

CASE REPORT

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Concomitant brachial plexus and phrenic nerve palsy due to birth trauma: A case report

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Abstract

Phrenic nerve palsy is a rare and mortal obstetric complication, and generally occurs with brachial plexus injury. Treatment options include surgical and conservative approach but there is no clear consensus yet. In this case, a Nigerian male baby with unilateral phrenic nerve palsy after traumatic delivery is presented. The patient had concomitant brachial plexus palsy on the right side. Cyanosis and respiratory distress developed following the birth. The patient was diagnosed with phrenic nerve palsy using chest x-ray and ultrasonography imaging. Non-surgical resolution was achieved and he was discharged after complete recovery. Phrenic nerve palsy is a rare cause of respiratory distress in newborns. It is often accompanied by brachial plexus palsy. The possibility of spontaneous recovery should be kept in mind before surgical options.

Keywords: Respiratory paralysis, phrenic nerve, newborn, obstetric labor complications

Introduction

Phrenic nerve palsy may result from lateral hyperextension of the neck during the delivery and leads to paralysis of the ipsilateral diaphragm [1]. There are many risk factors but the most common is traumatic delivery. Perinatal phrenic nerve palsy is often associated with breech delivery and shoulder dystocia. When traction and excessive stretching is applied to the 3rd to 5th cervical nerve, phrenic nerve disruption or laceration may occur usually unilaterally and at the right side [2]. In such a case, approximately three-quarters of the patients also experience brachial plexus injuries [2, 3]. Brachial plexus injury is a rare complications of delivery and occurs as a result of stretch or tearing of the C5-T1 nerve roots and almost associated with shoulder dystocia [4]. The phrenic nerve injury is thought to occur where the nerve crosses the brachial plexus. Risk factors include shoulder dystosia, breech presentation forceps and traumatic deliveries.

Respiratory distress, cyanosis, and decreased inspiratory thoracic movements in the newborn are suspicious markers related to the condition. Diaphragmatic paralysis due to phrenic nerve injury may result in many complications such as significant respiratory compromise, pneumonia, growth retardation, long intubation, and even neonatal death [3]. Although chest x-ray radiography and ultrasonographic imaging are sufficient in diagnosis, additional examinations such as fluoroscopy may be used if needed [4]. We describe a case of concomitant brachial plexus phrenic nerve palsy due to shoulder dystocia in a newborn in limited facilities clinic.

Case Report

We present the case of a Nigerian male baby who was term, weighed 3850gr, and was born by vaginal delivery with cephalic presentation. In the labor, shoulder dystocia was seen and it was managed with suprapubic pressure and Mc Roberts maneuver. The baby was cyanotic and cardiac or respiratory activity was not present. The resuscitation started immediately. After 30 seconds of resuscitation there was still no heartbeat. The baby intubated and spontaneous circulation was seen 30 seconds after the intubation. Heart rate was measured as 110 bpm. APGAR score was calculated as 3 at 1st minute. Baby administrated to the neonatal intensive care unit. APGAR score was 6 at 5th minute and spontaneous breathing effort started after 15 minutes.

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In the first examination, neonatal reflexes were normal except asymmetric Moro reflex. Lack of movement was observed in the right upper extremity and Erb's palsy was suspected. Umbilical venous catheter was placed. Maintenance fluids were started. He was followed with a mechanical ventilator in synchronized intermittent mandatory ventilation mode for 4 hours.

Since the baby's breathing effort was strong, the ventilator's pressure setting was at minimum, and Fraction of inspired oxygen (FiO_2) was at 21%, the baby was extubated. On the 15th minute of extubation, respiratory distress started. The baby's oxygen saturation started to fall, difference between right and left respiratory sounds were seen and respiratory muscle movements diminished on the right side of the chest. Continuous positive airway pressure (CPAP) started with a nasal cannula. A chest x-ray taken at this point showed a significant elevation on the right diaphragm (Figure 1). Abdominal ultrasonography showed no movement on the right side of the diaphragm and left side movements were seen as normal. Feeding was initiated through an orogastric tube.

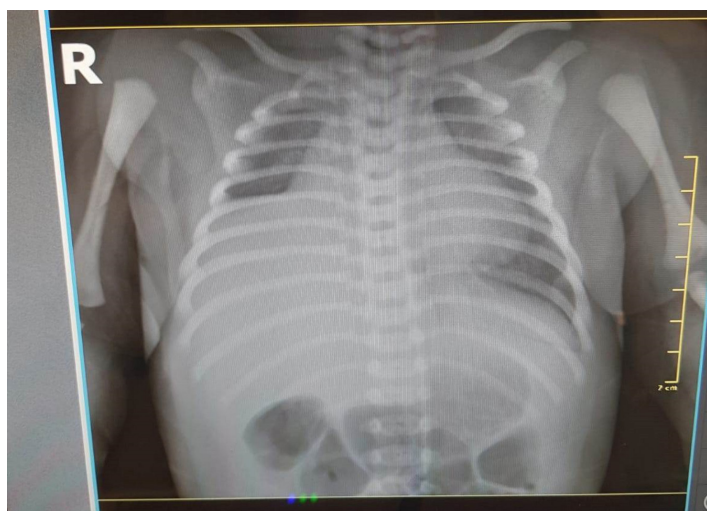


Figure 1. Image of right diaphragm elevation on chest x ray

CPAP treatment was continued for six days and replaced with headbox oxygen treatment on the 7th day. At that time little movement was present on the right side of the chest. He required headbox oxygen for two days and intermittent oxygen support for two more days. He was on complete breastfeed on the 10th day. Respiratory muscle movements improved day after day but still, it was significantly lower from the left side at discharge. Movement in the right-hand fingers was little.

He was discharged on the 20th day of his life with physiotherapy advice and follow-up. The follow-up revealed improvement in the movement of the right upper limb at the 3rd month of his life. Respiratory movements and feeding status of the baby were normal. In the chest x-ray, the right diaphragm was seen in the normal position, and ultrasonography showed normal movement of the right hemidiaphragm with respiration. The brachial plexus palsy of our patient resolved spontaneously.

Discussion

The incidence of perinatal phrenic nerve palsy is approximated as 1:15,000 to 30,000 live births and mortality is estimated to be 10–15% [2,3]. It may develop secondary to obstetric conditions and

cardiothoracic surgery in newborns. The most frequently observed obstetric causes are breech presentation, uterine malformation, macrosomic baby, shoulder dystocia, and traumatic births with forceps and vacuum usage [3]. Although in Bowerson et al. series they report cesarean section is protective for phrenic nerve palsy, following a cesarean section was reported in only one case by Stramrood et al [2,4]. From this point of view, delivery with cesarean section is preventive in terms of phrenic nerve palsy. Nowadays, this situation is observed less since the intervened births decrease and cesarean rates increase. But clinicians still need to be conscious about the management of this disorder.

There are many reasons for respiratory distress in the newborn, such as sepsis, pneumonia, transient tachypnea of the newborn, and meconium aspiration. In our case, when the elevation in the chest accompanying the respiratory distress was observed, our preliminary diagnosis was diaphragmatic hernia. On the chest x-ray radiograph, the right diaphragm was elevated and there was no evidence for a hernia. In the ultrasonographic imaging, the right diaphragm was seen immobile, and thus the diagnosis was made. The diagnosis of phrenic nerve palsy can usually be made by posterior-anterior chest x-ray and ultrasonography but fluoroscopy is also frequently used in tertiary centers. Ultrasound is the preferred diagnostic modality since it does not involve ionizing radiation.

Management of diaphragmatic paresis due to phrenic nerve palsy is controversial. There are supportive and surgical options. Surgical options include thoracotomy, abdominal diaphragmatic plication and thoracoscopic plication. The indications and timing for diaphragmatic plication are not established. In a study conducted by Rizeq et al., outcomes of 122 patients with phrenic nerve palsy were compared based on the treatment regime as operative or nonoperative [3]. Although there were trends toward shorter lengths of hospital stay, lower cost, and lower mortality in the operative group, differences were not statistically significant. Infants with phrenic nerve palsy may require intubation for a long time. Long-term immobilization of the diaphragm may contribute to the development of fibrosis, thereby making treatment difficult. Therefore, Garge et al. recommend early thoracoscopic diaphragmatic plication [5]. In the literature, it is reported that regression occurs in an average of 1 month in infants followed up without surgery [6]. In our case, diaphragm movements and breathing returned to normal on the 20th day. In Bowerson's study, 2 patients underwent diaphragmatic plication at the age of 1-2 months and experienced significant, rapid respiratory improvement postoperatively [7].

As a conclusion phrenic nerve palsy is a rare condition. It generally accompanied by brachial plexus palsy and shows unilateral involvement. It should be considered in case of respiratory distress that develop after traumatic births. Chest x-ray and ultrasonography are generally adequate for diagnosis. Surgical plication is an option but it should also be kept in mind that phrenic nerve palsy may show non-surgical regression as in our case.

Conflict of interests

The authors declare that they have no competing interests.

Financial Disclosure

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Informed Consent

Parental written informed consent obtained.

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