International Journal of Dentistry Scientific
Volume 1, Issue 2, Page 169-178, June 2024
p-ISSN: 3031-7142

COMPREHENSSIVE ORAL REHABILITATION WIH PROLONGED NURSING BOTTLE CARIES

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Article info: Received: 23-3-2023; Revised: 25-4-2023; Accepted: 20-6-2024; Publish: 30-6-2024

Abstract : Nursing bottle caries is an aggressive form of dental caries that first occurs on the labial surface of the maxillary incisors. This condition if not treated at an early stage can cause severe teeth decay, not only in primary teeth but can affect its permanent teeth. **Case Report:** An 8 year old girl came to RSGM Unpad with complaints of teeth 12, 11, 21, 22, 31, 41 reversible pulpitis, gangren radix 16, 53, 26, teeth 36, 46 irreversible pulpitis with extensive crown damage and teeth 55, 54, 63, 64, 75, 74, 73, 83, 84, 85 edentulous but the replacement permanent teeth haven't erupted. The patient has a habit of breastfeeding through the bottle until the age of 7 years. Comprehensive oral rehabilitation included filling of direct composite teeth 12, 11, 21, 22, 31, 41, extraction of teeth 16, 53, 26 and apexogenesis of teeth 36, 46 with final restoration of porcelain uplays and removeable partial denture for controlling eruption of mandibular premolars. **Conclusion:** Good collaboration between dentists, nurses, patients and parents is absolutely necessary to achieve successful treatment and help improve oral health and children's self-confidence.

Keywords: Nursing bottle caries, apexogenesis, removeable partial denture

INTRODUCTION

One of the goals of World Health Organization related to oral health is that by the age of 12, 50% of a country's population should be free from dental caries. However, the loss of first permanent molars in children is still quite prevalent, ranging from approximately 3.5% to 32%.[1] The most common and chronic disease affecting the anterior teeth in children is dental caries due to bottle-feeding, known as early childhood caries or nursing bottle caries. Nursing bottle caries is an aggressive form of teeth decay that initially occurs on the labial surface of the maxillary incisors.[2] Early Childhood Caries (ECC), if not treated promptly in its early stages, can lead to severe dental damage, affecting not only primary teeth but also permanent teeth.[3] Children become conscious of their appearance and may experience a decrease in self-esteem if their smile is not good. Rehabilitating the functional and aesthetic aspects of primary teeth poses a challenge for pediatric dentists.[2]

The American Academy of Pediatric Dentistry defines Early Childhood Caries/nursing bottle caries as the presence of one or more carious lesions, teeth loss due to caries, or any restorations on any primary teeth in a child aged 71 months or younger. Severe ECC is defined as any sign of smooth-surface caries in children under 3 years of age, one or more cavitated, missing teeth due to caries, filled smooth-surface primary anterior teeth in the maxilla, or teeth with carious, missing, or filled surfaces involving more than 4 surfaces (at age 3), more than 5 surfaces (at age 4) and more than 6 surfaces (at age 5).[4]

Early Childhood Caries has multifactorial etiology, including dietary habits, oral hygiene, the involvement of Streptococcus mutans and Lactobacillus bacteria, defects in primary teeth, socioeconomic conditions and the timing of the first dental care visit. More than 20-50% of mothers with pathological pregnancies have children with ECC and premature infants have a 37% higher prevalence of ECC.[5,6]

Early Childhood Caries begins to affect teeth upon eruption and has distinct clinical characteristics. Initial lesions appear as white spots on the labial surface of the maxillary incisors near the gingival margin, spreading to the maxillary molars and mandibular molars but rarely affecting the mandibular incisors. Demineralized areas will progress to carious lesions within 6-12 months, causing cavities to become discolored, appearing yellow, brown or black. The distribution pattern of caries is based on the consumption of milk or sugary liquids through bottles around the maxillary incisors and other teeth, while the mandibular incisors are physically protected by the tongue. ECC clinically presents in three forms:[7]

1. ECC type I (mild to moderate)
   Isolated carious lesions involving molars and or incisors. The number of affected teeth increases with the persistence of cariogenic potential. This type of ECC is commonly found in children aged 2-5 years.[7]
2. ECC type II (moderate to severe)
   Labiolingual carious lesions on the maxillary incisors with or without molar caries, depending on the child's age and disease stage. ECC type II can be observed shortly after the first teeth erupt.[7]
3. ECC type III (severe)
   Carious lesions affecting nearly all teeth, including the mandibular incisors. This condition is found in children between the ages of 3-5 years.[7]

Early prevention of ECC is crucial, and the best treatment involves brushing teeth with fluoride toothpaste twice a day and the topical application of fluoride by a dentist. The recommended topical fluoride for children under 6 years of age at risk of ECC is 5% sodium fluoride (22,500 ppm F).[5] Treatment of ECC can be achieved through various interventions, depending on the disease's progression, age, medical history, social factors and the child's behavior. During the initial visit, a caries risk assessment can provide the necessary data to educate parents about preventing dental damage.[7]

Early decalcification lesions (white spots) and hypoplasia can quickly progress to cavities. If lesions are identified early, the use of anticariogenic agents can reduce the risk of cavity development. Parents should be taught how to clean their child's teeth with fluoride toothpaste. Teeth surfaces should be brushed carefully after each breastfeeding session. Fluoride varnish application at monthly intervals is a practical option, especially for children with maxillary incisor caries. Atraumatic Restorative Treatment (ART) with glass ionomer can be performed to reduce trauma in children and release fluoride for cavity prevention. When cavities have formed, more extensive therapy is needed. Early-stage cavities can be addressed restoratively, while advanced stages may require endodontic treatment or final restorations such as strip crowns for anterior teeth or stainless steel crowns for posterior teeth. Pulpotomies, pulpectomies or extractions may be indicated depending on the size of the lesion and the damage to surrounding tissues.[7]

In the mixed dentition phase, the permanent teeth's occlusal patterns are not yet visible. Therefore, restoration types must be chosen carefully to avoid interfering with the development of the stomatognathic system. Additionally, it should be considered that any prosthetic treatment plans for pediatric patients cannot be static due to the child's head and facial growth and development. Thus, prosthetic treatment requires regular monitoring, observing various changes in the patient's oral cavity and making necessary adaptations and adjustments as needed.[1]

PURPOSE

The aim of this case report is to report the case of an 8 year old female pediatric patient in the mixed dentition phase who requires comprehensive oral rehabilitation, including both restorative and prosthetic treatments to restore normal occlusal function due to the habit of bottle-feeding until the age of 7.

CASE REPORT

A female pediatric patient aged 8 years and 3 months presented with complaints of nearly all teeth being decayed and the back teeth were missing due to a habit of bottle-feeding until the age of 7. The patient did not experience toothache but was bothered by the appearance of some cavities in her front teeth. There was no history of medical conditions or genetic abnormalities.

Extraoral clinical examination, including facial shape, profile, lip seal, temporomandibular joint and body posture did not show any abnormalities. Intraoral clinical examination showed that the patient was still in the mixed dentition stage. Soft tissue appeared within normal limits and there was a dental anomaly where teeth 32 resembled teeth 33. Caries had reached the dentin in teeth 12, 21, 22, 31 and 41, and caries had reached the pulp with nearly half of the crown damaged in teeth 36 and 46. There were residual root fragments from teeth 16, 53 and 26 as well as composite restorations with poor color match on teeth 11. Teeth

25 had partially erupted. Teeth 55, 54, 63, 64, 65, 75, 74, 73, 83, 84 and 85 had already been lost, but their permanent replacements had not yet erupted.

Figure 1. Intraoral Photograph

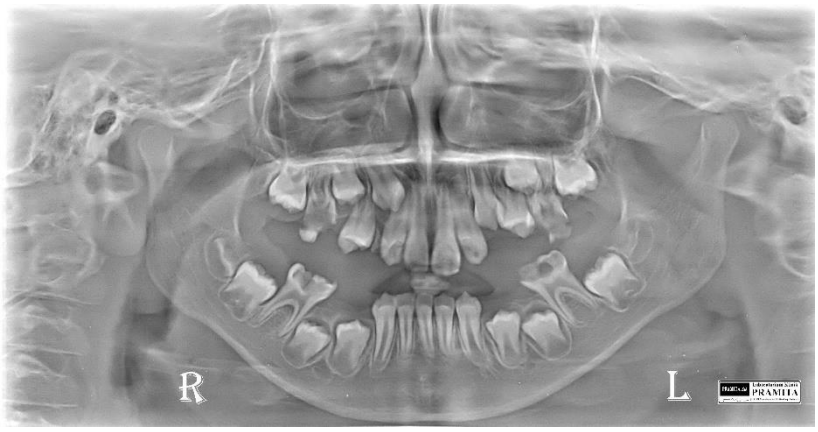

Figure 2. Panoramic Radiograph

On the first visit, a dental history was taken, a physical examination was conducted, extraoral and intraoral clinical examinations were performed, Dental Health Education was provided, an odontogram was filled out, an oral hygiene index was recorded and a referral letter for panoramic and periapical X-rays was prepared. The patient was given the tell-show-do technique for behavior management. The patient's mother was informed about the oral cavity condition, the planned treatment and signed an informed consent.

During the next two visits, direct composite restorations were carried out on teeth 12, 21, 22, 31 and 41 using 3M Espe composite in A2 enamel shade and A2 dentin shade Filtex Z350 XT. Teeth 11 also had its restoration repaired using the same composite material.

Figure 3. Direct Composite Filling on Teeth 12, 11, 21, 22, 31 and 41

The extraction of roots 16, 53 and 26 was performed gradually over the next three visits. Extraction with separation of the three roots was necessary because the crowns did not have sufficient support for extraction by gripping. The patient was given post-extraction instructions and prescribed amoxicillin antibiotics and paracetamol analgesics for pain management.

Figure 4. Radix Extraction of Teeth 16, 53, and 26

The patient returned for a follow-up visit, bringing the results of periapical X-rays for teeth 36 and 46, which indicated that both teeth were still vital and the apices had not yet completely closed. Apexogenesis was performed on teeth 36 and 46 with mandibular block anesthesia and buccal infiltration. The pulp chamber roof was then opened until reaching the orifice. The cavity was cleaned with chlorhexidine and dried with a cotton pellet. Biodentine was applied to the pulp chamber and orifice and a glass ionomer cement build up was done. These teeth were X-rayed again four months later and if there were no complaints and the apices had closed, final porcelain restorations would be carried out.

Figure 5. Apexogenesis of Teeth 36 and 46

During the next visit, topical fluoride application with M-Varnish was performed. The patient was instructed to brush their teeth first. Teeth were dried using cotton rolls and cotton pellets and then M-Varnish was applied to each teeth individually. The patient was advised not to drink, rinse or eat for at least one hour after the application.

On the following visit, porcelain veneer preparation for teeth 36 and 46 was carried out and impressions of the upper and lower jaws were taken to create working models. The patient returned for a follow-up visit four months later for post-apexogenesis periapical X-ray. The patient had no complaints, the apices had closed and clinical examinations showed negative percussion and negative sensitivity to pressure. Impressions of the upper and lower jaws were taken to create a lower jaw prosthesis.

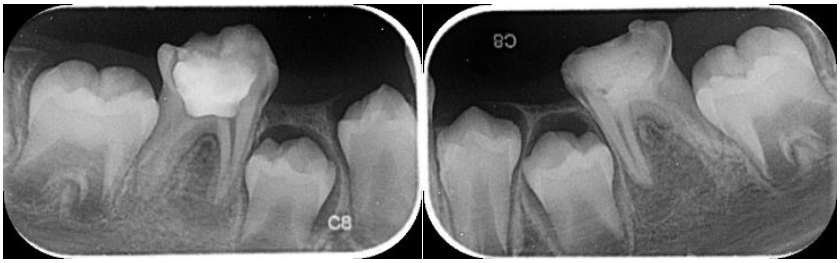

Figure 6. Radiographic Control 4 Months Post-Apexogenesis of Teeth 36 and 46

The patient returned one week later for the placement of porcelain veneers on teeth 36 and 46. The patient had no complaints and clinical examinations showed negative percussion and negative sensitivity to pressure. A bite ramp trial was also

performed for the lower jaw prosthesis. The patient returned again two weeks later for the insertion of the lower jaw prosthesis.

Figure 7. Clinical Overview 1 Month After Oral Rehabilitation

DISCUSSION

Poor dietary habits and nutrition can disrupt the balance between teeth demineralization and remineralization. Foods rich in sugars and fermentable carbohydrates, metabolized into acids by plaque bacteria, result in low pH levels and the growth of acidogenic and aciduric bacteria (such as Streptococcus mutans). Conversely, a diet low in sugar and fermentable carbohydrates and high in calcium can support remineralization.[5]

Children with early childhood caries generally have a higher frequency of sugar intake compared to caries-free children. This is consistent with most literature, which indicates that the incidence of caries increases when the consumption of sugary foods exceeds four times a day. The characteristics and frequency of food consumption play a significant role in the development of ECC and the assessment of the severity of ECC risk factors.[6]

In this case, the patient first visited the dentist at the age of 8 for anterior teeth restorations. Children who have delayed or no dental visits are more vulnerable to dental caries. Early and regular dental visits provide an opportunity to educate parents about improving their child's oral health, especially in low socioeconomic groups where oral health may not be considered a priority.[6]

The choice of ECC therapy depends on the severity level. In the early stage, such as white spots, topical fluoride and oral hygiene and dietary instructions can

be provided. In advanced stages, where lesions reach the dentin, conservation treatment or extraction may be necessary if the teeth cannot be restored. Comprehensive rehabilitation is carried out, considering the severity of the lesions, caries risk, the child's age, their behavior, parental cooperation and socioeconomic status.[2,8]

Oral rehabilitation in this case presents a challenge. Restoring permanent anterior teeth (teeth 11, 21, 22, 31 and 41) with composite resin is an appropriate choice because the teeth damage is not too extensive and composite resin provides aesthetic, functional and cost-effective restorations with a relatively short chairside work time.[9] The extraction of roots 16, 53 and 26 was indicated.[10]

Teeth 36 and 46 underwent apexogenesis with Biodentine because the teeth apices had not completely closed due to the patient's age of 8 years and final restoration with porcelain veneers was planned. Porcelain veneers are a restoration that covers the entire teeth surface, indicated for teeth with caries on one or more surfaces, extensive cervical decalcification, post-pulp treatment, extensive teeth structure loss, multiple hypoplastic defects and discolored anterior teeth.[11]

Biodentine is a new bioactive and specially tricalcium silicate-based restorative material with mechanical properties similar to dentin. It originates from Portland cement and exhibits a short setting time and excellent compression strength. These characteristics indicate biocompatibility and the ability to set and well adhere in an alkaline pH environment.[12,13]

Research by Laurent et al. on the secretion of TGF-β1 from the application of Biodentine, MTA and CaOH ex vivo on human dental pulp found that Biodentine initiated mineralization processes earlier and significantly increased the secretion of TGF-β1 from pulp cells.[14] TGF-β1 is a growth factor and bioactive molecule that plays a crucial role in the reparative dentinogenesis process through the differentiation and mineralization of odontoblast-like cells.[15] Perard et al. conducted research on the biological effects of Biodentine on dental pulp and the results showed that COL-1A1 expression was slightly lower in spheroid odontoblast cultures treated with MTA but higher with Biodentine. The COL-1A1 gene is responsible for matrix formation. In another study, it was reported that blood contamination did not affect the bond strength of Biodentine.[15] Shayegan et al. investigated the inflammatory cell response and hard tissue formation after Biodentine pulpotomy in pig primary teeth. After 90 days, it was found that normal pulp tissue without signs of inflammation was present, and 9 out of 10 teeth showed a calcified layer below the pulpotomy site. Biodentine was concluded to have bioactive properties, promoting tissue regeneration and not causing moderate or severe inflammation in the pulp.[16]

Damage or premature loss of primary teeth can lead to the development of parafunctional habits, functional-esthetic problems such as malocclusion and space loss, psychological issues that can disrupt a child's personality and behavioral development. These conditions justify the use of removable partial dentures as one

treatment option. However, there are several drawbacks associated with the use of removable partial dentures, such as the success rate depending on the patient, with issues like non-compliance, damage, loss, swallowing and potential damage to the surrounding soft and periodontal tissues. The use of fixed partial dentures in children is limited to modifications of the dental arch, reflecting the development of primary and mixed dentition.[17]

In this case report, the patient who is 8 years old and still in the mixed dentition period, is indicated to receive a removable partial denture while waiting for the eruption of permanent premolar teeth. The patient will have regular follow-up visits at 1 week, 1 month and 3 months after the insertion of the removable partial denture to monitor the growth and eruption of their mandibular premolar teeth.

CONCLUSION

1. Early Childhood Caries/nursing bottle caries can be effectively prevented and managed through accurate dental history-taking, the commitment of parents and patients to regular visits and the skills of the dentist.
2. Good cooperation among dentists, nurses, patients and parents is essential to achieve treatment success and enhance oral health and the confidence of the child.

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