

Case Report

Feeding an infant with high arched palate by high flow rate bottle nipple

Abdulkadir Eren MD, Huseyin Bilgin MD, Semra Kara MD

Department of Pediatrics, Division of Neonatology, Turgut Ozal University, Turkey

For infants with high arched palate, feeding is one of the most immediate challenges faced by parents and care-takers. General suggestions for feeding in infants with cleft palate may be adapted to infants with high arched palate. These include oral feeding facilitation techniques and special feeding tools. Here we present a newborn with a high arched palate and serious feeding problems who was fed easily by a large size and a large hole nipple, ordinarily used for infants older than 6 months, instead of specialized feeding equipment.

Key Words: newborn, high arched palate, feeding, nipple, bottle

INTRODUCTION

Feeding difficulty in infants born with high arched palate can have potential negative effects on the parent-infant bonding process and may cause inefficient oral intake and inadequate growth. Problems with oral feeding occur in varying degrees in infants born with cleft lip/palate.¹ Likewise, feeding of infants born with high arched palate may be significantly impaired. Inadequate airway protection ability during swallowing may reduce the oral feeding capacity and inefficient oral feeding may result in inadequate volume of intake for adequate growth. Furthermore, incapable airway protection during swallowing may create serious consequences to respiratory health.^{2,3} Commonly used feeding interventions in infants and children with palatal clefts include oral feeding facilitation techniques, specialized feeding tools, parental/caretaker education on feeding techniques, palatal obturators and assisted breast-feeding.² Sometimes the feeding of infants born with high arched palate may be assisted by similar methods.

CASE REPORT

A male baby was born by caesarean section at 39 weeks of gestation to a 20 year-old primi gravida mother. The parents were healthy and were not relatives. His birth weight was 3250 grams and appropriate for gestational age. His height was 50 cm and the head circumference was 38 cm. His Apgar scores were 7 and 9 at 1st and 5th minute, respectively. At 10 minutes of life, the patient was admitted to the neonatal intensive care unit with a diagnosis of respiratory insufficiency. On physical examination, the breath rate was 78/min. Intercostal retractions were observed. The laboratory evaluation revealed that the C-reactive protein, Interleukin-6, complete blood count, and the immature/total ratio were within normal values. The chest X-Ray showed well-expanded lungs and fluid in the horizontal fissure. On the basis of clinical examinations and chest X-ray, the baby was diagnosed as

having transient tachypnea of the newborn. On physical examination, he had high arched palate and low ears. His sucking reflex was very poor and he could not achieve adequate oral intake from his mother's breast. Oxygen by hood was begun. The respiratory insufficiency recovered within 48 hours and oxygen was stopped at 72 hours of life. The baby did not recover from feeding difficulty within the 2nd and the 5th days of life. During this time we used low flow rate bottle nipple for newborns, which had a small hole on the top, an orthodontic nipple, and Haberman Feeder, respectively. However, the baby could not receive adequate oral intake and we had to use nasogastric tube in this period. On the 6th day, we used a standard large size having a large hole nipple, which is used for babies older than 6 months. We observed that the baby could quickly adapt once the nipple was placed intraorally with the assistance of the feeder and the baby sucked by efficient compression of nipple and swallowed successfully. After this intervention, the baby was fed by total oral intake and was discharged from the hospital on the 7th day of life in good condition.

DISCUSSION

The management of feeding and swallowing issues in infants with high arched palate may vary between individual practitioners. If it is considered that high arched palate anatomy resembles the mild type of cleft palate, feeding issues for cleft palate patients may be adapted to high arched palate patients. These include oral feeding facilitation techniques and specialized feeding tools.

Corresponding Author: Dr Abdulkadir Eren, Alparslan Turkes Cad. No: 57 Emek, Ankara (06510), Turkey.

Tel: +905309235140; Fax: +90 312 221 36 70

Email: drakdreren@hotmail.com

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The general positioning suggestions for feeding include provision of head support, with arms forward, trunk in the midline, and hips flexed.⁴ Positioning the baby in an upright position of at least 60 degrees will enable gravity to assist with posterior transfer of fluid and with swallowing. It also helps inhibit nasal regurgitation.⁵⁻⁷ Direct oral-motor techniques to facilitate nutritive intake may include lip, cheek, and jaw support provided by the feeder.⁷ Stabilization of the jaw by placing the middle finger between the chin and the lower lip assists in providing a stable platform for movements of the tongue, lips, and cheeks.⁵ Provision of proprioceptive input to the tongue by use of slight downward pressure onto the midline may help initiate an appropriate sucking pattern.⁵

Another proposed interventional strategy is increasing the viscosity of fluids to assist with maintenance of airway protection during swallowing. Slower flow of the liquid will assist the infant in sustaining airway protection during swallowing.²

Assisted feeding requires the feeder to squeeze the nipple in synchrony with the infant's sucking efforts. External pacing including imposing pauses during infant feeding helps to maintain appropriate respiratory phase pattern for airway protection.⁸

Another feeding intervention is a feeding obturator, which consists of an acrylic palate inserted into the mouth over the hard palate, closing the palatal defect. With this method, separation between the nasal cavity and the oral cavity can be provided. There are differing reports in the literature regarding the effectiveness of a palatal obturator for improvement of oral feeding ability.^{9,10} The obturator provides a surface by which the infant can achieve nipple compression.

There are varying reports from experimental evidence regarding the type of nipples that are most effective, considering the following four nipple parameters: pliability, shape, size, and hole type.^{6,11} There is a general agreement that the nipple needs to be pliable enough to allow release of formula or breast milk with limited compression, but that the nipple must also be firm enough to provide an appropriate degree of proprioceptive input to stimulate sucking. Reports regarding the appropriate flow rate are varied. Overall, there is currently no definite evidence, other than expert opinion and clinical experience, to guide the decision-making regarding nipple selection. Generally, the type of nipple chosen should be based on each infant's oral-motor skill ability and on the type and degree of clefting.⁵ Therefore, clinical decision making at this time is based on the infant's success and ease of feeding with a particular nipple, as well as the instrumental assessment of airway protection and swallowing while feeding.

There is no 'standard' flow rate for bottle nipples. Each bottle brand has a unique rating system. In other words, a slow-flow nipple from one bottle brand may have a very different flow rate than a different manufacturer's slow-flow nipple. Nipples come in a range of sizes, lengths and flow speeds, from slow to fast, and are marked with the suggested age range. For example, newborns usually need the smallest size (often called "stage 1"), which has the slowest flow. Babies graduate to larger sizes and a faster flow as they get older, can suck more effectively, and

drink more breast milk or formula. Hence, parents/caretakers may have to try a few different nipple sizes to find the one that works best for each baby.

Orthodontic nipples are shaped to fit inside of the baby's mouth - wide at the tip and base, and narrow in the middle. It is designed to fit the shape of the baby's palate and gums. The nipple is flat on one side and has a bump on the other. The end is an oval shape that tapers in toward the bottle top and then widens back out again. The flat part of the nipple rests on the baby's tongue.

The Special Needs® Feeder (formerly Haberman) is particularly effective for children with high arched palate.¹² The nipple is designed to release milk by the infant compression efforts. Hence, suction is not required. The nipple is soft and pliable with one valve that prevents rapid flow and open only when the infant sucks. Soft Cup Advanced Cup Feeder (Medela) is made of soft pliable silicone. A control valve, with self-filling cuplike reservoir with flow rate, is controlled by the feeder. Ross Syringe Nipple with compressible bottle (Abbott nutrition) is a very thin log nipple, that requires an assistive squeeze for formula delivery with close monitoring. Pigeon Nipple/Bottle (Pigeon Corp) is the other one. Soft, compressible bottle is easily squeezed and it is fitted with a cross-cut nipple on the other one. The nipple has one side with a thick wall for placement against the roof of mouth and one side with a thin wall for the infant to suck. The bottle is soft and compressible, allowing assisted feeding. Mead Johnson Cleft Palate Nurser (Mead Johnson Nutrition) is the other. The soft compressible bottle is easily squeezed. It is fitted with a cross-cut nipple.²

In infants with high arched palate, feeding problem is the consequence of transient difficulty in achieving negative pressure for suction of an inadequate flow volume. Most likely, this situation results from the space between the nipple and the palate roof. This space may be decreased by using high size nipples and flow rate may be increased by large or multiple hole nipples. Haberman feeder and orthodontic nipples may be useful for these infants, but it should be considered that these methods are also costly. Therefore, initially a large size and large or multiple hole nipples should be experimented for feeding in these infants.

AUTHOR DISCLOSURES

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ETHICAL CONDUCT OF RESEARCH

The authors state that they have obtained appropriate institutional review board approval or have followed the principles outlined in the Declaration of Helsinki for all human or animal experimental investigations. Informed consent has been obtained from the parents of the patient.

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用高流量奶嘴奶瓶喂养高腭弓婴儿

对于高腭弓婴儿，喂养是父母和被照顾婴儿面临的最直接挑战。对腭裂婴儿喂养的一般建议或许适用于高腭弓婴儿。这些措施包括口服喂养促进技术和特殊的喂养工具。这里，我们提出了一个严重高腭弓新生儿的喂养问题，用大尺寸和大孔奶嘴很容易喂养，通常用来代替专门的喂养设备喂养年龄在6个月以上的婴儿。

关键词：新生儿、高腭弓、喂养、奶嘴、奶瓶