Difficult Airway and Pulmonary Hypertension Coexistence in a Child With I-Cell Disease

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I-cell disease (mucolipidosis type II) is an autosomal recessive lysosomal enzyme targeting disorder leading to fatal outcome in childhood mostly due to respiratory insufficiency. The most common features of the condition are mental and physical retardation with typical orofacial features. Typical cardiac involvement includes thickening and deformation of mitral and aortic valves and dilated or hypertrophic cardiomyopathy. Mucopolysaccharidoses have been described as the worst airway problems in pediatric anesthesia, and there have been a number of previous reviews that have demonstrated a high incidence of airway problems. Here, we report the clinical course of an infant with confirmed I-cell disease (mucolipidosis type II) complicated by difficult airway and severe pulmonary hypertension, which is very rarely associated with this disorder.

Key Words: Children, Difficult Airway, I-cell Disease, Pulmonary Hypertension.

I-cell hastalığı (mukolidipoz tip 2) otozomal resesif kaltım alan, çocuk yaş grubunda çoğulukla solunum yetmezliğine bağlı ölümçü seyreden lizozomal enzim bozukluğudur. Hastalığın en sik görülen bulguları mental ve motor retrasasyon ile birlikte tipik orofasial anomalilerdir. Tipik kardiak bulgular mitral kapak kalınlaması, aortik kapak kalınlaması, hipertrofillik ve dilate kardiyomyopatidir. Mukopolisakkaridozlar pediatri anestezide görülen en çok görülen problemlerden biridir. Ancak, I-cell hastalığı (mukolidipoz tip 2) tanıları olan, hava yolunun birlikte nadir görülen ağır pulmoner hipertansiyonu olan bir bebek sunulmuştur.

Anahtar Sözcüklər: Çocuk, I-cell hastalığı, Pulmoner hipertansiyon, Zor hava yolu.

I-cell disease (mucolipidosis type II) case with difficult airway management and pulmonary hypertension (PH) coexistence.

Case report

A 10-month-old male infant was admitted to our hospital’s department of pediatric emergency with high temperature, respiratory distress and cyanosis problems. On physical examination, he was tachyynic, hypotonical and hypoactive. He appeared dysmorphic, with coarse facial features, including broad forehead, swollen eyelids, flattened nasal-root, hypertelorism, macroglossia, short neck and gingival hypertrophy (Figure 1). Respiratory system examination revealed pectus carinatum, distinct bronchospasm, prolonged expiratory phase, rhonchus and rough rales. Cardiovascular examination showed S2 rigid, 2/6 pansystolic murmur. Additionally, he had hepatomegaly, elbow and knee joint...
contractures bilaterally and had typical radiological findings of dysostosis multiplex (Figure 2). He was born as the second child of consanguineous Turkish parents. His family lost another child at 1 year of age due to pneumonia.

Physical examination and X-ray findings implicated a prediagnosis of I-cell disease (mucolipidosis type II). Measurements of plasma activity of almost all lysosomal hydrolases were significantly increased and the diagnosis was confirmed (Table 1).

Teleradiography revealed cardiomegaly. Echocardiographic assessment of right ventricular systolic pressure estimated from tricuspid regurgitation was initially about 70 mmHg. Also, a small ventricular septal defect and 3 mm patent ductus arteriosus was noted in echocardiography. Chest computed tomography (CT) showed an appearance of ground glass and atelectasis in the lower lobes of both lungs and cardiomegaly.

On admission of the patient, the pediatric risk of mortality III-24 and pediatric logistic organ dysfunction scores were, 3 and 0, respectively. Noninvasive mechanical ventilation respiratory support was applied, but the patient did not tolerate it. Endotracheal intubation was deemed necessary. Laryngoscopy was very difficult due to stiffness on the root of the tongue and the short neck and it was not possible to properly position the patient for intubation. The patient was mallampati class 3 for difficult airway degree. Difficult oral intubation was established with 4-mm ID ETT using a stylet, pushing the endotracheal tube (ETT) behind the barely visualized epiglottis. Correct positioning of the tube was confirmed by auscultation of the chest and by capnography.

We had to support the high peak inspiratory pressure and positive end expiratory pressure, 36 cmH₂O and 13 cmH₂O, respectively. In the respiratory passage, viral panel Parainfluenza Type 4 was positive. Because of the patient’s difficult airway, ETT exchange using a stylet was undertaken as follows: the stylet was passed through the ETT. Then the old tube was removed and over the stylet a new tube was inserted into the airway. Correct positioning of the tube was confirmed by auscultation of the chest and by capnography. The patient could not be extubated. Tracheostomy opening was planned but the patient died on the 26th day of his hospital admission due to respiratory failure.

Discussion

I-cell disease (mucolipidosis type II) was first described by Leroy and DeMars in 1967 (9). Diagnosis of the condition is often made in retrospect as a result of physical and mental delay. However, the presence of marked elevation of lysosomal enzymes in the plasma is an accurate diagnostic test for this disorder. Also, a diagnosis is often obtained from peripheral lymphocytes, which contain large lysosomal inclusions (10). On physical examination of our patient, the following signs and dysmorphisms were detected: coarse face, gum hyperplasia, rough voice, joint contractions and hip luxations. Dysostosis multiplex was the X-ray finding. Measurements of plasma activity of almost all lysosomal hydrolases were significantly increased.

Pulmonary hypertension is commonly seen in depot diseases such as mucopolysaccharidosis (11). However, I-cell disease and PH association has only been identified in two cases in the literature (12, 13). A number of pulmonary complications of mucolipidosis type II have been described and include the presence of balloon cells filled with mucolipids and extracellular deposition in the connective tissue of the upper airway, congestion and focal indurations due

![Figure 1](image1.png)

**Figure 1** Typical dysostosis multiplex findings in straight bone X-Ray of patient.

![Figure 2](image2.png)

**Figure 2** The patient's coarse facial appearance, broad forehead, swollen eyelids, nose flattened root, hypertelorism, macroglossia and short neck were present.

**Table 1** Lysosomal enzyme activities in plasma for Mucolipidosis of patient (nmol/h/ml serum).

<table>
<thead>
<tr>
<th>Aryl Sulfatase A</th>
<th>α-Mannosidosis</th>
<th>Total Hexosaminidase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Result</td>
<td>3052</td>
<td>1562</td>
</tr>
<tr>
<td>Control 1</td>
<td>133</td>
<td>18</td>
</tr>
<tr>
<td>Control 2</td>
<td>157</td>
<td>13</td>
</tr>
</tbody>
</table>
to bronchopneumonia infiltrations, lipoid granuloma, and severe wall thickening of the tongue and trachea (14). In our case, interstitial lung disease as a result of stored glycoprotein might be one reason for PH. Findings of chest CT would support this hypothesis. The genesis of PH in patients with mucolipidosis type II might be multifactorial. Hypoxic episodes, vascular hyperreactivity, and primary cardiac symptoms of storage disease also play an important role in the genesis of PH.

Difficult tracheal intubation occurs infrequently. Tracheal intubation of especially small infants can be challenging (15). The overall incidence of a difficult airway is 1–3% (16), but the incidence in the pediatric population is unknown (17). Risk factors for difficult tracheal reintubation include a history of previous difficult intubation, airway edema secondary to surgical manipulation or volume resuscitation, morbid obesity, and an immobilized or unstable cervical spine (18). Exubation of a patient with risk factors for difficult tracheal reintubation is approached with concern, even in the experienced hands of an anesthesiologist and critical care physician. Tracheal extubation of patients at risk for difficult reintubation is frequently delayed postoperatively and often becomes the responsibility of the critical care physician. It is known that patients with mucolipidosis and mucopolysaccharidosis have restricted movement in cervical joints and macroglossia. Also, it should be kept in mind that hypertrophic nasal tissue, adenoid and tonsils lead to difficult management of the airway and intubation. A review reported an overall difficult airway rate in all MPS disorders of 25% and an overall failed intubation rate of 8%, but in those children with MPS I the failed intubation rate was 23% with difficulties in airway management being reported in 54% of cases (7). Our patient had a difficult airway and the patient could not be extubated. The patient’s endotracheal tube exchange was done using a stylet.

In conclusion, the patient was admitted with a diagnosis of viral infection due to respiratory insufficiency. I-cell disease (mucolipidosis type II) diagnosis was made. Very little has been reported in the literature in relation to I-cell disease and pulmonary hypertension, but multifactorial reasons could play a role in its etiology. I-cell disease in patients with difficult intubation may be kept in mind. In these patients the endotracheal tube stylet can be used for the exchange.

REFERENCES
