Dental Caries in Children with Cleft Lip and Palate

Wilawan Weraarchakul DDS*,
Wiboon Weraarchakul MD**

** Department of Community Dentistry, Faculty of Dentistry, Khon Kaen University, Khon Kaen, Thailand*
*** Department of Pediatrics, Faculty of Medicine, Khon Kaen University, Khon Kaen, Thailand*

Previous studies have shown that the prevalence of dental caries were high in children with cleft lip/palate. The objective of this present study was to review epidemiology of dental caries and oral health care for preventive measures of dental caries in children with cleft lip/palate. The factors influencing caries risk in cleft children included poor oral hygiene, oral fistula, removable and orthodontic devices, dental anomalies, prolonged night time feeding and consumption of sugary foods. Children and their parents should receive adequate preventive advice about oral health care and the availability of dental treatment. Closer cooperation between pediatric dentists and parents can improve dental health for these children.

Keywords: *Dental caries, Cleft lip, Cleft palate*

J Med Assoc Thai 2017; 100 (Suppl. 6): S131-S135
Full text. e-Journal: *http://www.jmatonline.com*

Orofacial clefts (OFC) are very common worldwide with an incidence of 1.7 per 1,000 babies being diagnosed with OFC[1]. The incidence of cleft deformities varies among different races around the world[1]. In Southern Thailand, the prevalence of oral clefts was 1.44 per 1,000 live births, and 15% of the cases had congenital anomalies or a recognized syndrome[2]. Patients with cleft lip (CL), cleft palate (CP), or both (CL/P) generally require extensive treatment by an interdisciplinary team of medical and dental specialists to rectify their cosmetic, speech, hearing, psychosocial, and dento-orthopedic problems. A healthy primary dentition in cleft children is essential for the successful outcomes of orthodontic treatment, oral function, speech development, and space maintenance for dentition. However, achieving optimal dental health in cleft lip/palate children may be difficult, due to the anatomy of the cleft area, malpositioned teeth, scarring, and the consequences of surgical repair that cause immobility of the lip. Early extraction would result in loss of the bone preserved by primary teeth bordering the alveolar cleft and may also hinder good speech development[3].

Dental caries is still a global public health problem and at present, constitutes the main threat to children's oral health. It is commonly believed from studies conducted worldwide that children with cleft lip and palate have an increased risk for caries, an elevated incidence and more untreated cavities, especially in the primary dentition[4,5]. The objective of this paper was to review epidemiology of dental caries and oral health care for preventive measures of dental caries in children with cleft lip/palate. It aimed to alert health care professionals about the importance of oral health care so that appropriate preventive programs may be integrated into the management protocol of the children with cleft lip/palate.

Correspondence to:
Weraarchakul W, Department of Community dentistry, Faculty of Dentistry, Khon Kaen University, 40002, Thailand.
Phone: +66-89-8419615
E-mail: wilwee@kku.ac.th

Epidemiology of dental caries in cleft patients

Dental caries, otherwise known as tooth decay, is one of the most prevalent chronic diseases of people worldwide. Individuals are susceptible to this disease throughout their lifetime. Dental caries forms through a complex interaction over time between acid-producing bacteria and fermentable carbohydrate, and many host factors, including teeth and saliva. *Streptococcus mutans* are important bacteria in the initiation of enamel demineralization. Parisotto et al also undertook a systematic review and concluded that the salivary mutans streptococci level is a strong risk indicator for dental caries[6]. The disease develops in both the crown and root of teeth, and it can arise in early childhood as an aggressive tooth decay that affects the primary teeth of infants and toddlers. Risk for caries includes physical, biological, environmental, behavioral, and lifestyle-related factors such as high numbers of cariogenic bacteria, inadequate salivary flow, insufficient fluoride

exposure, poor oral hygiene, inappropriate methods of feeding infants, and poverty[7]. Children with untreated dental caries often have persistent pain, inability to eat comfortably or chew well and distraction from play and learning.

Previous studies concluded that children with oral clefts had a higher caries prevalence compared with those without oral clefts. The prevalence of dental caries in Chinese cleft children with aged 3-5 years, 6-12 years and 13-25 years were 70.93%, 82.35 % and 68.35%, respectively. This prevalence was higher than non-cleft children[8]. The study in the West of Scotland found that the prevalence of dental caries in the children aged 4.5-6.0 years was higher when compared with national average where 62.8% of the children with clefts had dental caries compared with the national figure of 42.3%[9]. A study in Japan showed that the number of children with caries increased with age; it was 13.6% at the age of 12– 23 months, 44.4% at the age of 24–35 months, and all cleft children over 36 months of age had caries[10]. In addition, when comparing the cleft lip only or cleft palate with cleft lip and cleft palate, a study for dental caries in cleft children showed that those children with bilateral cleft lip and palate had a higher percentage of carious teeth than did the children with unilateral cleft lip and palate. In the upper arch, dental caries was significantly more prevalent in the central incisors whereas, in the lower arch, caries disease was more prevalent in the first molars[11]. The factors influencing caries risk in cleft children included poor oral hygiene, oral fistulas, removable and orthodontic devices[4] and dental anomalies[12]. Some children with cleft palate could use intraoral devices very soon after birth. The benefits of the devices included food assistance and guidance for the growth and development of the palate. However, these devices could promote early establishment of cariogenic bacteria in the oral cavity and cause an increase in acid production and promote the risk of destruction by caries[13]. Oral cleft patients with a palatal fistula also showed a significantly higher incidence of poor oral hygiene. This fact suggested that there were difficulties in achieving optimal oral health care by lack of access to brush all of the teeth, due to loss of elasticity of the surgically repaired lip, and because of the anatomy of the fissure and a little scare to make difficulties in having a good brushing around the fistula area[14]. The problems of a palatal fistula in patients with cleft lip/cleft palate are drainage of the nasal fluid to the oral cavity, and food escape through the nose and return to the mouth[14,15]. This could increase the risk of caries due to the presence of sugars and cariogenic bacteria in the mouth for a longer period of time. Moreover, Mutarai et al showed that sweetened bottled milk consumption, night-time feeding habit, and frequent sugary food consumption were the variables significantly associated with dental caries in children with oral clefts[4].

Strategy of prevention of dental caries

Recently, the Department of Dental Health in Children's Hospital "Royal Children's" in Brisbane, Australia, made some recommendations to prevent tooth caries in patients with cleft lip and cleft palate[14], which include:

1) The transmission of bacteria from parents, usually the mother, to the infant has been well documented. Wan et al presented that the mothers of infants with *Steptococcus mutans* infection had higher *Steptococcus mutans* levels, less frequent tooth brushing, greater plaque levels, and increased frequency of daily sugar intake compared with mothers of the infants without *Steptococcus mutans* infection[16]. The oral health of the parents, particularly the mother, and the parents' dietary habits and level of dental knowledge should be assessed by a dentist and brought up to a satisfactory standard, if necessary, before the birth of the child.

2) Parental education on oral health must be reinforced by a member of the dental team soon after the birth of the baby. Good feeding habits must be developed with emphasis on minimizing the amount of sugar intake and the frequency of snacking.

3) Chemotherapeutic agents such as chlorhexidine could be used to clean intraoral appliances when they are removed from the mouth.

4) Close contact such as kissing the baby's lips and sharing food and utensils have been associated with *Streptococcus mutans* colonization[16]. Parental education on cross-contamination should form a part of the parents' oral health education preferably before and reinforced after the birth of the baby.

5) Postsurgical oral health education and demonstration of tooth brushing technique is essential, especially around the cleft area. Teeth should be brushed at least once per day.

6) Maintenance of good oral health is essential for both the parents and the infant. Regular dental examinations every 6 months should be undertaken by both the parents and the infant or child. Fluoride supplements in non-fluoridated areas are recommended, and fissure sealants should be placed at risk pits and

fissures.

7) The risk of decalcification and caries increases when fixed appliance orthodontic treatment commences because of the increased accumulation of plaque around the attachments and difficulty in cleaning. The patient's oral hygiene, sugar intake, frequency of snacking, and consumption of acidic drinks should be reassessed before commencing orthodontic treatment and should be modified as required. A low dose 0.05% daily sodium fluoride mouth rinse is recommended[17]. This will strengthen the tooth structure by forming stronger hydroxyfluoroapatite and also exert minor antibacterial activities[18]. Assessment and reinforcement of good oral hygiene and dietary habits should occur at each orthodontic adjustment appointment.

8) Enamel hypoplasia results in rough defects that display an increased surface area for bacteria to adhere and colonize. Increased levels of *Streptococcus mutans* have been associated with enamel hypoplasia, which places the infant at a higher risk of dental caries[19]. The use of chemotherapeutic agents could be considered at an early age for babies born with cleft lip/cleft palate who are at a higher risk of developing dental caries. Weekly brushing of 0.2% chlorhexidine gel has been shown to reduce *Streptococcus mutans* infection[20].

Management of cleft lip and palate involves a multidisciplinary approach requiring the services of patient care coordinator, pediatrician, plastic surgeon, oral surgeon, neurologist, pedodontist, orthodontist, speech therapist, psychologist, ENT surgeon, social worker, parents, audiologist, and nurse. Good communication on a regular basis between the pedodontist and relevant members of the cleft team helps to achieve the best oral health outcomes for the patient[21].

How should parents keep their child's teeth clean and protect dental caries at home in daily life?

Children with cleft palate have more problems with the way their teeth grow than most children, and they need special dental care. Advice to be given to parents includes:

1) Brush child's teeth at least twice a day. (Fluoride toothpaste should be used, but only in very small amounts). Parents may be nervous to brush in the region of the cleft, especially following the primary lip and palate surgery. They often think that bleeding from gingival inflammation is caused by damage from tooth brushing or the breakdown of the surgical repair. It is important to point out the potential problem areas of plaque accumulation around the teeth in the cleft region. A small baby brush is advised as the first toothbrush. For many children with clefts, this size of brush can be used up until the eruption of the first permanent molars and beyond. A small-sized head is ideal where there is a lack of sulcus depth, or awkward tooth positions in the cleft region. An interspace brush is a useful additional aid where there is overlap and crowding of teeth, or in the case of the bilateral cleft where the upper anterior can be very retroclined. It is especially helpful for teeth in the cleft region of the hard palate[22].

2) Avoid foods with a lot of sugar and starches. Do not indulge in frequent snacking and in beverages, which are particularly harmful to teeth since the bacteria in dental plaque produce cavity-causing acids each time food enters the mouth.

3) Fluoride supplements: Fluoride prevents dental caries by inhibiting demineralization of the crystal structures inside the tooth and enhancing remineralization. A low fluoride children's toothpaste containing no more than 600 ppm fluoride is recommended for children under 6 years of age in order to reduce the likelihood of initial caries in the permanent teeth. Children with a high risk of developing caries should use a standard toothpaste (1,000 ppm fluoride)[23]. In addition, the twice-yearly professional application of topical fluoride varnish is a very useful preventive measure for teeth that are at risk from caries.

4) Infants should not be put to sleep with a bottle containing fermentable carbohydrates. Parents should be encouraged to have infants drink from a cup as they approach their first birthday. Infants should be weaned from the bottle at 12-14 months of age[24].

5) Regular dental visit should be performed every six months to maintain optimal oral health in the patient with cleft lip/palate.

Conclusion

Patients with cleft lip/cleft palate generally display poorer oral hygiene and higher susceptibility to caries because of the difficulty in achieving adequate plaque control associated with dental anomalies and defects from lips or palate. A good brushing technique must be implemented and parents need to be educated for good hygiene and nutrition from birth. It is important to keep consults with specialists in charge of the integrated management of these patients in order to restore chewing function, improving aesthetics and as a result, to provide better quality of life.

What is already known on this topic?

The prevalence of dental caries in children with cleft lip/palate was higher than the children without cleft lip/palate.

What this study adds?

Preventive measures for parents to keep their child's teeth clean and protected against dental caries at home in daily life.

Acknowledgements

The authors thank the Center of Cleft lip-Cleft palate and Craniofacial Deformities, Khon Kaen University under Tawanchai Royal Grant Project for supporting this publication.

Potential conflict of interest

None.

References

1. Vieira AR, Orioli IM. Birth order and oral clefts: a meta analysis. Teratology 2002; 66: 209-16.
2. Jaruratanasirikul S, Chicharoen V, Chakranon M, Sriplung H, Limpitikul W, Dissaneevate P, et al. Population-based study of prevalence of cleft lip/palate in Southern Thailand. Cleft Palate Craniofac J 2016; 53: 351-6.
3. Kirchberg A, Treide A, Hemprich A. Investigation of caries prevalence in children with cleft lip, alveolus, and palate. J Craniomaxillofac Surg 2004; 32: 216-9.
4. Mutarai T, Ritthagol W, Hunsrisakhun J. Factors influencing early childhood caries of cleft lip and/or palate children aged 18 to 36 months in southern Thailand. Cleft Palate Craniofac J 2008; 45: 468-72.
5. Wong FW, King NM. The oral health of children with clefts—a review. Cleft Palate Craniofac J 1998; 35: 248-54.
6. Parisotto TM, Steiner-Oliveira C, Silva CM, Rodrigues LK, Nobre-dos-Santos M. Early childhood caries and mutans streptococci: a systematic review. Oral Health Prev Dent 2010; 8: 59-70.
7. Selwitz RH, Ismail AI, Pitts NB. Dental caries. Lancet 2007; 369: 51-9.
8. Zhu WC, Xiao J, Liu Y, Wu J, Li JY. Caries experience in individuals with cleft lip and/or palate in China. Cleft Palate Craniofac J 2010; 47: 43-7.
9. Britton KF, Welbury RR. Dental caries prevalence in children with cleft lip/palate aged between 6 months and 6 years in the West of Scotland. Eur Arch Paediatr Dent 2010; 11: 236-41.
10. Mian AH, Inoue M, Sasa R. A study of prevalence of caries and oral health behavior in Japanese children with cleft lip and palate. Pediatr Dent J 2005: 15: 93-7.
11. Moura AM, Andre M, Lopez MT, Dias RB. Prevalence of caries in Brazilian children with cleft lip and/or palate, aged 6 to 36 months. Braz Oral Res 2013; 27: 336-41.
12. Al Jamal GA, Hazza'a AM, Rawashdeh MA. Prevalence of dental anomalies in a population of cleft lip and palate patients. Cleft Palate Craniofac J 2010; 47: 413-20.
13. Bokhout B, van Loveren C, Hofman FX, Buijs JF, van Limbeek J, Prahl-Andersen B. Prevalence of Streptococcus mutans and lactobacilli in 18-month-old children with cleft lip and/or palate. Cleft Palate Craniofac J 1996; 33: 424-8.
14. Cheng LL, Moor SL, Ho CT. Predisposing factors to dental caries in children with cleft lip and palate: a review and strategies for early prevention. Cleft Palate Craniofac J 2007; 44: 67-72.
15. Turner C, Zagirova AF, Frolova LE, Courts FJ, Williams WN. Oral health status of Russian children with unilateral cleft lip and palate. Cleft Palate Craniofac J 1998; 35: 489-94.
16. Wan AK, Seow WK, Purdie DM, Bird PS, Walsh LJ, Tudehope DI. A longitudinal study of *Streptococcus mutans* colonization in infants after tooth eruption. J Dent Res 2003; 82: 504-8.
17. O'Reilly MM, Featherstone JD. Demineralization and remineralization around orthodontic appliances: an in vivo study. Am J Orthod Dentofacial Orthop 1987; 92: 33-40.
18. Hicks J, Garcia-Godoy F, Flaitz C. Biological factors in dental caries: role of saliva and dental plaque in the dynamic process of demineralization and remineralization (part 1). J Clin Pediatr Dent 2003; 28: 47-52.
19. Pascoe L, Seow WK. Enamel hypoplasia and dental caries in Australian aboriginal children: prevalence and correlation between the two diseases. Pediatr Dent 1994; 16: 193-9.
20. Wan AK, Seow WK, Purdie DM, Bird PS, Walsh LJ, Tudehope DI. The effects of chlorhexidine gel on Streptococcus mutans infection in 10-month-old infants: a longitudinal, placebo-controlled, double-blind trial. Pediatr Dent 2003; 25: 215-22.
21. Kaul R, Jain P, Saha S, Sarkar S. Cleft lip and cleft palate: Role of a pediatric dentist in its management. Int J Pedod Rehabil 2017; 2: 1-6.

22. Rivkin CJ, Keith O, Crawford PJ, Hathorn IS. Dental care for the patient with a cleft lip and palate. Part 1: From birth to the mixed dentition stage. Br Dent J 2000; 188: 78-83.
23. Rock WP. Young children and fluoride toothpaste. Br Dent J 1994; 177: 17-20.
24. American Academy of Pediatric Dentistry; American Academy of Pediatrics. Policy on early childhood caries (ECC): classifications, consequences, and preventive strategies. Pediatr Dent 2008-2009; 30: 40-3.

โรคฟันผุในเด็กที่มีปากแหว่งและเพดานโหว่

วิลาวัลย์ วีระอาชากุล, วิบูลย์ วีระอาชากุล

รายงานการศึกษาในอดีตแสดงให้เห็นว่าเด็กที่มีปากแหว่งและเพดานโหว่พบความชุกของโรคฟันผุสูง วัตถุประสงค์ของการศึกษานี้ คือทบทวนวรรณกรรมเกี่ยวกับระบาดวิทยาโรคฟันผุและการดูแลสุขภาพช่องปาก เพื่อป้องกันโรคฟันผุในเด็กที่มีปากแหว่งและเพดานโหว่ ปัจจัยที่มีผลต่อความเสี่ยงโรคฟันผุคือ อนามัยช่องปากไม่ดี มีช่องติดต่อกับช่องปาก ใส่เครื่องมือถอดได้และเครื่องมือจัดฟัน ลักษณะฟันไม่ปกติ ดูดนมเวลานอนกลางคืน และการรับประทานอาหารที่มีรสหวาน เด็กและพ่อแม่ควรได้รับการแนะนำที่เพียงพอเกี่ยวกับการดูแลสุขภาพช่องปากและการได้รับการรักษาทางทันตกรรมที่เหมาะสม ความร่วมมืออย่างใกล้ชิดระหว่างทันตแพทย์เด็กกับพ่อแม่สามารถช่วยให้สุขภาพช่องปากของเด็กเหล่านี้ดีขึ้น