Feeding Infants with Cleft Lip, Cleft Palate, or Cleft Lip and Palate

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In assessing 143 infants with cleft lip and palate, we found feeding problems to vary with the patients' anatomic lesion. Effective feeding techniques were identified by first assessing the infant's ability to generate negative intraoral pressure and to move the tongue against the nipple and then by matching these deficits to appropriate feeding devices.

Infants with intraoral neuromuscular dysfunction or craniofacial malformations often have an impaired ability to feed. While the treatment of feeding problems stemming from neuromotor dysfunction has been extensively reviewed in literature, the literature pertaining to feeding infants with malformations like cleft lip or cleft palate is sparse. Some authors have presented short catalogues of feeding equipment or techniques that may help infants with clefts (Pressland, 1973; Shah, 1980; Styer and Freech 1986); others have advocated specific feeders for use in some or all clefting conditions (Takagi et al 1966; Wood, 1970; Kelly, 1971; Shirtley, 1971; Paradise, 1974; Grady, 1977; Pashayan, 1979; Martin, 1983). Unfortunately, no feeding method is optimal for all babies and, to our knowledge, no one has published an overview that describes the clinical parameters of feeding deficit in terms of the anatomic lesion and then matched the deficits to specific, successful feeding devices or techniques. We have found this kind of approach to be efficacious and have summarized our experience in this article.

The goals in feeding an infant with a cleft lip or cleft palate are similar to the goals in feeding any infant: maintaining nutrition is the first priority, and finding a feeding technique as close to normal as possible is second. A mother's interest in breast feeding should never be summarily dismissed; in fact, breast feeding is a superior technique in certain cleft conditions. Finally, it is in the infant's best interest to find a feeding technique that also maximizes oral stimulation, since it is likely that these movements facilitate oral motor development (Morris, 1982).

METHODS

In a 5-year period (1980-1985), our Craniofacial Program evaluated 120 newborns who had cleft lip, cleft palate, or both without any associated anomalies. An additional 23 infants with Robin malformation sequence were assessed who did not have sufficient respiratory distress or swallowing difficulties to preclude an oral feeding attempt. We were able to identify an effective feeding technique in each baby within 1 to 2 days. Concurrent with noting which feeding techniques worked best with each type of anatomic lesion, we clinically observed each infant's feeding deficit. We have found it useful to think of infant feeding in terms of two basic tasks: sucking, the actions that draw milk into the mouth; and swallowing, the movements that transfer milk from oropharynx to stomach.

Sucking has been functionally defined by the amount of time it takes an infant to consume a given volume of liquid. Sucking is achieved through the combined tasks of generating intraoral negative pressure and making effective intraoral muscular movements. Negative intraoral pressure is accomplished by sealing the lips and velopharynx and expanding the intraoral cavity, either through contraction of the tongue or by movement of the mandible. Infants with
cleft lip or palate who are otherwise healthy make normal attempts at intraoral muscular movements. The gums hold or stabilize the nipple in the mouth. The nipple is pushed against the palate and rhythmically stroked by the tongue.

RESULTS

General Observations

Infants with cleft lip, cleft palate, or both as their sole health problem swallow normally but suck abnormally. A cleft in lip and alveolus, the bony palate, or a combination will generally preclude the generation of any negative pressure unless the deficit can be plugged. Some infants with functionally small air leaks may be able independently to produce partial or intermittent negative pressure. Problems with intraoral muscular movements occur in three cleft-related anatomic deficits: bilateral cleft lip with severe anterior projection of the premaxilla that precludes stabilizing the nipple; wide palatal clefts that offer no backboard for tongue movements; and retroplaced tongues that do not stroke the nipple effectively. Infants who chew on the nipple dysrhythmically, grind the nipple with their gums, or have weak tongue movements are considered to have a neurologic or developmental problem that goes beyond the anatomic lesion. Although these babies can sometimes be fed orally, they often have unique problems and as such were not included in the patients described below.

It appears that babies combine different techniques to suck from bottles than from breasts. In breast feeding, infants use negative intraoral pressure primarily to position and stabilize the nipple, and they rely on the tongue to strip the milk from the breast mechanically. When infants bottle feed, they principally use their gums and to a lesser extent their tongue and palate to stabilize the nipple and generate negative pressure to draw milk from the bottle. These differences help to explain why one technique will succeed over another in specific situations.

Swallowing problems may occur in infants with the Robin malformation sequence with severe glossoptosis. More frequently, swallowing difficulties are found in infants with associated pharyngeal or esophageal abnormalities or central nervous system problems. Coughing, gagging, or aspiration are the usual presentations of swallowing disturbance. Reflux of milk into the nose without sequelae is not a swallowing problem. Swallowing difficulty is generally a contraindication for continual oral feeding. Persistent attempts to feed infants with swallowing dysfunction can lead to aspiration, or at least to newborn panic, and may ultimately delay successful oral feeding. Nasogastric gavage should be used to feed infants with swallowing problems, and intensive feeding therapy programs should be implemented. If swallowing problems show little improvement after several weeks, a feeding gastrostomy should be placed.

Breathing difficulties are also rare in children with isolated clefts, except for some children with Robin malformation sequence. When respiratory distress occurs in these infants, airway stabilization is necessary, and nipple feeding is generally impossible. Patients with swallowing or breathing difficulties were also deleted from the patient population reported here.

<table>
<thead>
<tr>
<th>CONDITION</th>
<th>Generation of Negative Pressure</th>
<th>Ability to Make Mechanical Movements</th>
<th>Feeding Techniques</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cleft lip and palate</td>
<td>—</td>
<td>+/-</td>
<td>Breast feeding unlikely</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Deliver milk into the mouth</td>
</tr>
<tr>
<td>Cleft palate only</td>
<td>+/-</td>
<td>+</td>
<td>Breast feeding sometimes succeeds</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Soft artificial nipples with large openings</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>effective</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>May need delivery of milk into the mouth</td>
</tr>
<tr>
<td>Cleft of soft palate</td>
<td>+/-</td>
<td>+</td>
<td>Breast feeding or normal bottle feeding usually</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>works well</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Nipple shape may make functional difference</td>
</tr>
<tr>
<td>Robin malformation sequence</td>
<td>+/-</td>
<td>-</td>
<td>Breast feeding unlikely</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Nipple position critical</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Many need delivery of milk into the mouth</td>
</tr>
<tr>
<td>Cleft lip only</td>
<td>+/-</td>
<td>+</td>
<td>Breast feeding works well</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Artificial nipple with large base works well</td>
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</tbody>
</table>

* + = present; - = absent; +/- = partial
The specific observations discussed below are arranged by general anatomic lesion. The feeding techniques that worked well in each situation are described, and an explanation of success is proposed. A summary is available in Table 1. It should be emphasized that within each patient group there remains a range of anatomic diversity and that some infants are more adaptable to a variety of feeding techniques than others.

Specific Observations

Cleft Lip and Palate. Patients assessed and treated: 53
General solution: Deliver milk directly into the mouth.

Regular breast feeding or bottle feeding did not work well for infants with a cleft of both lip and palate, apparently because they were unable to seal either their lips or their velopharynx. They could not correctly position the breast nipple for compression, nor could they develop efficient suction on a bottle nipple. While tongue movements were not mechanically impaired in these cases, such movements were of little use with a poorly positioned breast nipple and simply pushed the artificial nipple into the cleft space. Any feeding device that delivered sufficient volumes of milk into the mouth and allowed the infant time to swallow was effective. A soft plastic bottle was very useful in this situation—it gave the feeding person excellent control over the amount of milk delivered into the infant’s mouth (Fig. 1). Since milk flow was controlled by the adult, the nipple choice was not critical. Occasionally, a mother with easily expressed milk was able to nurse by placing her infant in a supine position and expressing milk directly into the baby’s mouth.

A baby’s ability to produce negative pressure may improve after cleft lip closure, thus allowing some infants in this category to breast feed adequately. Mothers may elect to express milk mechanically for a period of time to see if a feeding transition occurs. Other women have successfully “breast fed” using the “Lact-aide” device, which delivers milk into the baby’s mouth through a small tube while the infant is placed at the breast (Fig. 2).

Isolated Cleft Palate. Patients assessed and treated: 17
General solution: (1) Breast feeding
(2) Bottle feeding using a soft nipple with an enlarged outlet

Breast feeding worked well when the cleft was narrow or posterior, but was less effective with more complete clefts of the bony palate. When the cleft was small, the infant could develop...
enough negative pressure to stabilize the nipple and mechanically work the breast between the intact anterior palate and the tongue. Regular bottle nipples did not work well since infants with cleft palate could not develop adequate negative pressure to stimulate milk flow. Enlarging the nipple opening in association with a softer nipple often enabled tongue movements to express a greater quantity of milk. Caution must be exercised in enlarging nipple holes, for if the hole is too large the milk flow will "drown" the baby. We have found that using scissors or a scalpel blade to adjust the nipple hole was very imprecise; melting the plastic with a hot needle provided a better result, but commercially available cross-cut ("juice") nipples were usually preferable to any custom modification. When the cleft was wide and involved most of the hard palate, the techniques for feeding infants with cleft lip and palate worked best.

Cleft of the Soft Palate (or Bifid Uvula or Submucous Cleft). Patients assessed and treated: 6

General solution: "Correctly" shaped "regular" nipple

These infants often fed completely normally, and this was probably why so few patients in this category were referred to our program in the newborn period. If feeding was difficult, a nipple with a broader base and a longer shaft usually resolved the problem. Figure 3 shows four commercial "regular" feeding nipples; note the differences in the size of the nipple base and the length of the nipple shaft. We have found that the EvenFlo shape worked best, perhaps because the longer shaft allowed for better mechanical movement as an adjunct to the formation of negative pressure.

Occasionally, small palatal clefts additionally prevented the creation of adequate negative pressure. In those cases, the treatment modalities described for complete cleft palate were effective.

Robin Malformation Sequence (Excluding Patients with Significant Respiratory Distress or Swallowing Difficulties). Patients assessed and treated: 23

General solution: (1) Artificial nipple with large base and long shaft
(2) Deliver milk into mouth

Our patients in this group did not breast feed well. Although a few could develop some negative pressure, posterior tongue placement precluded adequate mechanical action on the breast. Likewise, they failed to feed using regular artificial nipples, since they could not stabilize the nipple with the tongue or generate adequate negative pressure.

Many patients in this category did well using a long nipple with a broad base (Fig. 4). Nipple position in the mouth was critical; if the nipple was inserted too far, gagging and vomiting could occur; if the nipple was not in far enough, the infant could not get enough tongue action. There was often a critical nipple position of only a few millimeters. When an optimum nipple position could not be found, the techniques described for infants with cleft lip and palate worked well.

FIGURE 3 "Regular" nipples, manufactured (left to right) by Wyeth, Gerber, EvenFlo, and Ross. The small differences in shape may make significant differences in feeding success with some infants with marginal suckle.

FIGURE 4 The lamb’s nipple can be adapted to a regular bottle by cutting the top off a regular nipple and using the base as a washer. The lamb’s nipple may help some infants with the Robin malformation sequence.
Cleft Lip Only. Patients assessed and treated: 14
General solution: (1) Breast feeding
(2) Large nipple base

Feeding was generally adequate in these infants unless the air leak from the cleft precluded the generation of negative pressure. When there was impairment, plugging the cleft space solved the problem. Breast feeding was the ideal method in this case, since the breast conformed to the defect. Artificial nipples with a large soft base were effective when breast feeding was not desired (Fig. 5).

COMMENT

Several additional factors should be considered in evaluating the acceptability of a feeding system. If feeding is going poorly in the hospital, it is unlikely that the family will successfully feed the infant at home. A parent or other caregiver should not have to spend more than one-half hour with a feeding or spend more than 4 hours per day in feeding. Prolonged feeding interferes with the parents’ ability to attend to other matters and increases familial stress. Prolonged feedings are also an energy drain on the infant and may precipitate failure to thrive. Finally, the baby should not go hungry. Gavage feeding should always be considered as an adjunct to oral feeding until a satisfactory system has been found.

Some centers favor the use of prosthetic obturation of the neonatal cleft palate to enhance feeding (Oliver, 1969; Spira et al, 1969; Hemingway, 1972). Palatal obturation improves palatal seal in many patients and so may improve the generation of negative pressure, but these obturators are expensive and potentially dangerous if partially swallowed. Since we have always found an appropriate nippling system without these devices, we have not relied upon them.

Feeding solutions for individual patients in any of the anatomical categories listed above varies case by case. The feeding techniques and devices listed under each category are intended to be used as a guide. Virtually every patient falling under any given category will be able to feed successfully with at least one of the suggested solutions. Although one patient in any given category may be able to feed successfully with all of the feeding devices suggested in that category, another patient may be able to successfully utilize only one. By describing an infant’s specific deficits and trying the various feeding systems suggested under the appropriate anatomic category, successful feeding can be realized within 1 to 2 days of birth.

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REFERENCES