Breastfeeding Issues That Every Orthodontic Practitioner Should Know

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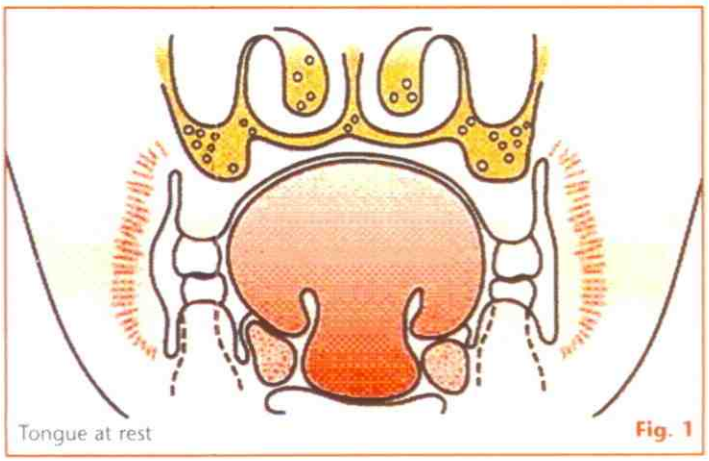
There are so many benefits of breastfeeding and breast milk, both from a medical and dental view. As dental professionals, we can educate and support mothers who desire to breastfeed, thus helping the development of their child's oral cavity and dentition.

As a recent graduate dental hygienist in the early 1970s, I heard Daniel Garliner speak about tongue placement and mouth development. This lecture launched my interest in breastfeeding and oral development. The expectant parents who I saw as patients received more information than they ever expected since I spoke with them about breastfeeding as well as oral care. When I became a mother in 1980, I was able to put all of this information to practical use. After my daughter was born, I became a member of Nursing Mothers, Inc. and eventually became a counselor. I am proud to say that "I practiced what I preached" and my daughter is caries-free and has not needed orthodontic treatment.

This article explains the importance of breastfeeding so that dentists and orthodontists can recommend and support its implementation. Here are answers to some questions that many of you may ask:



Tongue at rest

Fig. 1

1. How does breastfeeding help form the palate?

During intrauterine development, the baby's teeth are influenced by the mom's health. Medications taken at this time (such as tetracycline) as well as a high fever in the mother can stop enamel calcification causing hypocalcification and or banding on some front teeth.

Other variables can be birth trauma such as a breech birth or prolonged labor causing intracranial pressures that could affect jaw development. Heredity plays a part in jaw development as well. A child could inherit the father's large maxilla and the mother's small mandible (or the other way around) and cause an obvious problem.

The mother's diet during pregnancy can also affect jaw development. When researchers observed tribesmen and aborigines in various corners of the world, it was found that the primitive and civilized tribe members believed that diets that were heavy in refined carbohydrates were more civilized. However, the carbohydrate-rich diet produced cleft lips and malocclusion that led to tooth decay, missing teeth and bleeding gums. Researchers also observed skin rashes, acne and obesity. This observation was done over a period of time and the same area revisited over a 10-year period. It was noted that after the more "advanced" diet of refined carbohydrates was introduced that these effects occurred.

A baby's first action is to suckle, then swallow during feeding. It is followed by chewing when solid foods are

introduced, and finally speaking. From the very beginning, all this together influences oral development. Many dentists and orthodontists have realized that encouraging facial growth and good dental occlusion makes more sense compared to waiting until teeth become crowded.

The greatest influence on facial development is the position of the tongue.(Fig.1) Breastfeeding places the action of sucking at the back of the mouth; from here tongue balance should gradually tip backwards and downwards. At the start of each cycle, the jaws compress the lactiferous sinus, trapping a bolus of milk. The tongue wells up at the top and a wave of compression moves back along the tongue compressing the nipple and breast tissue against the hard palate. The milk comes out the end of the nipple to be swallowed.(Fig.2) Still recent studies have shown that the creation of a vacuum is the primary mechanism of milk removal in the breastfeeding infant. More investigation continues.

When a baby is breast fed, the development of the mouth is affected by the breastfeeding. The breast is soft and elastic, the baby positions his gums and tongue in such a way that it helps his palate and gums develop perfectly.(Fig.3) Breastfeeding offers the best possible mouth development by moving the baby's tongue in the way described above in order to obtain milk from the breast.

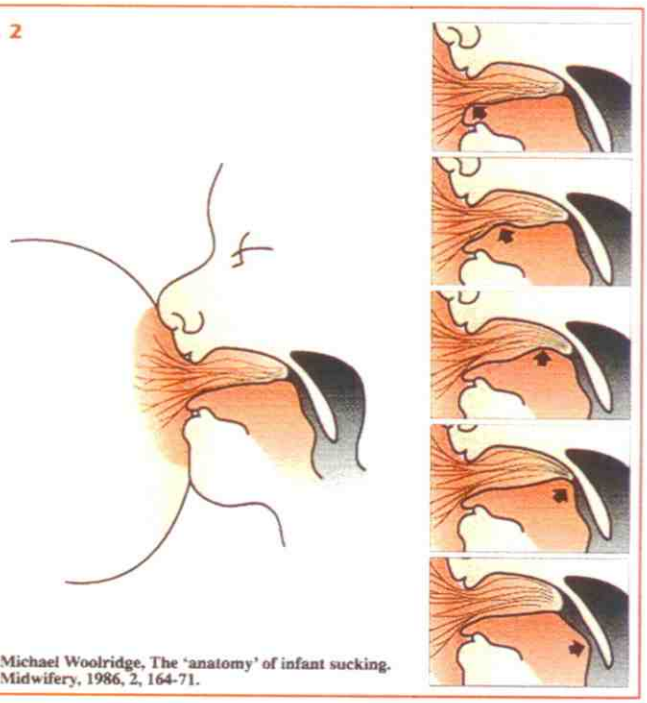
A dental researcher compared the mouths of adults who had been breastfed with those who had been fed with bottles. The adults who were breastfed all had "U" shaped arches that allowed for the teeth to be placed well, while those who were fed with bottles had "V" shaped arches that offered little space for all the permanent teeth to be placed well, which resulted in malocclusion. (Fig.4)

Ninety percent of head growth and eighty percent of jaw growth occurs by six years of age, and it is then possible to detect underdevelopment of the facial bones in relation to the skull. Since breastfeeding places the action of sucking at the back of the mouth, the tongue balance should gradually tip backwards and downwards. Once chewing is established, continued sucking of artificial nipples on bottles, cups with tops, juice boxes, straws and water bottles, will keep the tongue forward and in the floor of the mouth.

The following chart shows the relationship between breastfeeding, eating and speaking:

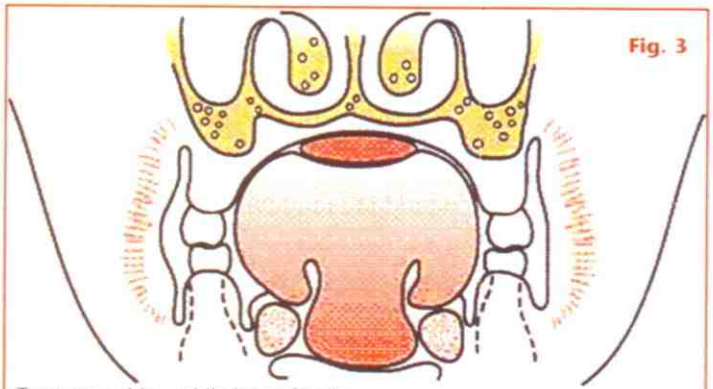
BREASTFEEDING	NOURISHMENT IN THE FORM OF SOLID FOOD	FORMING THE SOUNDS
TOUCHING THE BREAST WITH THE LIPS	REMOVING FOOD FROM THE SPOON USING THE LIPS	LABIALS P, B, M, F, W
BOWL-SHAPE OF THE TONGUE WHEN TOUCHING THE BREAST	BOWL-SHAPE OF THE TONGUE WHEN POSITIONING THE FOOD READY TO BE SWALLOWED	VOICED AND VOICELESS S AND SCH AND BRIGHT CH
UPWARD MOVEMENT OF THE TONGUE TOWARDS THE FRONT OF THE PALATE WHEN COAXING OUT THE MILK	UPWARD MOVEMENT OF THE TONGUE TOWARDS THE FRONT OF THE PALATE WHEN SWALLOWING	T, D, N, L AND THE FORMATION OF A NARROW OPENING FOR THE FRICATIVES S, SCH, Z AND ROLLED R
CLOSING THE THROAT WHEN SWALLOWING THE FOOD	CLOSING THE THROAT WHEN SWALLOWING THE FOOD	THROAT SOUNDS R, G, K, DARK CH

Fig. 2



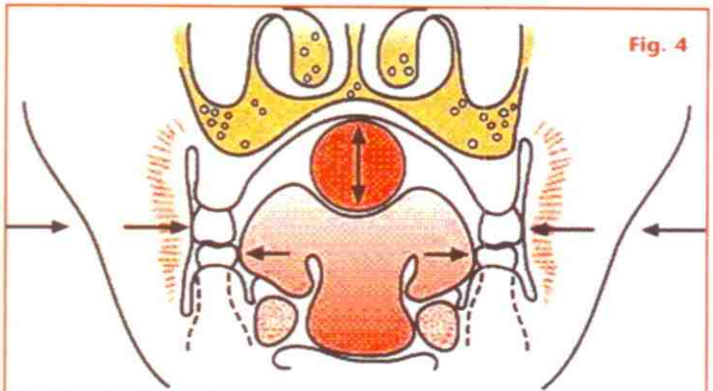
Michael Woolridge, The 'anatomy' of infant sucking. Midwifery, 1986, 2, 164-71.

Fig. 3



Tongue position while breastfeeding

Fig. 4



Pacifier / bottle nipple

2. Where does milk go as it expressed from the source?

Since the human nipple is taken further into the child's mouth and a sucking motion only releases milk, the milk is carried into the back of the throat triggering a swallow. Positioning while breastfeeding is important to encourage this to happen, a change in position can affect the way the milk is swallowed. This could be the mother shifting the baby in her arms, or having the

baby's head at a different angle. In addition, a frenum attachment can cause difficulty swallowing. Once the attachment is released, tongue placement and the proper swallow of milk can take place. At one time midwives kept one fingernail long and sharp to "clip" the frenum if the attachment was too tight. Today, the pediatrician often does this as soon as possible after birth.

Bottle nipples allow milk to flow freely, which encourages the child to stop the continuous flow of milk with the tongue so as to not choke on the rapid flow of milk. This may result in a tongue thrust, which can exert a great deal of force to change the shape of the mouth and placement of erupting teeth. The milk can also pool in the mouth and if there is teeth erupted, pooling around these teeth can result in decay.

3. How long is breastfeeding helpful?

The World Health Organization (WHO) recommends exclusive breastfeeding for the first six months of life, after which "infants should receive nutritionally adequate and safe complementary foods while breastfeeding continues for up to two years of age or beyond." The American Academy of Pediatrics (AAP) recommends exclusive breastfeeding for the first six months of life. The AAP states, "breastfeeding should be continued for at least the first year of life and beyond for as long as mutually desired by mother and child."

This addresses the nutritional aspect but there are other needs that are met by breastfeeding for longer periods of time. It is nurturing as well. Those needs are harder to define. In times of illness breast milk may be the only food the infant or child may be able to tolerate. The list of benefits from nursing includes preventing obesity, a lowered risk of; heart disease, type 1 diabetes, multiple sclerosis, asthma and allergies. Research suggests that nursing may also play a role in preventing ulcerative colitis, Crohn's disease and some childhood cancers.

A child led weaning is usually the best choice for all. Not many argue when a child of the age of two or even three years old is walking around with a bottle, but if that same child were being breast fed, there may be raised eyebrows. Yes, this child now has teeth and there are precautions that must be taken as for any child with teeth.

4. What in breast milk decreases the potential for decay?

Breast milk may actually help prevent decay. One component found in breast milk is lactoferrin. Lactoferrin kills streptococcus mutans, the bacteria that causes decay. According to studies conducted by Dr. Brian Palmer, "Human milk alone does not cause dental caries. Infants exclusively breastfed are not immune to decay due to other factors that impact the infant's risk for tooth decay. Decay causing bacteria (streptococcus mutans) is transmitted to the infant by way of parents, caregivers, and others." A study by Erickson indicated that breast milk alone had a pH similar to water and did not cause tooth decay and another experiment showed that teeth became stronger when immersed in breast milk. But, when just a small amount of sugar was added to the breast milk, that mixture was worse than a sugar solution when it came to causing tooth decay. This emphasizes the importance of good oral hygiene.

A study by Dr. Norman Tinanoff showed that breast milk itself does not cause cavities as much as previously thought. He believes that the milk proteins in breast milk protect the enamel on the teeth and that the antibacterial qualities in breast milk stop the bacteria from using the lactose in breast milk the same way as regular sugar. Dr. Tinanoff also showed that five minutes of breastfeeding lowered the pH level to only slightly more than rinsing with water.

There are studies showing that xylitol, disables the bacteria causing tooth decay. Xylitol is naturally occurring, found in birch bark and corncobs and sweet tasting. There are various ways to use this for a child from infant drops (Spry) to xylitol mouth wipes (Spiffies).

The enzymes found in breast milk may also have positive effects. The milk enzymes include:

- Bifidus factor, which allows for the growth of beneficial bacteria; keeps the PH in the gut low; and supports an "unfriendly" environment for the growth of bacteria.
- Lactoperoxidase aids in the destruction of strep.
- Oligosaccharides aid in obstructing antigens from attaching to the gastrointestinal tract.

5. How does breast milk contribute to dental decay?

Breast milk actually includes ingredients that fight decay. As mentioned, the component lactoferrin kills streptococcus mutans. The enzymes, lactoperoxidase and lactoferrin reduce the oral bacterial counts. Lactoperoxidase also protects the child's intestinal tract from infection. What can cause decay are enamel defects, high carbohydrates in the child's diet, and the oral hygiene of the mother and infant, especially involving the presence of strep mutans. Milk pooling does not occur with breastfeeding, as the milk does not release unless the infant/child is actually sucking and swallowing. If human milk is provided by a bottle, pooling can occur. Bottle-feeding is a risk factor, even with human milk. When the child has teeth there are often other foods involved other than breast milk. The sugars in these foods combined with a lack of proper oral hygiene is what is usually responsible for caries.

There are a number of dentists and researchers who do not believe that breastfeeding, even at night, causes dental caries. In a study led by Dr. Harold Slavkin, DDS, "Population-based studies do not support a definitive link between prolonged breastfeeding and caries." Dr. Constantine Oulis and colleagues concluded that breastfeeding may "act preventively and inhibit the development of nursing caries in children." Dr. Harry Torney looked at 107 children who had breastfed for at least two years (about half were still nursing at the time of the study). His results indicated there is no evidence to support the view that prolonged; on-demand breastfeeding is likely to lead to dental caries.

Dr. Brian Palmer is a well-known defender of breastfeeding as it relates to dental caries. He believes that early childhood caries are a relatively new phenomenon. Palmer has examined the skulls of prehistoric to early historic infants and children in various museums. Less than 1.4 percent of teeth that were examined had decay. Of 1,344 deciduous teeth examined, only 19 had any signs of decay, and of those 19, only four (0.3 percent) had significant decay.

Anthropologists say that anatomically modern humans have been around for about 100,000 years, with modern humans being present for about 30,000 years. However, according to skull studies, early childhood caries have been around for only about 8,000 to 10,000 years, which suggests that babies and toddlers remained free of decay for about 92,000 years. As diets changed, caries increased. Presumably, prehistoric babies were breastfed, most likely all night long and possibly until they were toddlers or older. It seems improbable that human milk would cause decay-if it did, there would be decay evident in skulls older than 10,000 years. As Dr. Palmer and many anthropologists suggest, it would be "evolutionary suicide for human milk to cause decay."

There are studies showing significant differences between human milk and most formulas. It was found that human milk does not significantly lower the pH in the mouth, while almost all brands of artificial baby milk did. The bacteria that contributes to decay, Streptococcus mutans, thrives in a low pH. Most formulas supported significant bacterial growth, while human milk supported only moderate bacterial growth. Formulas were found to dissolve tooth enamel, while human milk actually deposited calcium and phosphorus into enamel (remineralization).

Researchers also concluded that human milk is not cariogenic unless another source of carbohydrates is available for bacteria to feed on. Most artificial baby milk formulas tested were cariogenic.

6. Does breastfeeding also affect the growth of the mandible?

Aside from genetic predisposition, the greatest influence on facial development is the position of the tongue, as many dentists and orthodontists have realized. Encouraging facial growth and good dental occlusion may make more sense than waiting until teeth have become crowded. As noted, 90% of head growth and 80% of jaw growth occurs by six years of age, and at this point, it is then possible to detect underdevelopment of the facial bones in relation to the rest of the skull.

Breastfeeding places the action of sucking at the back of the mouth where the tongue action should gradually tip backwards. Once solid foods are introduced, the continued sucking of bottles, sippy cups and boxes of juice with straws will keep the tongue forward and in the floor of the mouth. If there are finger or thumb habits as well as a pacifier, this will also add to developmental problems.

The movement and action of breastfeeding promotes facial growth. According to Dr. William Sears, the complex action of the sucking motion influences better jaw development, stronger facial muscles and a healthier palate shape. A study of close to 10,000 children found that those who were breastfed for a year or more were 40% less likely to require orthodontic treatment. If treatment was required, it was less involved. The better jaw development associated with breastfeeding can even mean less snoring and a lowered risk for obstructive sleep apnea. A constricted palate may result in blocked airflow during sleep, interrupted sleep patterns and can also lead to other health problems.

7. When is the best time to start weaning?

Most proponents of baby lead weaning acknowledge that some signs of weaning are actually mistaken. Often what is perceived to be signs of self-weaning may be a growth spurt or the baby becoming more social. Around 4 to 6 months of age, babies become more aware of their surroundings and the business of feeding may suffer. Teething, ear infections or sore throat, may also be perceived as self-weaning. A mother should be aware of all of these possibilities before thinking it is time to wean, especially if it is under the recommended time of one year. Once a baby is eating solid foods, weaning has begun.

A mother returning to work may find that her time and energy have become less and may need to concentrate on the breastfeeding, if that is her choice. Remember the less that artificial nipples and pacifiers are used, the better the oral development. Weaning is the gradual removal of a favored object. Mothers and babies wean at different times for different reasons. Preferably, weaning is done slowly over a few weeks.

8. What are the economic, psychological, sociological benefits of breastfeeding?

According to a 2001 study, a minimum of $3.6 billion would be saved annually if breastfeeding increased from the current levels of 64% in hospital, 29% at six months, to the recommended of 75% and 50% at six months. This may be an underestimation of the real savings as it only represents the savings from treatment of only three childhood diseases: otitis media, gastroenteritis, and necrotizing enterocolitis.

In areas of unclean water, it is much healthier to breastfeed than to mix formula with water that is likely to cause illness. Researchers have found that there are several social factors that correlate with differences in the initiation, frequency and duration of breastfeeding practices. Race, ethnic differences and socioeconomic factors have been shown to affect a mother's choice of whether or not to breastfeed and how long the child is breastfed. Using formula can cost upwards of $2000 a year. But it has been shown that usually those of the higher socio economic groups are breastfeeding longer.

There are studies to examine whether breastfeeding in infants is associated with higher intelligence later in life. Many have found a connection. A large randomized study was conducted in Belarus between 1996 and 1997. During this time 13,889 infants were randomly chosen to receive or not to receive breastfeeding promotion, based in the "Baby Friendly Hospital Initiative". The findings were that those born in hospitals receiving breastfeeding promotion had IQs that were 2.9 – 7.5 points higher when followed up in 2002-2005. Since a trial like this should allow for maternal IQ, the conclusion was that there was strong evidence that prolonged and exclusive breastfeeding improves cognitive development.

A 2001 study by Horwood, Darlow and Mogridge found that those who were breastfed for more than eight months had verbal IQ scores 6 points higher and they concluded that breast feeding may have small long term benefits for child cognitive development. In 2005, a study with pairs of siblings found evidence of breastfeeding and intelligence involving 2,734 siblings. A 2007 WHO report suggested that "breastfeeding is associated with increased cognitive development in childhood." What is unsure is whether it is actually the properties of breast milk or whether breastfeeding increases the bond between mother and child and in this way contributes to intellectual development.

A recent study from the United Kingdom showed that children who were breastfed as babies at age five had higher scores on tests of vocabulary and reasoning than those who weren't breastfed. The biggest difference was seen in those who were born early and needed more brain development to catch up. One reason breast feed babies scored higher is there are essential fatty acids in breast milk which are good for cell development and particularly brain development, and there are differences in hormones and growth factors which are not in formula.

Another explanation is social. Breastfed babies are cuddled more and seem to have a perceived advantage. In this study, there were about 12,000 babies born in the UK between 2000 and 2002. At nine months old at a later study visit the parents were asked whether the child was breastfed and until what age. At five years, the children were tested for vocabulary, reasoning and spatial skills. Breastfed children did better on tests whether born on time or preemies. Those born on time and breastfed for four to six months were a few months ahead of those not breastfed on vocabulary and picture related reasoning tests.

While increases were seen with two months of breastfeeding in picture and spatial tests, the benefits were seen in increased vocabulary when breastfed for four months. While the differences may have been small, the children who start off with a disadvantage see gaps get even larger as they get older.

9. What are some of the medical reasons to avoid breastfeeding?

- Drugs or medications such as chemo
- CMV, cytomegalovirus
- Hepatitis B & HIV
- Mom has been regularly exposed to toxins, such as lead & mercury
- Active TB, malaria or typhoid fever
- Previous breast surgery, or breast deformity
- Baby has galactosemia or PKU

The Duggar's youngest daughter, Josie, the youngest daughter of the Duggar family of the cable network reality show " 19 and Counting", was taken off breast milk. Born almost 3 months premature, she was lactose intolerant without the lactase to break down the lactose in breast milk. All of the 18 other children were breast fed!

Some think that ankyloglossia or tongue-tie is a reason not to breast-feed. It can be difficult and may need the muscle to be clipped, but again with proper information this too can be done. Sometimes just the position of how the baby is being held while feeding can contribute to the success or failure of the process. Most other problems can be overcome with guidance and perseverance.

10. Do children who breastfeed have a higher or lower incidence of pacifier use or thumb sucking?

Pacifiers are generally discouraged when breastfeeding. It is best to avoid non-nutritional sucking. Pacifiers have been used when a feeding is complete.

There have been studies done in Brazil to show that there is actually lesser use of pacifiers and thumb sucking in breastfed babies. Also researchers found that breastfeeding can prevent the occurrence of sucking habits and prevent malocclusion. Another study in Brazil in 2009 found that the duration of breastfeeding had a positive effect on the mobility of the oral structures while prolonged duration of artificial (bottle) feeding showed negative effects.

Research shows that prolonged breastfeeding without any bottles or artificial nipples has only positive effects and prevents non-nutritive sucking habits.

Most children who are breastfed do not have the need for further sucking on a pacifier or thumb.

Recent changes in laws may encourage more mothers to breastfeed. The US Surgeon General, Dr. Regina Benjamin, recently released a report relating to breastfeeding. Benjamin's report outlines steps that communities, employers, researchers and others should take to improve support for breastfeeding. Specifically, Surgeon General Benjamin encourages more and better education about breastfeeding issues in medical schools, and in Continuing Medical Education programs. She also stated that such content should be included in licensing and certification examinations.

In 2011, the IRS has established that breastfeeding supplies, such as pumps, and other needed accessories are now tax-deductible for 2010. As more businesses and agencies become aware of these and other benefits of breastfeeding, we can hope that the time and benefits of the breastfeeding experience will be extended.