Case Report

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The general anesthesia experience of deletion 8p syndrome patient
-A case report-

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A deletion 8p syndrome is a relatively uncommon congenital disease characterized by mental retardation associated with multiple malformation that make anesthetic management a challenge. Anesthetic management of a patient with deletion 8p syndrome may pose a serious problem mainly from difficult tracheal intubation, aspiration complication and cardiac malformation. We experienced a case of 10 year-old boy with a deletion 8p syndrome who underwent appendectomy under the general anesthesia. Intubation was performed by video glidescope after unsuccessful attempt with Macintosh laryngoscope. A high arched palate, short neck, poor patient cooperation due to mental retardation and occasional autistic behaviour made airway management difficult. This case should alert anesthesiologists to the greater difficulties of managing patients with deletion 8p syndrome. (Korean J Anesthesiol 2011; 61: 332-335)

Key Words: Congenital disease, Deletion 8p syndrome, Difficult intubation, Mental retardation.

To maintain a healthy physique, developmental chromosomes need to include the appropriate amount of genes. Deletion 8p syndrome is a genetic disorder, in which chromosome 8p is deleted from the 46 chromosomes [1]. Most deletions of 8p23 appear as terminal deletions and the rest as interstitial deletions [2]. As can be seen in most other chromosomal abnormalities, deletion of 8p also is characterized by birth abnormalities, developmental delays of the body, characteristic facial features, and learning disabilities.

This genetic disorder has a high frequency of congenital cardiac malformation such as atrioventricular septal defect (AVSD), pulmonary stenosis (PS), ventricular septal defect (VSD), Ebstein's malformation, tetralogy of Fallot (TOF). It also causes difficulties in intubation due to microcephaly, a high arched palate, cleft palate, high narrow forehead, broad nasal bridge, short neck, and a large tongue. In addition, it is commonly accompanied by congenital diaphragmatic hernia and esophageal motility disorder which leads to frequent gastroesophageal reflux so there is a high risk of aspirating the contents of the stomach when inducing anesthesia or during

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recovery. In addition, there are reports of complications such as seizures and epilepsy so when anesthetizing patients with this disorder, an appropriate method should be selected considering the above problems.

There are no reports concerning anesthetized patients with deletion 8p syndrome in Korea, and the authors had a patient with this disorder who experienced appendectomy under general anesthesia so the authors are reporting this case accompanied by a literature review.

Case Report

The patient was a 10 year-old boy with a height of 128 cm and a weight of 36 kg who complained of pain in the right lower abdomen. He was diagnosed with appendicitis, and it was decided to do an appendectomy. He had been diagnosed with grade 3 mental retardation at age 4 although an exact diagnosis was not possible because a DNA test was not done. However, the parents were planning for a second child and had a DNA test done in England when the patient was 10 and confirmed an 8p23 deletion. According to the past history, there were no abnormalities that accompanied the genetic disorder such as asthma, and DNA tests were done on the parents for a family history but all were normal. Based on the physical exam, the patient exhibited the characteristic facial features of microcephaly with a broad nasal bridge, short neck, and high arched palate. According to the airway examination, the interincisional distance was approximately 3 cm and the thyromental distance was approximately 5 cm when the mouth was opened at its widest maximum. The Mallampati airway classification was grade 3 and difficulty in intubation was predicted; there were no limitations in neck movement and there were no loose teeth but they were irregular. In an echocardiography conducted at another hospital, the patient had no heart problems that can accompany 50% of the people with deletion 8p23 syndrome, and there were no indication of Ebstein's malformation and TOF. No abnormalities were found in the blood tests or computed tomography (CT) done before surgery. The patient exhibited severe mental retardation and although simple communication was possible, he was not able to use language properly. The patient responded impulsively and showed destructive and aggressive behavior characteristic to this syndrome when moving to the operating bed such as pulling hair and kicking with his feet.

Blood pressure before anesthesia was 125/70 mmHg; heart rate was 115 beats/min; oxygen saturation was at 100%, and the ECG was normal. In the emergency room before coming up to the operating room, a 22 G intravenous access was prepared on the right upper extremity but no medication before anesthesia was administered. As intubation was predicted to be difficult, a video glidescope was additionally prepared as well as a McCoy laryngoscope. Before proceeding with anesthesia, preoxygenation was done with 100% oxygen for several minutes. 50 μg of fentanyl and 150 mg of pentothal sodium was IV injected and mask ventilation was started with 4.0 vol% sevoflurane and 100% oxygen. After checking that the mask ventilation was operating properly, 30 mg rocuronium bromide was administered for rapid sequence intubation while Sellick's maneuver was done due to the risk of respiratory aspiration. After a minute, proper muscle relaxation was verified and the glottis were exposed using a Macintosh laryngoscope. Grade 3 in Cormack and Lehane airway classification was confirmed, and although intubation of an endotracheal tube with 6.5 mm envelope was attempted, it was unsuccessful so the video glidescope was used to carefully intubate an endotracheal tube with inserted stylet. Directly after intubation, blood pressure was 130/88 mmHg; heart rate was 100 beats/min, and oxygen saturation was at 100%. Mechanical ventilation was started with volume controlled ventilation with a 400 ml tidal volume and a respiratory rate of 15/min, while maintaining anesthesia with 50% oxygen/N_2O and 1.0−2.0 vol% of sevoflurane. The operation lasted a total of 1 hour and 35 minutes and 200 ml of Ringer's lactate solution was supplied. There were no abnormalities during surgery and after the surgery had finished, 7.5 mg of pyridostigmine and 0.3 mg of glycopyrrolate was IV injected to contend with muscle relaxation. Spontaneous respiration was induced to confirm stable respiration. After confirming that the tidal volume was more than 5 ml/kg, the patient responded to the command to open his eyes, which indicated that he was awake. Then, extubation was done, followed by 100% oxygen through a mask while checking the recovery of consciousness and muscle motility. Afterwards, the patient was transferred to the recovery room. Respiration was regular in the recovery room but the patient displayed excessive behavior and impulsive responses shown before the anesthesia so 4 mg of nalbupine was IV injected and he was stabilized. Oxygen saturation and blood pressure were all normal.

Discussion

Deletion 8p syndrome is a very rare congenital disease with characteristic cardiac malformation, mental retardation, craniofacial anomalies, malformations of the digestive system, and neural developmental abnormalities. It was first detailed in 1973, and deletion 8p23 was first detailed in 1988. Large terminal deletions can be discovered through basic chromosome testing but the latest molecular biological methods such as fluorescence in situ testing (FISH testing) or array comparative genomic hybridization (array CGH) need to be used to discover or confirm small interstitial deletions [3].

The frequency of 8p23 deletion syndrome is equal regardless of gender and the age of the parents [4], and it appears as either a first occurrence in one family (de novo) or through familial translocation [4,5]. There are cases where a parent has the 8p deletion but their children have no abnormalities, or parents have no deletion but the children develop problems [6].

Deletion 8p syndrome causes developmental delays in nearly all the organs in the body so it exhibits diverse clinical signs [7]. The most important and common symptom is cardiac malformations and mild to moderate intellectual disabilities and mental retardation. Also, due to microcephaly, the size of the brain is smaller which can lead to more problems, and there are common reports of behavioral abnormalities such as excessive behavior, impulsive responses, and attention deficit. Destructive and aggressive behavior and abrupt changes in response are characteristic, and they express themselves to others through behaviors such as pulling hair, hitting, biting, and kicking with their feet [8]. In boys, there could be cryptorchidism or hypospadia and they may need surgical correction [1]. Epilepsy and seizures are relatively common but known to be comparatively easier to treat [1,2,8]. Hypotonia or hypertonia or a combination of these can occur in newborns [8]; in ophthalmology, there could be strabismus, myopia, or hyperopia but can be corrected with ordinary glasses [9], and serrated teeth form can occur [5]. It usually does not affect pregnancy but there is a high possibility of giving birth to small for gestational age (SGA) or large for gestational age (LGA) [2]. The points to be considered in general anesthesia of patients with deletion 8p syndrome is that intubation will be difficult because of facial features such as microcephaly, a high arched palate, cleft palate, high narrow forehead, broad nasal bridge, short neck, and a large tongue; congenital diaphragmatic hernia occurs in 20−30% of people with this syndrome but can be corrected through surgery [3], and esophageal motility disorder which leads to frequent gastroesophageal reflux so there is a high risk of aspirating stomach content resulting in aspiration pneumonia when inducing anesthesia or during recovery [1,10]. Therefore, the degree of difficulty in securing the patient's airway should be checked beforehand, and the operator should be well-acquainted with the ASA difficult airway algorithm. Cornelia de Lange syndrome (CdLS) caused by mutation of the NIPBL (Nipped-B like) gene located at chromosome 5p13 is very similar to deletion 8p syndrome and has difficulties in intubation due to characteristic facial features, poor esophageal motility, and congenital diaphragmatic hernia and is easily exposed to aspiration [11]. Tsukazaki et al. [12] failed in achieving an orotracheal intubation of a 8 year-old CdLS patient with a cleft palate and TOF so they used a laryngeal mask and bronchofiberscope to intubate, and Fernandez-Garcia et al. [11] also did not use muscle relaxants in the general anesthesia of a 11 year-old CdLS patient considering the difficulties in intubation and maintaining airway but successfully conducted anesthesia by using a laryngeal mask. Corsini et al. [13] conducted rapid sequence intubation using pentothal sodium and succinylcholine on a 9 year-old CdLS patient undergoing surgery due to external injuries keeping in mind the possibility of aspiration and enterocleisis from malrotatio intestini. Also in our case, there were no limitations in neck movement but intubation was anticipated to be difficult according to Mallampati airway classification so video glidescope was prepared as well as a McCoy laryngoscope. In the first attempt, it was confirmed as a grade 3 Cormack and Lehane airway classification so a rapid sequence intubation using the video glidescope and Sellick's maneuver was done. A grade 3 Cormack and Lehane airway classification signifies that only the epiglottis is visible through proper use of the laryngoscope, and grade 4 is when no anatomical structure relevant to the airway but only soft tissue is visible [14].

Pre-anesthetic evaluation of deletion 8p syndrome patients can be very difficult because severe mental retardation and uncooperative behavioral disorders can make accurate examination and tests difficult. Evaluation of cardiac function is essential in particular because there is the possibility of cardiac malformations. Accompanying cardiac malformation such as AVSD, PS, and VSD, Ebstein's malformation, TOF, and hypoplastic left heart syndrome (HLHS) can congenitally occur [1,15]. Paez et al. [2] contended that from patients with deletion 8p23 syndrome, 75% of those with a terminal deletion and 94% of those with an interstitial deletion had cardiac malformation. In our case, an echocardiography was done as a pre-anesthetic evaluation to confirm that there were no cardiac malformations and cardiac output was also normal. In addition, since excessive behavior, impulsive responses, lack of cooperation, and self-injurious behavior from mental retardation can accompany most patients with deletion 8p syndrome, general anesthesia is preferred rather than regional anesthesia and occurrence of agitation in the recovery room must also be carefully observed and prevented. Extubation is done after awakening because intubation is commonly difficult in patients with deletion 8p syndrome; complications such as laryngospasm and coughing can emerge, and the risk of aspiration from gastroesophageal reflux is high. However if there is no evidence of gastroesophageal reflux and risk of aspiration in the pre-anesthetic evaluation, and intubation was not difficult, then extubation before awakening can be considered to reduce the excessive behavior and impulsive responses of the patient. The patient in our case showed pain and agitation after post-awakening extubation, and was stabilized by IV injecting of nalbuphine.

In conclusion, there have been no anesthetic cases in Korea

of patients with deletion 8p syndrome and when a patient shows several characteristics mentioned here, pre-anesthetic evaluation of the patient such as assessing the degree of intubation difficulty according to facial deformities, cardiac malformation, and mental retardation must be thoroughly conducted to select a suitable method of anesthesia.

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