



Case Study:

IPP Team Develops Surgical Management Treatment Plan for Laryngomalacia in the Neonatal Intensive Care Unit

SIG 2: Neurogenic Communication Disorders

Summary

A triplet girl born at 29 weeks gestational age was admitted to the NICU for management of prematurity including respiratory distress syndrome. Her treatment team developed an interprofessional plan to target oral breathing and oral feeding, and following surgery, Mia showed improved suck/swallow/breathe coordination and respiratory stability and stamina.

Patient Info



MIA
10 WEEKS,
corrected
gestational
age of
39 weeks
and 4 days

Current Diagnosis:

Prematurity, Laryngomalacia

Meet The Team



Neonatologist



Neonatal nurse
practitioner



NICU nurse



Pediatric
otolaryngologist



SLP



Lactation
consultant



Physical
therapist



Patient



Family


Background

Mia is a triplet girl born at 29 weeks gestational age. She was admitted to a Level III NICU in a community hospital for management of prematurity including respiratory distress syndrome, for which she required breathing support via continuous positive airway pressure (CPAP), a type of respiratory support that provides extra pressure to open the small air sacs of the lungs. She experienced an unremarkable NICU course, and her respiratory support was slowly weaned to 2 liters of high-flow nasal cannula (HFNC), which remained in place when she began orally feeding at 35 weeks gestational age. During initial oral feeding attempts, Mia's NICU nurse and lactation consultant observed inspiratory stridor, a high-pitched breath sound that can indicate upper airway obstruction. The stridor was, at first, only present with breastfeeding attempts, then progressed to being present at rest while laying supine in her crib, with physiologic instability including desaturations (decrease in oxygen saturation), bradycardia (decreased heart rate), and peri-oral cyanosis (blue tinged color in face and lips due to decreased oxygen) over the course of a week. Institutional guidelines for early speech-language pathologist (SLP) consult at birth allowed the SLP to follow Mia's course by initially providing parent education on prefeeding development and interventions until readiness for oral feeding was observed. As a result, the SLP observed Mia's change in physiologic stability - inspiratory stridor and work of breathing at rest that worsened during oral feeding, both of which are atypical breathing patterns that suggest an upper airway disorder - and knew further medical work-up was needed to provide treatment recommendations to support Mia's breathing and feeding skills. After an interprofessional discussion, the pediatric otolaryngologist was consulted, and findings of laryngomalacia via flexible fiberoptic laryngoscopy were shared with the IPP team. Laryngomalacia is a congenital softening of the tissues of the larynx above the vocal cords. The larynx is malformed and floppy, causing the tissues to obstruct the airway opening and partially block it, causing inspiratory stridor. The SLP supported Mia's family through counseling and education on feeding and swallowing development in the context of laryngomalacia as Mia's family frequently shared their fears and concerns regarding her medical status.

How They Collaborated

The IPP team met to share their findings of their initial assessments. In general, Mia's NICU course was complicated by laryngomalacia, diagnosed by the pediatric otolaryngologist via flexible fiberoptic laryngoscopy, which was impacting her ability to breathe and making it difficult for her to progress developmentally and eat by mouth. Her SLP and lactation consultant reported concerns about suck/swallow/breathe incoordination and work of breathing increasing her risk for aspiration, which was suspected by frequent episodes of physiologic instability including desaturations, bradycardia, and cyanosis despite developmental interventions such as elevated sidelying positioning, slow flow nipple use, and co-regulated external pacing (helping the infant coordinate swallowing and breathing by tipping the bottle down to empty the nipple and slow milk flow or removing the nipple from the infant's mouth to impose a break). Mia's NICU nurse reported observing increased work of breathing during her care assessments, including suprasternal and subcostal retractions (chest and neck sucking is due to increased breathing effort), as well as tachypnea (increased respiratory rate). Mia's physical therapist discussed the impact of her discomfort related to increased work of breathing on her musculoskeletal development.

After sharing their assessments, Mia's family and the hospital-based team members agreed upon a set of recommendations. The pediatric otolaryngologist recommended correcting Mia's laryngomalacia via supraglottoplasty, which was supported by the NICU medical team including a neonatologist and neonatal nurse practitioner (NNP). A supraglottoplasty is a microscopic surgical procedure to alter malformed structures of the upper larynx, making it easier for the infant to breathe. In the interim, the neonatologist increased Mia's



respiratory support from 2 liters HFNC to 6 liters HFNC. In collaboration with the SLP, the neonatologist stopped Mia's oral feedings and she was fed via nasogastric tube until surgery. The SLP focused on supporting Mia and her family in maintaining positive oral experiences and skills needed for future oral feeding through interventions such as skin-to-skin care, non-nutritive sucking (pacifier or empty breast after her mother pumped), and therapeutic tastes of breastmilk. The lactation consultant collaborated with the SLP on Mia's bedside feeding plan and supported Mia's mother in maintaining her milk supply. Physical therapy provided developmental positioning for Mia to support respiration and decrease her efforts to breathe.

Outcome

In the week after her surgical procedure, Mia made remarkable progress towards her feeding goals. She displayed adequate respiratory stability, characterized by appropriate respiratory rate (<60 breaths per minute) and oxygen saturations (>90%) with no retractions or cyanosis, and quickly weaned her respiratory support in the post-operative period. She resumed oral feeding via breast and bottle with the support and collaboration of her SLP, lactation consultant, and NICU nurse. To support Mia's endurance and suck/swallow/breathe coordination, developmental interventions including sidelying positioning, slow flow nipple use, and co-regulated external pacing were continued. Close attention was paid to Mia's stress cues (which included increased work of breathing, closing eyes/fatigue, and facial grimacing) and physiologic stability to ensure neuroprotection (protecting the brain from stressful experiences) and promote positive oral feeding experiences. Mia demonstrated improved suck/swallow/breathe coordination, respiratory stability, and stamina after surgery with no signs of oropharyngeal dysphagia observed; as a result, an instrumental swallowing evaluation was not recommended. The pediatric otolaryngologist followed Mia throughout her post-operative course and arranged for outpatient follow-up to continue to assess her recovery.

Ongoing Collaboration

After surgery, Mia displayed improved respiratory status and returned to oral feeding successfully. She continued to grow and develop well and met oral feeding goals 6 days post-op at corrected gestational age of 40 weeks and 4 days. The interprofessional team met daily for approximately 30 minutes during NICU rounds to discuss Mia's medical status, progress, and goals. Her family reported significant improvement in her breathing and feeding and were happy with her progress. She was discharged home on day of life 78, 8 days post-op. She followed up with the SLP and pediatric otolaryngologist in clinic 4 weeks post-operatively and continued to display improved respiratory status and feeding skills. No concerns for oropharyngeal dysphagia were identified and an instrumental swallowing evaluation was not recommended.

Case Rubric:

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Lactation
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Physical
therapist



Patient



Family

Continue for more

History and Concerns

(Share key information gathered from team)

Mia is a triplet girl born at 29 weeks gestational age. She was admitted to a Level III NICU in a community hospital for management of prematurity including respiratory distress syndrome, for which she required breathing support via continuous positive airway pressure (CPAP), a type of respiratory support that provides extra pressure to open the small air sacs of the lungs. She experienced an unremarkable NICU course, and her respiratory support was slowly weaned to 2 liters of high-flow nasal cannula (HFNC), which remained in place when she began orally feeding at 35 weeks gestational age. During initial oral feeding attempts, **Mia's** NICU nurse and lactation consultant observed inspiratory stridor, a high-pitched breath sound that can indicate upper airway obstruction. The stridor was, at first, only present with breastfeeding attempts, then progressed to being present at rest while laying supine in her crib, with physiologic instability including desaturations (decrease in oxygen saturation), bradycardia (decreased heart rate), and peri-oral cyanosis (blue tinged color in face and lips due to decreased oxygen) over the course of a week. Institutional guidelines for early speech-language pathologist (SLP) consult at birth allowed the SLP to follow **Mia's** course by initially providing parent education on prefeeding development and interventions until readiness for oral feeding was observed. As a result, the SLP observed **Mia's** change in physiologic stability – inspiratory stridor and work of breathing at rest that worsened during oral feeding, both of which are atypical breathing patterns that suggest an upper airway disorder – and knew further medical work-up was needed to provide treatment recommendations to support **Mia's** breathing and feeding skills. After an interprofessional discussion, the pediatric otolaryngologist was consulted, and findings of laryngomalacia via flexible fiberoptic laryngoscopy were shared with the IPP team. Laryngomalacia is a congenital softening of the tissues of the larynx above the vocal cords. The larynx is malformed and floppy, causing the tissues to obstruct the airway opening and partially block it, causing inspiratory stridor. The SLP supported **Mia's** family through counseling and education on feeding and swallowing development in the context of laryngomalacia as **Mia's** family frequently shared their fears and concerns regarding her medical status.

Assessment Plan

(Determine roles/
responsibilities for
evaluation)

Mia's case is unique in that she is a preterm infant in addition to her surgical airway needs. The team is proactive in promoting neuroprotection (protecting the brain from stressful experiences) during care and understands supporting desired neurodevelopment despite her medical complications. Team members recognize the importance of cooperative assessment, integrated goal planning, mutual respect and support, and clear, open communication. **The IPP team was led by Mia's attending neonatologist, neonatal nurse practitioner, and pediatric otolaryngologist and included various allied health practitioners supporting Mia's family's feeding goals.**



Neonatologist/NNP: Manages sequelae of prematurity, provides input on infant's general medical and physical assessment.



Pediatric otolaryngologist: Assesses airway structure and function, manages surgical needs, collaborates with the SLP on feeding and swallowing needs.



NICU nurse: Provides bedside care for Mia daily, supports post-op care, collaborates with SLP on feeding plan.



Lactation consultant: Supports mother's desire to breastfeed, assesses breastfeeding proficiency in the context of airway disorder.



SLP: Conducts comprehensive feeding, swallowing, developmental evaluation, and instrumental swallowing assessment as needed.



Physical therapy: Conducts comprehensive developmental evaluation, provides developmental support and positioning.



Family: provides feedback on infant's status, reports concerns to medical team.

Assessment Results

(Summarize key diagnostic results)

The IPP team met to share their findings of their initial assessments. In general, Mia's NICU course was complicated by laryngomalacia, diagnosed by the pediatric otolaryngologist via flexible fiberoptic laryngoscopy, which was impacting her ability to breathe and making it difficult for her to progress developmentally and eat by mouth. Her SLP and lactation consultant reported concerns about suck/swallow/breathe incoordination and work of breathing increasing her risk for aspiration, which was suspected by frequent episodes of physiologic instability including desaturations, bradycardia, and cyanosis despite developmental interventions such as elevated side lying positioning, slow flow nipple use, and co-regulated external pacing (helping the infant coordinate swallowing and breathing by tipping the bottle down to empty the nipple and slow milk flow or removing the nipple from the infant's mouth to impose a break). Mia's NICU nurse reported observing increased work of breathing during her care assessments, including suprasternal and subcostal retractions (chest and neck sucking is due to increased breathing effort), as well as tachypnea (increased respiratory rate). Mia's physical therapist discussed the impact of her discomfort related to increased work of breathing on her musculoskeletal development.



Neonatologist/NNP: Initially, Mia's course was unremarkable. She was supported with CPAP then weaned to 2 liters HFNC prior to oral feeding. Worsening stridor, bradycardia/desaturations, cyanosis was observed when weaning high-flow nasal cannula; therefore, required up titration (from 2 liters to 6 liters HFNC) in respiratory support. Coordinated interdisciplinary family meeting to discuss surgical plan.



Pediatric otolaryngologist: Flexible fiberoptic endoscopy revealed diagnosis of laryngomalacia. Discussed the need for surgical management of laryngomalacia via supraglottoplasty with family.



NICU nurse: Inspiratory stridor was initially identified by the NICU nurse during bedside assessment. Reported concerns related to frequent physiologic instability including bradycardia and desaturations events, as well as cyanosis.

Assessment Results

(Summarize key diagnostic results)



Lactation consultant: Discussed concerns related to safety during breastfeeding as Mia displays frequent inspiratory stridor, work of breathing, and poor stamina. Occasionally reported coughing/choking episodes with cyanosis.



SLP: Comprehensive feeding, swallowing, and developmental evaluation revealed concerns regarding suck/swallow/breathe incoordination subsequent to increased work of breathing. Recommended use of interventions, including elevated sidelying positioning, slow flow nipple, and co-regulated external pacing, during oral feedings to support suck/swallow/breathe coordination and respiration. SLP discussed pathophysiology of dysphagia in the context of laryngomalacia with family and likely need for increased respiratory support and cessation of oral feeding until surgical intervention.



Physical therapy: Reported concerns about Mia's level of discomfort due to work of breathing and its impact on musculoskeletal development.



Family: Reported concerns and fears about Mia's medical status.

IPP Treatment Plan

(Discuss, reflect, and modify recommendations to develop a coordinated plan)

After sharing their assessments, Mia's family and the hospital-based team members agreed upon a set of recommendations. The pediatric otolaryngologist recommended correcting Mia's laryngomalacia via supraglottoplasty, which was supported by the NICU medical team including a neonatologist and neonatal nurse practitioner (NNP). A supraglottoplasty is a microscopic surgical procedure to alter malformed structures of the upper larynx, making it easier for the infant to breathe. In the interim, the neonatologist increased Mia's respiratory support from 2 liters HFNC to 6 liters HFNC. In collaboration with the SLP, the neonatologist stopped Mia's oral feedings and she was fed via nasogastric tube until surgery. The SLP focused on supporting Mia and her family in maintaining positive oral experiences and skills needed for future oral feeding through interventions such as skin-to-skin care, non-nutritive sucking (pacifier or empty breast after her mother pumped), and therapeutic tastes of breastmilk. The lactation consultant collaborated with the SLP on Mia's bedside feeding plan and supported Mia's mother in maintaining her milk supply. Physical therapy provided developmental positioning for Mia to support respiration and decrease her work of breathing.



Neonatologist/NNP: Supported Mia with 6 liters HFNC as well as anti-reflux pharmacology, until surgical intervention. Managed weaning of high-flow nasal cannula in post-op period and collaborated with SLP for advance in oral feeding plan.



Pediatric otolaryngologist: Performed supraglottoplasty; managed Mia's airway needs in post-op period; collaborated with the SLP on post-op swallowing function.



SLP: Prior to surgery, supported Mia and her family in maintaining positive oral experiences and skills needed for future PO feeding through interventions such as skin-to-skin care, non-nutritive sucking, and therapeutic tastes of breastmilk. Assessed swallowing function post-op and coordinated feeding plan including developmental interventions such as sidelying positioning, slow flow nipple, and co-regulated external pacing to support endurance and suck/swallow/breathe coordination.

IPP Treatment Plan

(Discuss, reflect, and modify recommendations to develop a coordinated plan)



NICU nurse: Collaborated with the SLP on Mia's bedside feeding plan.



Lactation consultant: Collaborated with the SLP on Mia's bedside feeding plan and supported mother in maintaining milk supply.



Physical therapy: Provided developmental positioning to support respiration and decrease work of breathing.

Treatment Outcomes

(Discuss results of treatment)

In the week after her surgical procedure, Mia made remarkable progress towards her feeding goals. She displayed adequate respiratory stability, characterized by appropriate respiratory rate (<60 breaths per minute) and oxygen saturations (>90%) with no retractions or cyanosis, and quickly weaned her respiratory support in the post-operative period. She resumed oral feeding via breast and bottle with the support and collaboration of her SLP, lactation consultant, and NICU nurse. To support Mia's endurance and suck/swallow/breathe coordination, developmental interventions including sidelying positioning, slow flow nipple use, and co-regulated external pacing were continued. Close attention was paid to Mia's stress cues (which included increased work of breathing, closing eyes/fatigue, and facial grimacing) and physiologic stability to ensure neuroprotection (protecting the brain from stressful experiences) and promote positive oral feeding experiences. Mia demonstrated improved suck/swallow/breathe coordination, respiratory stability, and stamina after surgery with no signs of oropharyngeal dysphagia observed; as a result, an instrumental swallowing evaluation was not recommended. The pediatric otolaryngologist followed Mia throughout her post-operative course and arranged for outpatient follow-up to continue to assess her recovery.



Neonatologist/NNP: Mia displayed improved respiratory status and returned to oral feeding successfully. She was able to maintain physiologic stability (no decreases in oxygen or heart rate, no cyanosis) without the need for breathing support. She consumed adequate oral intake to support her nutrition and hydration needs.

Treatment Outcomes

(Discuss results of treatment)



Pediatric otolaryngologist: Mia had no post-operative needs or complications and her breathing improved significantly with limited inspiratory stridor seen following surgery.



SLP: Mia demonstrated improved suck/swallow/breathe coordination, respiratory stability, and stamina after surgery. No signs of swallowing dysfunction are observed; therefore, instrumental swallowing evaluation is deferred until outpatient follow-up. Mia achieved full oral feedings 8 days post-op and displayed appropriate skill with no signs of distress.



Lactation consultant and NICU nurse: Mia resumed breastfeeding successfully with improved suck/swallow/breathe coordination and respiratory stability following surgery. No signs of respiratory instability were observed, and Mia fed comfortably, efficiently, and without signs of distress during nursing care.



Team Follow-Up

(Determine meetings & communication plan)

After surgery, Mia displayed improved respiratory status and returned to oral feeding successfully. She continued to grow and develop well and met oral feeding goals 6 days post-op at corrected gestational age of 40 weeks and 4 days. The interprofessional team met daily to discuss Mia's medical status, progress, and goals. Her family reported significant improvement in her breathing and feeding and were happy with her progress. She was discharged home on day of life 78, 8 days post-op. She followed up with the SLP and pediatric otolaryngologist in clinic 4 weeks post-operatively and continued to display improved respiratory status and feeding skills. No concerns for oropharyngeal dysphagia were identified and an instrumental swallowing evaluation was not recommended.

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Stepanie LaManna, MS, CCC-SLP, CNT
Special Interest Group 2 (SIG 2): Neurogenic Communication Disorders

Citations

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