics. However, if child has frequent infections, including ear and sinus infections, or antibiotics do not help, or child has ongoing breathing problems, surgery may be needed to remove the adenoids.[5] Enlarged adenoids causing airway obstruction is known to be associated with mouth breathing and craniofacial abnormalities such as retrognathia.[6]

Presently, as per American Academy of Otolaryngologist guidelines removal of the adenoids (adenoidectomy) may be recommended if there are recurrent infections despite antibiotic therapy, and/or difficulty breathing due to enlarged adenoids.[2] In the present patient several clinical features such as mouth breathing, retrognathia and severe respiratory distress indicated possibility of upper airway obstruction possibly due to enlarged adenoids or tonsils, and the patient should have been referred for surgical removal of adenoids. The important issue in this case is the severity of airway obstruction which was life threatening. Enlarged adenoids causing life threatening airway obstruction has not been reported and this may be the reason of delayed referral of the patient for surgical management in-spite of repeated medical consultation. American academy of otolaryngology and Anthem guidelines describe adenoidectomy for sleep disturbed breathing, airway obstruction and for repeated ear infections; however, the guideline does not describe when to intervene in case of airway obstruction. From the case report, it appears that as soon as mouth breathing or craniofacial abnormalities appear the treating pediatrician should refer the child for surgical management and it would be appropriate if the child is operated delaying further may result in severe respiratory distress and other associated complications.

Conclusion: Association of mouth breathing, craniofacial deformities and respiratory distress, indicates life threatening nasopharyngeal airway obstruction, in such a child, surgical removal of enlarged adenoids should be performed immediately; waiting for natural regression of adenoids in such cases can cause fatal outcome and is inappropriate. Anesthetic management is challenging because of the possibility of difficulty with mask ventilation, placing a pharyngeal airway in mouth breathers may provide room for anesthetic gases entry and mask ventilation.

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