Feeding Infants with Cleft and the Postoperative Cleft Management

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KEYWORDS

• Cleft lip • Feeding • Cleft bottles • Feeding modifications • Wound care

KEY POINTS

- The development oral facial clefts can have a significant impact on the ability of the child to feed adequately.
- There are several feeding modifications available to help with normal feeding and aid in the normal development of oral-motor function.
- Postoperative wound care plays an essential part in cleft care; treatment providers should understand the wound healing pathway and ways it can be modified.

INTRODUCTION

Feeding in the cleft lip and palate setting is a major and continued challenge that parents, nurses and surgeon's encounter. Feeding is an important time in the neonate's life when the mother-child bond is developed. The infant is also developing the complex oral-motor skills required to accommodate future complex feeding and eventual speech development. Adequate feeding is vital for healthy infant development and growth. Feeding challenges are among the greatest concerns that parents and caretakers have during the initial stages of cleft diagnosis. Young and colleagues[1] demonstrated that 97% of parents thought that it was critical to discuss feeding challenges of cleft infants and 95% thought it was critical to have a demonstration of breast or bottle feeding. In the same study, only 55% of parents reported having feeding demonstrations during the cleft evaluation and 40% of parents were not informed of the potential feeding difficulties. Adequate nutrition in the presurgical and postsurgical phases of cleft care is invaluable. It is imperative that providers for cleft patients appropriately understand the feeding challenges encountered with cleft deformities, as well as adequately inform and instruct families about how to overcome those challenges.

Postoperative wound management continues to be a poorly researched realm in cleft care. There exists wide diversity in postsurgical wound management protocols and variability from differing surgeons and cleft centers. Research is challenging due to the lack of standardization of post-cleft repair along with the inherent genetic variations that affect scar development.

INFANT FEEDING AND SWALLOWING

Feeding and swallowing is an essential task that every neonate undertakes within the first hours of life. Neurologically intact infants are preprogramed with the innate knowledge of rooting along with the suck-swallow reflex. Rooting and sucking by the infant is stimulated by tactile stimulation to the mouth. Feeding is fundamental for adequate growth and development, along with oral-motor development. Feeding also serves as a time for bonding between mother and child and allows for the development of early communication skills as the infant responds to mother's cues. Infant-parent communication behaviors have a direct positive influence on the success of infant feeding performances.[2] Feeding action is also pivotal in the early development of oral-motor coordination and is the foundation of for future complex feeding

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and speaking motions that will be developed. Cleft lip or palate malformations have the potential to disrupt a portion or all of the normal feeding process and, in turn, result in complex abnormalities for both the child and family.

Normal Anatomy and Physiology

There are several anatomic variations in the newborn anatomy that facilitate the sucking action. One of the main obvious differences is that most of the structures are smaller in size and closer to each other. As the infant grows there is an increase in connective tissue volume along with complex muscle and neural tissue development.[3] The infant tongue is relatively larger in size ratio to the oral cavity and fills most of the oral cavity. Infants have large buccal fat pads that aid to stabilize the lateral walls of the oral cavity. Because of the underdeveloped temporomandibular joint and lack of dentition, an infant's mouth opening is smaller and can be closed deeper than the adult mouth.[4] The soft palate in newborns tends to be longer and has a greater surface contact with the posterior portion of the tongue. Along with a closer approximation of the lateral pharyngeal walls, this makes the overall pharyngeal space smaller. In infants, the larynx is approximately one-third the size of the adult and is located high in the hypopharynx, causing the epiglottis to extend past the free margin of the soft palate. The epiglottis is more tubular and narrower than the adult structure and the tip often extends into the nasopharynx.[5] These anatomic variations facilitate sucking and improve the efficiency of the suck-swallow-breathing complex.

These anatomic differences directly aid in the physiologic process of feeding. A smooth, synchronized suck-swallow-breathing motion is key to adequate feeding and eventual growth and development. The swallow motion is separated into 2 phases: oral and the pharyngeal. The oral phase is initiated by rhythmic sucking. Anatomic structures create a pressure gradient as the tongue presses the nipple against the alveolar ridge while the lips create a seal around the nipple. As the nipple is compressed against the bony ridge, a positive pressure gradient is created, causing the release of fluid from the nipple. The infant initiates sucking by a rhythmic motion that involves the cupped tongue around the nipple moving in a backwards direction. The jaw drops, enlarging the oral cavity and creating a negative pressure gradient, causing more fluid to be expressed. Nipple compression against the alveolar ridge and generation of negative pressure are required for normal feeding.

The pharyngeal phase of swallowing begins as the fluid bolus is moved posterior from the oral cavity into the pharynx. As the pharyngeal phase begins, a variety of movements occur to allow the infant to continue nasal breathing during sucking, while avoiding laryngeal aspiration or nasal regurgitation of fluids. When the fluid bolus is moved posteriorly, the velum elevates to close the velopharyngeal valve. Due to the elongated epiglottis, the velum does not contact the posterior pharyngeal wall but instead closes around the epiglottis. This allows the infant to maintain nasal breathing during sucking. The tongue base moves posteriorly as negative pressure builds, moving the fluid bolus into the pharyngeal space around the epiglottis.[6] Once swallowing is initiated the epiglottis is retracted over the larynx by adduction of the laryngeal muscles, including the true and false vocal folds, as well as the arytenoid muscles.[7] The fluid bolus is advanced from the pharynx into the esophagus, initiating the esophageal phase. The esophagus has upper and lower esophageal sphincters that are closed during the oral and pharyngeal phases of swallowing. As the fluid bolus moves from the pharynx to the hypopharynx, the esophageal sphincters open and the fluid bolus is passed into the stomach. Once swallowing is complete, the velum drops, the epiglottis elevates, and the tongue moves back to a forward position. The upper and lower esophageal sphincters close and the process starts anew. Synchronization of the suck-swallow-breathing mechanism is critical to prevent aspiration or nasal regurgitation.

Feeding Challenges in Cleft Patients

As are the variations in cleft formation, feeding difficulties in patients with clefts are equally diverse. In the isolated cleft, not associated with syndrome, feeding problems result from the anatomic-structural deformity and usually only affect the oral phase of the suck-swallow-breathing mechanism. When the cleft is associated with a syndrome, the risk of poor feeding is 15 times more probable.[8] Feeding challenges include poor oral suction, inadequate volume intake, lengthy feeding time, nasal regurgitation, excessive air intake, coughing, or choking.[9] Feeding challenges are secondary to the inability to create nipple seal from the labial cleft, inadequate nipple compression due to nipple location on nasal mucosa versus the alveolar ridge, and inability to separate the oral and nasal cavities because of the hard palatal cleft. Patients with isolated labial clefts or small clefts of the soft palate can often create and maintain normal levels of