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Case Report

Bronchopulmonary dysplasia in low-birth-weight infant: a case study

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ABSTRACT

Bronchopulmonary dysplasia is one the most common causes of mortality and morbidity specially in the low birth weight or preterm infants. Though it is the most common but with prompt treatment can be treated at the earliest without any permanent damage to the newborn. The aim of this case study is to present a report of a low-birth-weight infants with bronchopulmonary dysplasia overviewing its management including developmentally supportive care given to the baby.

Keywords: Bronchopulmonary dysplasia, Developmentally supportive care, Low birth weight

INTRODUCTION

The prevalence of BPD remains high in preterm infant's despites of various advances in care and considered one of the most common causes of mortality and morbidity in preterm.[1] Bronchopulmonary dysplasia (BPD) is a chronic lung disease that affects premature infants mostly, which increases the requirement of mechanical ventilation or oxygen supplementation. It is characterized by inflammation, injury to the developing lung and impaired growth of the alveoli and blood vessel.[3]

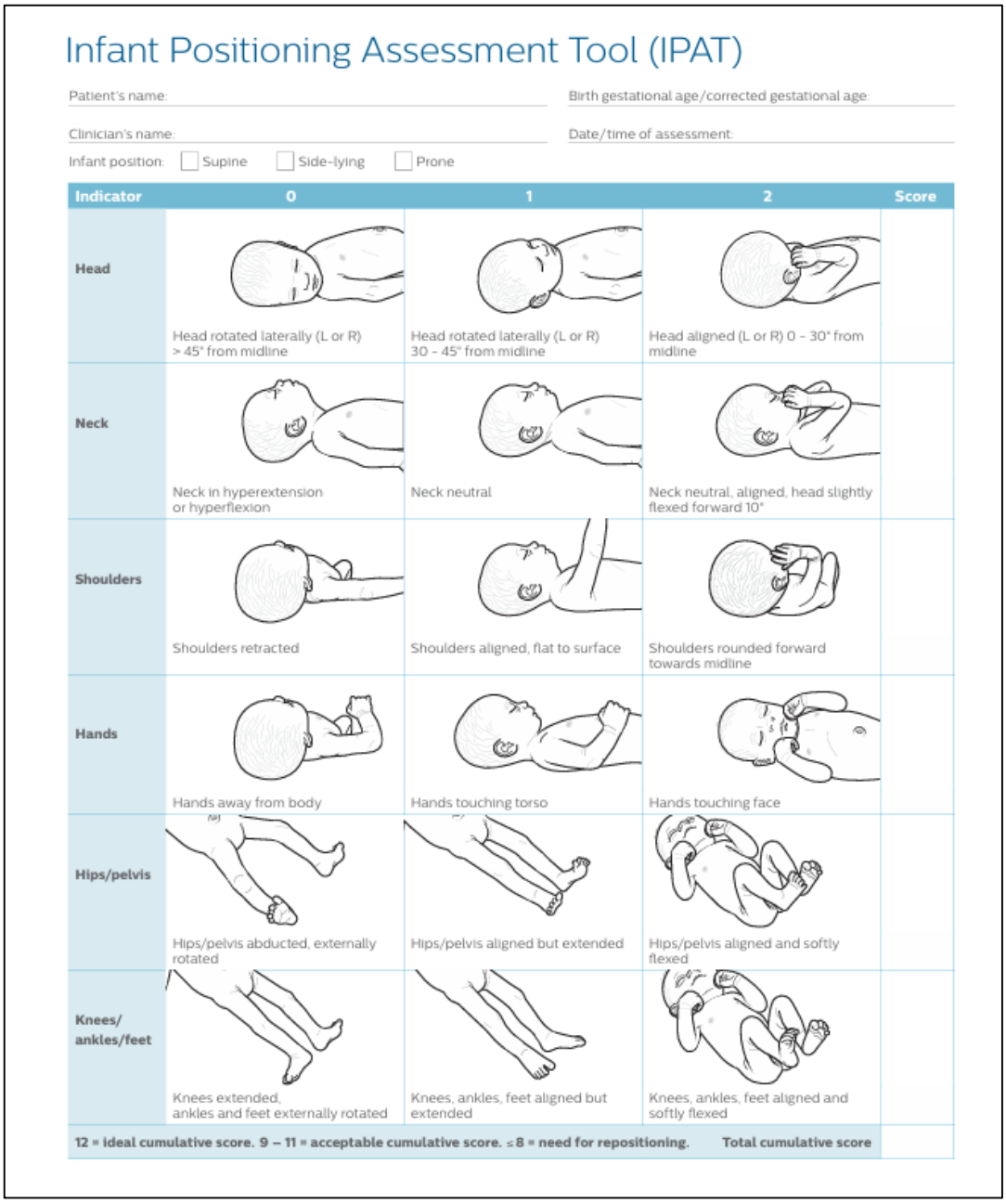
BPD is a multifactorial process with pathogenesis being linked to immature lung tissue, barotrauma and volutrauma resulting from mechanical ventilation, oxidant injury and proinflammatory mediators postnatally.[2] Other factors include- maternal smoking, chorioamnionitis, pregnancy induced hypertension, IUGR, genetics (high in monozygotic twin), sepsis, nutrition (vitamin D deficiency).[2] Bpd was first coined by Northway et al in 1967. The change in medical facilities strategies of care example improvement of surfactant and advance and smooth modes of ventilation changed the characteristics of BPD. In 1999, Jobe termed it as new BPD, where less airway damage was demonstrated compare to old BPD.[1] Babies having BPD may develop other problems like increased blood pressure, eye and ear problems, delayed growth and development, heart issues.

CASE REPORT

A male infant of 33 weeks of gestational age received from casualty admitted in NICU in the month of December 2023. Baby was single child delivered naturally in a secondary care hospital, Puri, Odisha with birth weight of 1200 gram. He was presented as moderately preterm, very low birth weight, small for date, late onset neonatal sepsis with RDS in casualty of AIIMS Bhubaneswar. At the time of admission to the NICU baby's weight was 1200-gram, active pink in color and periphery was cold.

Temperature, heart rate respiratory rate and oxygen saturation was 36.60c, 138 bpm, 42 bpm and 88% respectively. VBG was done immediately, where findings were pH- 7.38, po2 44.1, Hco3- 26.9, PCV 30% and HB 9.3 mg/dl. On X ray opacification was present in left lung diagnosed with BPD grade II. Baby was kept under radiant warmer with set temperature of 36.7 o c, CPAP support was provided with Fio2- 25%, PEEP-6, flow- 6

L/min as periodical breath holding was present. With the support baby was maintaining spo2 85-95%. Gradually oxygen saturation was decreasing to 70% not improving with CPAP, NIPPV was provided with Fio2 – 60%, PIP-20, PEEP- 6. Due to vast fluctuation in saturation and increasing retraction endotracheal intubation was done on 3rd day of admission. Urine culture, urine KOH, blood culture, CSF culture was sent to rule out any infection. In urine candida UTI was found and in blood Acinetobacter. ROP screening was done periodically, baby had zone III immature retina while shifting to the ward. During NICU stay baby was on PTV support for 188 hrs, NIPPV for 37 hrs, SIPPV for 6 hrs, HFO for 16 hours, PSV for 135 hrs, CPAP for 17 hours, HHHFNC for 404 hrs and LFNC for 87 hours. total of 93 ml PRBC was infused along with medication and investigation developmental supportive care was provided. Oral motor stimulation (PIOMI) before each feed to improve sucking. Nebulization was given followed by continuous chest physiotherapy, vaccination of the baby as a requirement was kept in mind. Baby was shifted to stepdown NICU for 2 more weeks where mother was taught about PIOMI and it's benefits. Position of the baby was maintained by following IPAT chart (infant position assessment tool), Katori spoon feeding was taught to the mother along with signs of aspiration. Baby was shifted to the mother side on room air and direct breast feeding followed by Katori spoon feeding for observation then discharged. Follow up will be continued till 5 years of life.



Infant Positioning Assessment Tool (IPAT)

Patient's name: Birth gestational age/corrected gestational age:

Clinician's name: Date/time of assessment:

Infant position: ☐ Supine ☐ Side-lying ☐ Prone

Indicator	0	1	2	Score
Head	Head rotated laterally (L or R) > 45° from midline	Head rotated laterally (L or R) 30 - 45° from midline	Head aligned (L or R) 0 - 30° from midline	
Neck	Neck in hyperextension or hyperflexion	Neck neutral	Neck neutral, aligned, head slightly flexed forward 10°	
Shoulders	Shoulders retracted	Shoulders aligned, flat to surface	Shoulders rounded forward towards midline	
Hands	Hands away from body	Hands touching torso	Hands touching face	
Hips/pelvis	Hips/pelvis abducted, externally rotated	Hips/pelvis aligned but extended	Hips/pelvis aligned and softly flexed	
Knees/ ankles/feet	Knees extended, ankles and feet externally rotated	Knees, ankles, feet aligned but extended	Knees, ankles, feet aligned and softly flexed	
12 = ideal cumulative score. 9 – 11 = acceptable cumulative score. ≤ 8 = need for repositioning.			Total cumulative score	

Figure 1: Infant positioning assessment tool.[12]

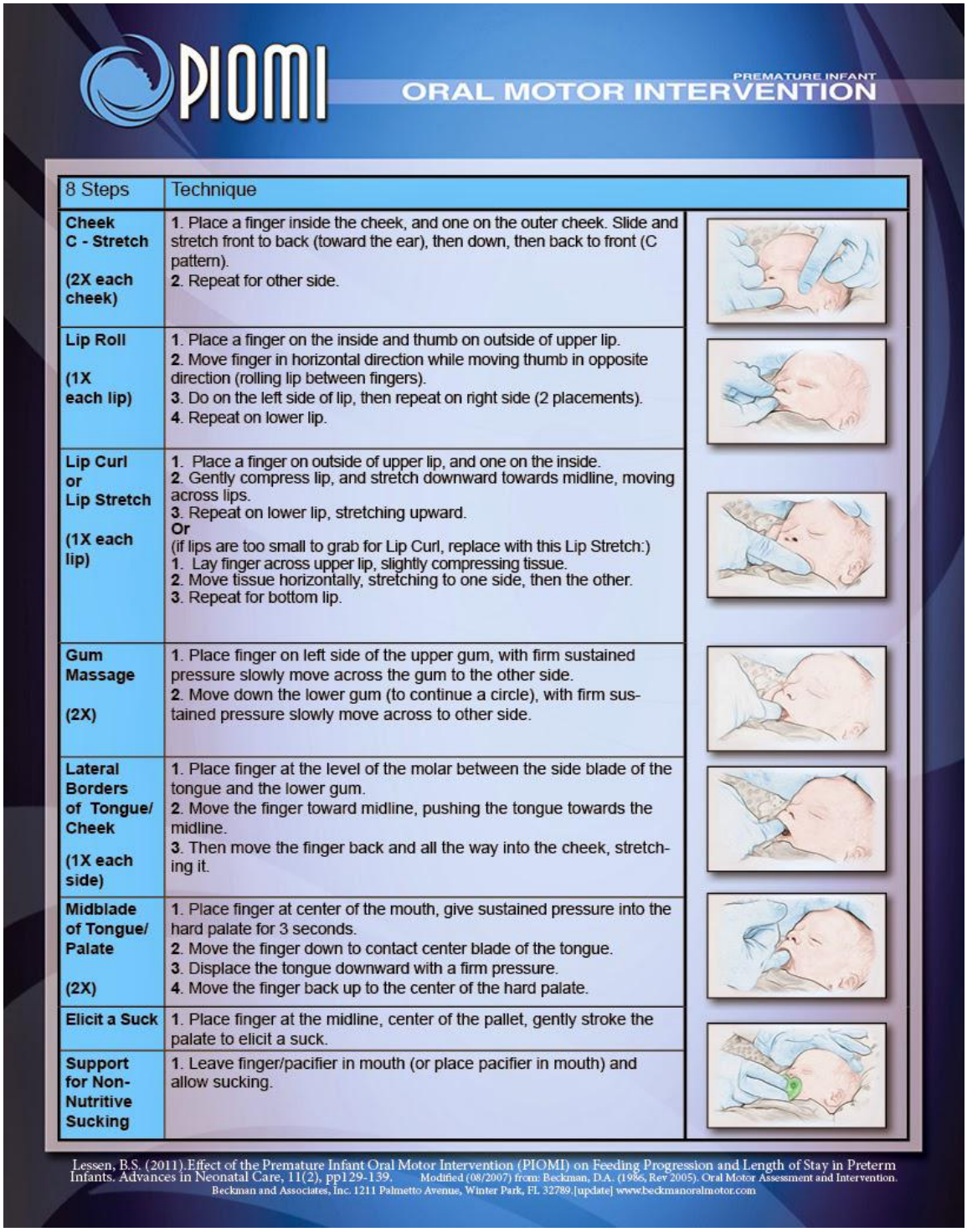


Figure 2: Premature infant oral motor intervention.[13]

DISCUSSION

Bronchopulmonary dysplasia (BPD) is a chronic lung disease of primarily premature infants that results from an imbalance between lung injury and repair in the developing lung. BPD is the most common respiratory morbidity in preterm infants.[4] A report of a premature infant with 27+4 weeks of gestational age was presented with severe respiratory distress at 60 days of life. On investigation congenital lobar emphysema (CLE) was present. For CLE high risk factor is the BPD.[5]

Extremely premature have survived with high incidence of BPD in last few years. Infants are treated for severe BPD in case of CLE.[5] Developmentally supportive care (DSC) is one of the most vital elements in intact growth and development of the baby. It is a structured, systemic process that begins when an infant admitted to NICU.

DSC has seven components which needs to be strictly followed as soon as baby is admitted.

Safeguard sleep

Along with Kangaroo mother care, nesting, swaddling, non-nutritive sucking, dimming of lights, reducing noise and cluster care helps to aid undisturbed sleep. A study was conducted including 106 newborns, 53 in each experimental and control group focusing on the effect of clustering nursing care and creating healing environment on premature infant's behavioural outcome has significant improvements in organizational state/sleep and responsiveness/interaction domain in the study group.

Shorter hospital stays and greater weight gain on discharge also observed in experimental group.[6] Partnering with families- It involves the active decision making and caregiving of the parents by providing education related to child care and initiating family centered care.

Minimizing stress and pain

Proper observation of pain and stress by several cues by the infant. Adjusting and modifying the care. Pain assessment can be done by various scales especially for newborn NIPS (neonatal infant pain scale), N-PASS (neonatal pain, agitation and sedation scale) and most commonly used scale is PIPP (premature infant pain profile).

Healing environment

Reducing unwanted and harsh environments.

Activities of daily living

Dressing, undressing, massage, diaper changing, skin care, sponging and feeding are important for the infant's growth. In our NICU routine care is provided in every 6 hourly and as required by the baby.

Optimizing nutrition

Human milk is the ideal source of nutrition to the baby specially for preterm and low birth weight babies. If human milk is insufficient or mother is unavailable, consent is taken for giving donor milk. Another alternative followed in our NICU is to provide formula milk if both mother milk and donor milk is not available. TPN for needed babies.

Positioning

During the activities care should be taken to position the baby to ensure that it support symmetrical development.[6] In our NICU, strictly IPAT is followed for proper growth of the baby.

Protecting skin

In NICU, care should be taken to avoid pressure and device related sores.[8] Newborn skin condition score (NSCS) is useful for daily evaluation of the newborn's skin. Evaluating dryness, erythema and breakdown of the skin. The best score is 3 and the worst score is 9.

CONCLUSION

An infant of 33 weeks gestational age presented with neonatal sepsis and RDS later diagnosed as BPD. With medical management and comfort care infant recovered. Developmental supportive care played an important role in positive prognosis of the baby.

Advances in neonatal care have resulted in increased rates of survival of extremely premature infants leading to both a new set of management challenges as well as an emerging population of long-term survivors of BPD and longitudinal studies are required to evaluate long term complications of BPD.

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