

Case Series

Dysphagia intervention in NICU set up: a report of case studies in an Indian public hospital

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ABSTRACT

A retrospective study was conducted in the Neonatal Intensive Care Unit (NICU) of a public hospital in Mumbai, India wherein 13 neonates with varying pathophysiologies were taken up for swallowing intervention. Of these, 7 neonates had history of prematurity, 1 was born of twin birth with prematurity, 3 had clefts of lip/palate and 2 had Pierre Robin Syndrome. For 7 neonates with prematurity, the swallowing regimen consisted of oro motor intervention (OMI) followed with therapeutic oral feeds. With improved tolerance of oral feeds while maintaining airway safety, they were graduated to oral feeds progressively increasing in volume until they reached optimum prescribed oral feeds. 6 out of 7(86%) progressed to breast feeds while 1 succumbed to medical complications. 3 babies with CLP graduated to complete oral feeds through bondla, when they were fitted with obturators and had swallowing intervention but were unable to move to breastfeeds while in NICU. 2 babies with PRS could not tolerate oral feeds even after multiple sessions and had to be maintained on orogastric feeds. 1 infant, one of a twin delivery with prematurity although was showing improvement to OMI succumbed to medical complications. Among these neonates, those with prematurity showed the maximum improvement with swallowing intervention followed by infants with CLP. Co-morbidities such as prematurity in twin births worsened the prognosis as did a disorder such as PRS. This preliminary study, done on a small sample, stressed the importance of swallowing intervention in neonates with high risk factors by the SLP in the NICU in an Indian set up.

Keywords: Neonatal dysphagia, Prematurity, Cleft lip and palate, Pierre Robin sequence, Oromotor intervention

INTRODUCTION

DaCosta, Krüger, Kritzinger and Graham reported an unexpectedly high prevalence of 64% (52 of total 81 babies) of neonatal oropharyngeal dysphagia (OPD) in high risk neonates in a South African Hospital who were deemed medically stable and ready to feed orally indicating the need for assessment and management by Speech Language Pathologists (SLPs).¹ A significant percentage of neonates, have difficulty in swallowing due to maturational issues due to prematurity, low birth weight; anatomic malformations such as craniofacial birth defects such as cleft lip and palate (CLP) and Pierre

Robin Sequence (PRS); neurogenic factors such as Hypoxic Ischemic Encephalopathy (HIE). Necrotizing Enterocolitis (NEC), GERD, chronic multisystem illness, sepsis and metabolic disease, structural abnormalities of the brain.^{2,3}

The prevalence of feeding problems in premature infants born at <37 week of gestation is ~10.5%, and this frequency increases to ~24.5% among those born with a very low birth weight (<1500 g).⁴ Preterm infants are often low birth weight or very low birth weight or micropreemies with immature respiratory systems which may impact swallowing and they may not be able to

suckle effectively at the breast owing to poor oral muscle tone.^{2,5} Their extrauterine growth restriction affects not only their weight but their length and head circumference as well.⁵ To prevent this, it is needed to detect nutrient deficiencies early and to correct them.² Neonates born with certain pathologies such as CLP and may have difficulties in sucking, and swallowing owing to their structural defects.

The common clinical consequences of neonatal dysphagia are malnutrition; dehydration; aspiration / penetration of milk droplets into airway; frequent infections; vitamin, mineral and calcium deficiencies; failure to thrive; crankiness; hypersensitivity to sensory stimuli.^{5,6} To prevent these consequences, many neonates at risk for dysphagia would require feeding / swallowing intervention in the NICU and literature reports most frequently of Non-nutritive sucking (NNS) and oromotor intervention (OMI).² NNS stimulation alone and with oral/perioral stimulation showed strong positive findings for improvement in some infants with reference to various disorders.^{2,6-8} Hence, there was a need to study these procedures related to NNS/OMI in neonates with or at risk for dysphagia and observe their utility by the SLP in the NICU, in the Indian context.

This study aimed to identify dysphagia in neonates with HRF admitted in NICU and treat dysphagia in those neonates using NNS; OMS; trial feeds, aiming to shift them from nasogastric to oral feeds.

METHODS

A preliminary study was undertaken in the NICU set up of a tertiary care hospital at South Mumbai, India, to carry out swallowing therapy intervention using purposive sampling in a small group of 13 neonates who were at risk for feeding and swallowing dysfunction.

Identification of feeding/swallowing disorders in neonates with high risk factors

This was a retrospective study and neonates were considered as having risk for feeding/swallowing disorders if they were seen to have 1 or more of the following difficulties on the day of assessment: difficulties in sucking /swallowing /maintaining suck-swallow-breathe synchrony; those on orogastric feeds or other non-enteral modes of feeding such as IV intake; those with poor tolerance for oral feeds.

The case history files of such neonate participants were studied to understand the respective pathophysiology of each.

Participants

13 neonates were included for this study using purposive sampling and their profiles are given below.

Prematurity

7 out of 13 neonates had a history of prematurity and were born between 30 to 36 weeks (average of 34 weeks) of gestation. They were admitted to the Intermediate Care section of the NICU. Feeding was their main concern.

Twin birth (co-existing co-morbidities)

1 infant, one of twins, was born prematurely at 28 weeks of gestation, with very low birth weight (VLBW), lagging in development compared to the other twin. Direct breastfeeding, in all 8 neonates with prematurity was difficult, as poor sucking was seen due to poor oromotor tone. When oral feeds with Bondla (also known as a Paladai; a small steel utensil with a pointed spout used for feeding milk to infants in the Indian set up) were tried, these neonates had dribbling, delay in swallow due to improper coordination for sucking, poor suck-swallow-breath synchrony, coughing, facial grimacing and crying during feeds. Hence for maintaining adequate nutritional intake, they were retained on orogastric feeds.

CLP

Out of the 3 infants, 2 had bilateral clefts of lip and palate while 1 had unilateral cleft of lip and palate. When oral feeds were tried with bondla, they had dribbling, coughing, increased redness of face after coughing; facial grimacing and sudden crying. Hence all 3 were on orogastric feeds.

PRS

2 neonate participants with PRS had retrognathia and glossoptosis. Labial seal was good and showed strong sucking but the neonates showed facial grimacing and sudden crying and appeared to be at severe risk for aspiration as they had coughing soon after swallowing, and bluish (cyanotic) discoloration on forehead and lips during trials of oral feeds. Hence oral feeds were deferred and both were on orogastric feeds.

Swallowing intervention was initiated in all 13 neonate participants with NNS; OMI; trial feeds being the regimen followed for 8 participants with prematurity, including the neonate - one of twins. In case of those with CLP, trial feeds facilitated with palatal obturators was the focus of intervention and in those with PRS, trial feeds – bondla feeds and breast feeds – with guidance related to feeding by SLP was the focus of intervention.

Neonate participants with prematurity

They were followed up for NNS and OMI regimen, from 4-18 sessions with an average of 6 sessions. The sessions were conducted in the NICU near the crib of the infant with the SLP seated at the right side of the mother. Prior

to intervention, a tray was kept ready with the following materials: sterile gauze pieces and cotton wool, Bondla having capacity for 5 ml, 10 ml or 20 ml milk respectively Expressed breast milk (EBM), 2 ml dropper.

Procedure for NNS

After the standard hand washing method, the SLP placed the little finger of right hand into the neonate participant's mouth and gently pressed on the anterior part of tongue to initiate sucking. This was done 3 times and the oromotor tone and strength of sucking was checked whether it was weak, fair or strong.

Procedure for OMI

3 exercises were used for oromotor intervention: Exercise 1: Gentle pressure was applied using the right forefinger of SLP around the orbicularis oris of the neonate in clockwise and anticlockwise direction, 3 cycles of each. Exercise 2: The SLP held index finger and thumb of right hand below the ears of the neonate on either side, cupping the neonate's face between the fingers and with gentle deep pressure dragged the fingers downwards, till they met at the neonate's lips on either side at the outer corners. This was repeated 5 times. Exercise 3: The SLP kept the little finger of right hand perpendicular to the neonate's chin and gently pressed upwards, in the neonate's submandibular region immediately posterior to the chin, for 10 times.

The researcher demonstrated this regimen of NNS and OMI to the mothers of the neonate participants which took 2 minutes, and they were asked to do it for a minimum of 5 to a minimum of 7 times, in the course of the day, prior to feeds.

Direct swallowing intervention

Trial (therapeutic) Feed: Once the sucking became stronger and there were a minimum of 4 sucks per burst, a few drops of EBM were put in the bondla with the dropper and the trial feed was attempted with the long beak of the bondla positioned at the left outer corner of the participant's lips, gently eased into the mouth taking care to allow few drops into the mouth. This was done just after OMI regimen, to evaluate preparedness of participants for oral feeds. After the swallow, the SLP observed carefully for signs such as: coughing; reflux; increased pallor; bluish coloration; increased redness of face and body; facial grimacing; sudden crying and apathy. The mothers were told to keenly observe their babies for the same, for 15 minutes after feed and report to SLP/nurse/ resident doctor, if any such signs were noted. Absence of these signs and consistent maintenance of suck-swallow-breathe synchrony were the criteria to proceed with oral feeds.

If any of the above signs were seen, the trial feed was stopped, the neonate participant was held upright, patted

gently on the back to elicit burping and to ensure safety of airway. Once a complete suck-swallow-breathe synchrony was seen to occur, the volume of milk in bondla was gradually increased to 3 ml, 5 ml and 10 ml, following the same precautions. After 15-20 minutes of holding the neonate in an upright position and ensuring burping had occurred, the neonate participant was rested in the crib on the side. Each of them were given orogastric feeds to ensure adequate nutritional intake. As the neonate's tolerance for oral feeds improved, the mothers were advised to try oral feeds in these neonates in the same manner in the presence of SLP. The volume of feeds through bondla was consistently increased in subsequent sessions with an attempt to reach the prescribed volume of feed, maintaining the suck-swallow-breathe synchrony. Once the participant could tolerate prescribed volume of feeds orally, the orogastric tube was removed and only oral feeds were given through bondla.

The mothers were also instructed to attempt direct breast feeds when tolerance to oral feeds was increasing. With improved tolerance to direct breastfeeding the bondla feeds were reduced and the baby was given more exclusive direct breastfeeding (BF) and shift to complete direct breast feeds which was the purport of the swallow intervention program. The mothers were told to still continue with OMI as it helped to build up the neonates' oral motor tone and reduced fatigue.

Participants with CLP were fitted with an obturator within the first 4 days of life, with the help of detailed demonstrations of its use, by the prosthodontist. The mothers of these 3 neonates were also explained how to maintain hygiene of the obturators and were asked to place the obturator in the mouths of their babies. They were asked to place a few drops of milk in the baby's mouth, through bondla and wait for the neonate to clear it. If the neonate could clear it without any signs as mentioned above, then the mother was guided to resume. The procedure for introducing trial feeds was the same and these participants were not given OMI.

Participants with PRS

NNS and OMI were not tried as these neonates had anatomical anomalies rather than disturbed or immature swallow physiology. As there was good labial seal and strong sucking, trial feeds were introduced. Bondla feeds with few drops of EBM were tried as also breast feeding in first infant for 10 sessions and in the other for 18 sessions. Apart from trial feeds, the SLP guided the mothers in terms of positioning of baby- head was held elevated / straddling positions was tried to prevent premature spillage; slow pacing of trial feeds; adjusting volume of trial feed- giving only few drops at a time to prevent / minimize aspiration.

Ethical considerations Permission was taken from the Institutional Review Board of AYJNIHH where the first author is registered for doctoral study as this study was a preliminary part of the doctoral thesis work

DISCUSSION

The status of swallowing intervention in the 13 neonates was reviewed after an average of 6 sessions and is described based on their HRF.

Neonates with prematurity

It was seen that out of the 7 neonates, 6 showed a better prognosis and began to show improvement by shifting to oral feeds, initially through bondla and graduating to breast feeds, after an average of 6 sessions of swallowing intervention with NNS/ OMI / trial feeds. Their swallowing appeared to have improved as a function of development with swallowing intervention acting as a catalyst in facilitating this change and there was an absence of signs of dysphagia seen prior to intervention. 1 participant, although was improved tolerance to oral feeds, died due to medical complications, mid-therapy.

NNS is used in preterm babies when they are on gavage feeds and during transition from gavage to bottle feeds and breast feeds. Its rationale is to improve sucking and facilitate digestion of enteral feeds as discussed by Pinelli et al however it has the potential to negatively influence breastfeeding and contribute to oral aversion at a later stage.⁹ According to the Cochrane Database of Systematic Reviews, NNS led to significantly reduced hospital stay in preterm infants, transition from tube to bottle feeds, better bottle feeding performance and behavior.¹⁰ There were no negative outcomes reported in any of the studies they reviewed.⁹ In the present study too, 6 neonates with prematurity showed a transition from orogastric feeds to bondla feeds and finally to breast feeds and no negative outcomes were seen with the swallowing intervention program.

Exercises 1 and 2 of the OMI regimen aimed to enhance oral motor tone which would facilitate sucking behavior whereas Exercise 3 aimed to stimulate oral propulsive phase, by giving submandibular stimulation. Although no objective tests were done to verify the efficacy of this regimen, better feeding performance, reduced irritability and crying indicated a positive outcome. The short duration of 2 minutes of regimen was designed so as to, avoid causing strain to the fragile oromotor musculature of the participants with prematurity, whilst being feasible for mothers to implement it, prior to feeds especially when the baby was hungry and likely to cry, if withheld from feeds for a longer duration.

Neonate with twin birth with prematurity 1 participant, one of twin births, born with prematurity having VLBW was seen for 4 sessions and had begun to show improved tolerance to oral feeds through bondla. However, this neonate died of medical complications prior to completion of intervention.

In the intervention of participants with CLP and PRS, the main difference was that they were not given NNS and

OMI, as their feeding /swallowing problems were owing to maxillofacial anomalies, and not owing to poor muscle tone or immature physiology as in neonates with prematurity. Occasionally, Exercise 3 was done in the former, to facilitate swallowing during initial therapeutic feeds.

Neonates with CLP

There was progress in reaching up to prescribed nutritional intake through bondla feeds after an average of 4 sessions guided by the SLP. There was no facial grimacing, coughing or sudden crying however, these neonate participants still had difficulties with breast feeds as they were unable to have a good labial seal and have optimum intraoral pressure necessary for sucking. This is in agreement with the findings of Clark et al who acknowledge this difficulty due to absence of proper seal in the mouth which does not allow the suction required to get the nipple to the back of mouth as required for breast feeding. Such babies need to be burped more often as a result of this improper seal.^{8,3}

Neonates with PRS

The 2 infants with PRS showed no improvement with trial feeds both when bondla feeds and breast feeds were tried. They had normal sucking as they had normal oromotor tone but their swallowing was affected owing to maxillofacial anomalies of retrognathia and glossoptosis. They continued to show facial grimacing, coughing, sudden crying, bluish (cyanotic) discoloration after trial feeds and hence had to be continued with orogastric feeds.

In the oral phase the bolus is prepared with salivary enzymatic action, bolus extraction, lingual-palatal coordination, and airway protection. The pharyngeal phase is characterized by the propulsion of the bolus and airway protection, whereas normal esophageal phase is characterized by peristalsis and airway protection. The regulating neuromotor and neurosensory factors, prevent the occurrence of aspiration and gastroesophageal reflux (GER) during the feeding cycle.³ In these participants with PRS, the propulsive phase being affected due to glossoptosis may have led to premature spillage, which made them prone to aspiration and thereby increasing the risk of cyanosis. However, no objective assessment was done to verify the same. Change of position of babies during breast feeding such as the straddling position and or mother lying on her side did not improve tolerance for oral feeds.

No surgical procedure such as suturing the tongue forward to counter the glossoptosis was done in these infants. There was close monitoring however, of nutritional intake using orogastric feeds and when they showed adequate weight gain consistently, they were discharged from NICU whilst on orogastric feeds.

The findings of Nassar et al were that, when the following feeding-facilitating techniques were applied daily in infants with Robin sequence, such as anteriorizing the tongue, long and soft bottle nipple with original or enlarged hole, and insertion of the nipple on the tongue, their results showed that feeding-facilitating techniques can foster oral feeding in infants with Robin sequence.^{11,12} The mothers in the present study were advised to try the feeding bottle with elongated nipple at home, feed with the baby's head supported higher to prevent premature spillage and pace the feed allowing more time for swallowing and pausing frequently. They were advised to report on a weekly basis to the SLP. However, they were lost to follow up.

CONCLUSION

It may be concluded that effect of, and the role of the SLP in swallowing intervention differ based on the inherent pathophysiology. 6 out of 7 neonates with prematurity as a HRF progressed to breast feeds while maintaining suck-swallow-breath synchrony, which was the expected outcome of this regimen. This indicated that essentially normal but immature swallow physiology had good prognosis to swallow intervention comprising of NNS; OMI; trial feeds. In case of maxillofacial anomalies, neonates with CLP had a more favourable prognosis when palatal obturators were used to compensate for the cleft, along with guidance on feeding by SLP. However, those with PRS had poor prognosis and remained on orogastric tube feeds, with only trial feeds and guidance about feeding from SLP, and indicated need for a surgical line of management by anterior suturing of the tongue to compensate for glossoptosis or specialized feeding bottles with elongated and modified nipples customized to the needs of these neonates.

This preliminary study attempted to present 13 case studies to highlight the need for swallowing intervention for neonates with dysphagia by the SLP in the NICU in the Indian context and training of mothers of these neonates. A similar study needs to be replicated on a larger sample of neonate participants with different pathophysiologies. Comparative groups with prematurity, one group taken for OMI, other without, could be taken to compare efficacy of OMI comparing their weight pre and post intervention. In this study, neonates were selected for swallowing intervention based on a few clinical signs but these may not be adequate to effectively screen neonatal dysphagia. There is a need for developing an Indian checklist for screening neonates with high risk factors in the NICU.

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