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Impact of pulmonary rehabilitation on improving lung health in a known case of Pseudobulbar Palsy - A case report

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ABSTRACT

Aspiration Pneumonia is a deadly complication of pseudobulbar palsy, which is characterized by abrupt respiratory distress, hypoxia, and temperature spikes. We discuss a four-month-old kid who was taken to a tertiary care hospital with complaints of unrelieved fever and hypoxemia. He was a known instance of pseudobulbar with developmental delay and on nasogastric feed .Based on radiological and clinical results; he was diagnosed with aspiration pneumonia and placed on mechanical ventilation due to inability to maintain saturation on room air. Goal-directed therapy is used in conjunction with medical care. Physiotherapy rehabilitation was begun to treat hypoxemia and help in the elimination of secretions, hence enhancing air admission into the lungs. Initial treatment was also provided for dysphagia and hypertonicity. The Modified Ashworth scale (MAS), Alberta Infant Motor Scale (AIMS), and Peabody developmental motor scale were used as outcome measures. The multidisciplinary technique has been shown to be effective in terms of early ventilator weaning, preserving general lung health, and reducing hospital stay duration.

Keywords: Aspiration Pneumonia, Pseudobulbar palsy, Physiotherapy, Case report

1. INTRODUCTION

Pseudobulbar palsy is described as an UMN lesion (upper motor neuron) caused by bilateral corticobulbar tract disruption with supranuclear control over brainstem motor nuclei governing head and neck muscular action. Dysphagia is a well-known consequence of this illness, affecting up to 80% of patients, followed by Dysarthria, facial and tongue paralysis, and emotional liability (Chaves et al., 2019). Long-term nasogastric feeding in such individuals increases the risk of secretion collection in the pharynx caused by reflux of stomach contents into the throat, resulting in aspiration. Aspiration

pneumonia (AP) is consequently the most common complication of pseudobulbar palsy. The death rate from this type of pneumonia is mostly dependent by the volume of stuff aspirated, and it can approach 70% (Ebihara et al., 2016). The most typical clinical sign of AP is the sudden development of dyspnea, fever, and hypoxemia AP consequences include empyema, lung abscess, and respiratory failure. Aspiration pneumonia has a high morbidity and fatality rate. Delayed consultation and management leads to longer hospital stay and extra consequences (Falk et al., 2018).

We discuss the case of a four-month-old patient with pseudobulbar palsy and developmental delay who was diagnosed with aspiration pneumonia and required effective goal-directed physiotherapy rehabilitation to help with secretion clearance, lung capacity improvement, and gaseous exchange. Maintaining respiratory function, reaching milestones, and preventing secondary issues were key indicators, all of which increased overall quality of life.

2. PATIENT INFORMATION

On 9th of March 2022, a 4 month child was referred to Tertiary Care Hospital with complaints of fever since 5 days which was not relieved on medications along with severe respiratory distress. Patient was known case of pseudobulbar palsy with developmental delay and was on Nasogastric feed since 15th of December 2021 .Baby had a birth asphyxia and history of neonatal ICU stay for 30 days after birth and during that period he had multiple episodes of convulsion so was started with phenobarbitone. So after thorough assessment and certain series of tests he was diagnosed with aspiration pneumonia. So, was admitted to Pediatric Intensive Care Unit (PICU) on March 7th, 2022 and Since he was not able to maintain oxygen saturation at room air so was intubated and was kept on pressure control mode of ventilation but on 13th of March 2022, baby did self extubation due to excessive irritability, post which he was taken on oxygen by bottle Continuous Positive Airway pressure (bCPAP) and was referred for Physiotherapy.

3. CLINICAL FINDINGS

Physical examination was conducted on 7th of March 2022, after taking informed consent from the parents. The baby was intubated with endotracheal tube and was kept on Pressure control mode of ventilation at Fraction of inspired oxygen -100%, Positive end expiratory pressure of 5 cm of H_2O and Respiratory rate of 30 breaths per minute. Ryle's tube was insitu. Breathing pattern was altered; continuous drooling of saliva was present. Auscultation revealed reduced air entry on right upper zone with crepitations over bilateral lung fields. On neurological examination sucking and rooting reflexes were absent. Tonal assessment revealed hypertonicity, in upper limbs it was grade 1+ and in lower limbs it was grade 2 according to Modified Ashworth scale and Deep tendon reflexes were exaggerated and mute plantar response. There was no neck control and bidextrous reach was absent suggestive of delay in gross and fine motor milestones whereas social milestone is achieved. Timeline of the Current episode is illustrated in Table 1

Table 1 Timeline of event during the hospital stay.

Date	Events
5th December 2021	Admitted to NICU for birth asphyxia
13th December 2021	Diagnosed with pseudobulbar palsy
15th December 2021	Started on Nasogastric feed
7th March 2022	Episode of fever and severe respiratory distress & Admitted to PICU
8th March 2022	Diagnosed with Aspiration Pneumonia
9th March 2022	Physiotherapy assessment was done and treatment was initiated
27th March 2022	Discharge

Diagnostic Assessment

A series of Chest X Rays were carried out as shown in (Figure 1, 2 and 3).Other Investigations which were carried out were Acid blood gas (ABG) Analysis. On 10th March 2022 ABG revealed presence of uncompensated respiratory acidosis and re evaluation on 13th March 2022 there was persistent uncompensated respiratory acidosis as mentioned in the reports. On Laboratory investigations were done after admission which revealed following derangements, Complete blood count (CBC) – reduced Hemoglobin (9.6 %), total leukocyte count (TLC) – increased (11900). Liver function test revealed reduced albumin (2.7).

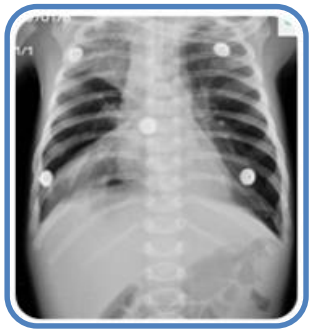

Figure 1 Sign of right upper lobe collapse (7th March 2022)

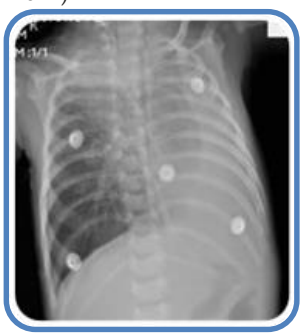

Figure 2 Left lung collapse along with right upper lobe collapse (13th March 2022)

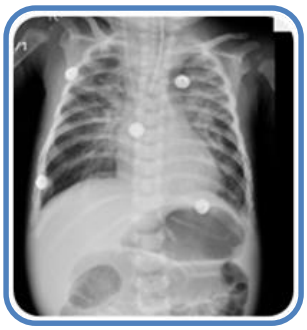

Figure 3 Signs of improved air entry bilaterally thus, improving lung collapse (22nd March 2022).

Diagnosis

Aspiration Pneumonia secondary to pseudobulbar palsy with developmental delay

Therapeutic Interventions

The Interdisciplinary approach was used in managing this patient which was helpful in gaining early recovery. The primary objective of Physiotherapy rehabilitation was to reduce Dypsnea and treat hypoxemia by improving gaseous exchange and improving air entry in the lungs. Along with this physiotherapy treatment was focused on managing complications of pseudobulbar palsy that is Dysarthria and dysphagia and achieving developmental milestones.

Physiotherapy Treatment Goals and Management

Physiotherapy treatment was divided according to the goals so first goal was to explain the parent about the condition and gain cooperation and informed consent in order to teach importance of adherence to the treatment. To loosen the mucus and improve the air entry in the lungs aerosol therapy and nebulization was given 3 times a day. The next goal was focused on removing obstructive tracheobronchial secretions in order to reduce airway resistance and improve work of breathing, s done which was

done by Manual techniques like vibrations and manual hyperinflation combined with gravity assisted positioning along with endotracheal tube suctioning as shown in Figure 4.

The most important goal was to facilitating early weaning from ventilator by taking on prone position, which is found to be highly beneficial in order to improve gas exchange. 3 set of 10 repetitions of each Oromotor exercises and Pharyngeal tactile stimulation is to improve dysphagia. To reduce tone in upper and lower limb, Roods approach was used which included one inhibitory technique that are slow stroking and slow icing. The major goal, according to neurological perspective is to reduce muscle tone by giving rhythmic passive movements. To achieve developmental milestone bobath approach was used. Combination of therapy was found to effective in managing this patient.

Follow up and outcome measures

The outcome measures used Modified Ashworth Scale (MAS), Peabody Developmental motor scales-second edition (PDMS) and Alberta Infant Motor Scale (AIMS) and are illustrated in the Figure 5.

Figure 4 [A] and [B] Chest vibrations to lung fields

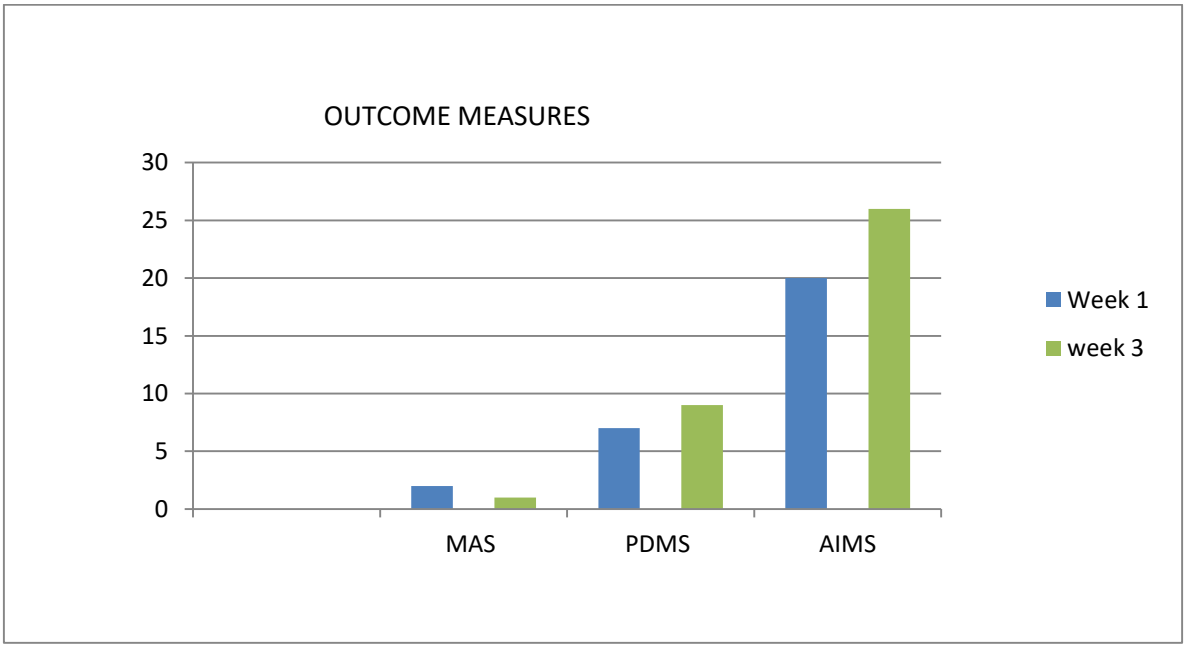

Figure 5 Outcome measures (MAS – Modified Ashworth Scale, PDMS- Peabody development motor scale, AIMS – Alberta Infant Motor Scale)

4. DISCUSSION

Chest physiotherapy is recommended for patients with complex respiratory or neuromuscular disorders and is a crucial adjuvant in the treatment of most respiratory ailments. The primary goal of chest physiotherapy in patient with aspiration pneumonia is to aid in the elimination of tracheobronchial secretions, lowering airway resistance, facilitating gas exchange, and making breathing easier (Jeon et al., 2019). Along with managing and preventing neuromuscular complication is also a vital role of physiotherapist. In this study we concluded that goal directed physiotherapy approach is effective in managing aspiration pneumonia and preventing complications of pseudobulbar palsy along with the medical management (Kinshella et al., 2020).

Physiotherapeutic interventions also help in early weaning from ventilator and thus helps in preventing long term ventilator associated infections. Nonetheless there are very few studies describing the role of physiotherapy in aspiration Pneumonia. Continuous positive airway pressure is a typical instrument approach (CPAP). CPAP can be administered traditionally or as bubble CPAP, which involves applying mild air pressure in order to maintain the airway patency. Bubble CPAP varies from CPAP in that it employs an underwater device that creates 'bubbles' by immersing the expiratory tube. CPAP is an effective treatment for children with respiratory distress, especially preterm and low birth weight babies (Rissardo and Caprara, 2021).

In this case, our goal was to manage and prevent pulmonary complications secondary to pseudobulbar palsy and initial Neuro physiotherapy management for preventing deformities. Physiotherapy was aimed at early weaning from ventilator and reducing the hospital stay. An interdisciplinary approach had a positive influence on patient's condition.

5. CONCLUSION

Integrated Physiotherapy Approach was found to be beneficial in improving the lung compliance and clearing secretions thus improving air entry and overall lung health. This case study provides a goal directed physiotherapy approach for managing aspiration pneumonia secondary to neuromuscular condition in pediatric population. Although complete recovery was not achieved during rehabilitation program but certain initial ICU goals were achieved during 3 weeks of hospital stay and patient was further referred to Neuro rehabilitation for managing pseudobulbar palsy.

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We thank the patient for his co operation throughout the treatment.

Authors Contribution

NHS is prime author and managed the patient under MJJ and contributed in writing the manuscript and VV Guided in making the treatment protocol.

Patient Perspective

Baby's parents were satisfied with the physiotherapy treatment as it helped the baby to breathe easily and played a important role for clearing chest.

Informed Consent

Written consent was taken from the parents after briefly explaining the goals of physiotherapy intervention.

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Conflicts of interest

The authors declare that there are no conflicts of interests.

Data and materials availability

All data associated with this study are present in the paper.

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