

## DENTAL CARIES MANAGEMENT IN YOUNG CHILDREN WITH INTERIM THERAPEUTIC RESTORATION

*(MANAJEMEN KARIES GIGI PADA ANAK DENGAN TERAPI RESTORASI SEMENTARA)*

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*JHDS.unjani.ac.id/jite*  
*Doi: 10.54052/jhds.*

**Article History**  
*Received: 03/07/2022*  
*Accepted: 05/08/2022*

### ABSTRACT

Caries are the most common case in every individual, including children who are still at an early age. Caries in primary teeth can occur in the early period of tooth eruption, which begins with the presence of white spot lesions. Dental caries are known as Early Childhood Caries (ECC) at an early age. ECC is used for caries in primary teeth up to 71 months. Many factors trigger the occurrence of ECC. Early treatment is very important to prevent comprehensive damage. Usually, the operator will face conditions that are not conducive to treatment. Young children generally will behave uncooperatively, have very high mobility, cry, and have difficulty opening their mouths, so it will be difficult for the operator to give treatment. One of the most therapy is dental restoration. The treatment approach will depend on the severity of the case; treatment can be in the form of non-operative therapy, dental restoration,

or the last stage extraction if the teeth cannot be maintained. This case report will discuss the treatment of primary tooth cavity lesions without pulp involvement in young children through Interim therapeutic Restoration (ITR) and strategies that need to be implemented to support the success of treatment and prevent the damage from worsening. The result showed that ITR was successfully performed in young children with cooperative behavior to prevent more extensive tooth decay.

**Keywords:** caries in primary teeth; interim therapeutic restoration

### **ABSTRAK**

*Karies merupakan penyakit gigi yang paling umum terjadi pada setiap individu, termasuk anak dengan usia dini. Karies gigi yang terjadi pada awal periode erupsi ditandai dengan lesi white spot. Karies gigi pada anak usia dini dikenal dengan istilah Early Childhood Caries (ECC). ECC adalah terminologi pada lesi karies yang digunakan pada anak sampai dengan usia 71 bulan. Banyak faktor yang menjadi penyebab terjadinya ECC. Perawatan dini penting dilakukan untuk mencegah kerusakan menjadi lebih buruk dan umumnya operator akan dihadapkan pada kondisi yang tidak kondusif. Secara umum anak usia dini akan sangat tidak kooperatif, mobilitas tinggi, dan cenderung menangis saat perawatan, tidak mau membuka mulut sehingga akan menyulitkan saat perawatan. Restorasi gigi merupakan salah satu perawatan yang sering dilakukan pada lesi karies. Pendekatan perawatan akan sangat tergantung dari tingkat keparahan kasus, dimulai dari pendekatan non operatif, restorasi karies gigi, ataupun ekstraksi jika kerusakan tidak bisa lagi dipertahankan. Laporan kasus ini akan mendiskusikan mengenai perawatan lesi karies tanpa keterlibatan pulpa pada anak usia dini melalui teknik Interim Therapeutic Restoration (ITR) dan strategi yang diperlukan untuk mendukung keberhasilan perawatan dan mencegah kerusakan menjadi lebih buruk. Hasil laporan kasus menunjukkan bahwa ITR berhasil dilakukan pada anak usia dini yang sangat tidak kooperatif untuk*

*mecegah kerusakan gigi lebih luas.*

***Kata kunci*** :*karies gigi sulung; interim therapeutic restoration*

## **INTRODUCTION**

Primary teeth generally begin to grow at the age of 6 months and will erupt with a perfect amount at the age of approximately two years. Dental caries is very likely to occur at the age of newly erupted teeth caused by many factors. Both non-cavity to cavity lesions and pulp involvement were found early in many cases. According to the American Academy of Pediatric Dentistry, caries lesions in young children are called Early Childhood Caries. Early Childhood Caries is the presence of one or more decayed (non-cavitated or cavitated lesions), missing (due to caries), or filled tooth surfaces in any primary tooth in a child 71 months of age or younger. Treatment of ECC must be done immediately. Otherwise, it will cause more severe damage, interfering with oral and overall health conditions.<sup>1-3</sup>

Many factors cause the etiology of caries at an early age. The involvement of several components such as diet, environment, microorganisms, and the teeth themselves, if not in a balanced condition, will cause carious lesions. Dietary factors through the intake of foods containing high sugar will trigger ECC quickly, and the lack

of information and knowledge of parents or caregivers about the proper way to maintain teeth is closely related. For example, children habitually consume milk using bottles until they fall asleep and are indisciplined in brushing their teeth. Brushing without supervision, children eating too long without chewing, and does not get used to flossing is the cause most related to dental caries.<sup>4-6</sup>

The treatment of dental caries in young children is very complex. Children at an early age are generally very uncooperative because it is related to their psychological condition. Dentists who treat the patient's young children are strangers to them, so during treatment, they tend to be very uncooperative, cry, and do not want to open their mouths. Treatment must also be fast, and dentists must be friendly and give a pleasant impression, especially at the beginning of treatment. The limitation of the child's mouth opening and the shortest possible visit time must be a concern for the operator.<sup>1,7</sup>

Sharp dental instruments risk injuring oral tissue during treatment, especially if they are uncooperative and very active in moving, so there is a high

chance of injuring the teeth and surrounding soft tissue. It also adds to the dentist's difficulty in carrying out an ideal treatment in the case of cavitory lesions. Some references, the treatment approach in ECC cases can be made by applying behavior management techniques, both non-pharmacologic and pharmacological, depending on the severity of the case and the treatment plan and patient cooperation. It requires a lot of consideration to decide on the appropriate treatment approach regarding the patient's overall condition.<sup>8</sup>

A dentist should consider the benefits and risk factors that the child will face. In principle, treatment of ECC patients must be carried out immediately to prevent further damage and maintain the teeth as space maintainers for the growth of mixed and permanent dentition. Delaying ECC therapy can be bad for the child's life because the child has difficulty eating, disturbing activities, lost weight, the risk for infectious disease, and disturbed sleep and rest, so this will have an impact on decreasing the quality of life of the child.<sup>5,8</sup>

Management of dental caries in children requires the involvement of other and several approaches, such as home care, professional, and community. The side effects or consequences of delaying caries at an early age will lead to an adverse effect characterized by the emergence of new

lesions, more treatment visits, high treatment costs, and traumatic effects.<sup>5,9</sup>

The success of treatment must involve many parties and family discipline in caring for teeth and operator experience to decide on suitable treatment. Restoration treatment is frequently performed because restoration aims to maintain the tooth and prevent further damage. According to experts, dental restoration treatment in young children can be done using basic behavior management techniques or in very difficult conditions through advanced behavior management such as sedation and general anesthesia. However, related to the child's age, parents tend to choose basic treatment with direct behavioral management approaches without drugs because of the risk factors and considerable costs, as well as the opportunity for recurrent infections.<sup>10,11</sup>

Restoration treatment directly at the dental unit will be very difficult for the operator because generally young children are uncooperative, cry, and do not want to open their mouths. Care must be taken to remove the infected tissue to prevent the surrounding soft tissue injury. Interim therapeutic restoration (ITR) is a technique that the American Academy of Pediatric Dentistry recommends.<sup>7,10,12</sup> Principally, *ITR* is similar to Atraumatic Restorative Treatment (ART) introduced by World

Health Organization. Both have similar approaches and are performed using the same material, but they have a different purposes. ITR is a treatment where ideal therapy could not be performed, while ART is used for cases with obstacles to facilitating tools and dental care units<sup>9,13</sup>

According to the American Academy of Pediatric Dentistry, ITR is a temporary restoration that a definitive one will replace. Therapy with ITR is an option that can be taken when the operator is faced with conditions where the ideal treatment cannot be carried out. Difficulty in preparation, limitation in opening the patient's mouth, crying, uncontrolled movement, and high risk of injuring the cheeks, tongue, and lips, so recommendations with ITR can be considered. Generally, ITR should be monitored regularly to see the post-restoration condition and ensure the restoration's presence or absence, failure, and replacement should be carried out in the next six months if the patient's condition is more cooperative with an ideal restoration.<sup>12,14</sup>

ITR may be considered in cases of active carious lesions to prevent a major increase before definitive therapy approaches with sedation and general anesthesia. The ITR procedure is performed using hands or a rotary instrument where the

lesion has no pulp involvement. Materials used can be glass ionomer cement and modified glass ionomer resin. GIC has a high viscosity, especially in lesions with one surface.<sup>10</sup>

ITR is useful for controlling caries with multiple lesions as a temporary restoration. The use of GIC can reduce the number of cariogenic bacteria such as streptococcus mutans, and it helps to neutralize oral flora. GIC is expected to improve the remineralization process on the tooth surface.<sup>6,8,12</sup>

ITR is indicated in cases where there are obstacles in children's behavior. It is very helpful for dentists and patients with a very young age, patients with low levels of cooperation, special needs patients, and cases where conventional restorative care cannot be carried out.<sup>9,13</sup>

## **CASE REPORT**

### **Case 1**

A child aged one year and two months came to the clinic with her parents. The chief complaint from the patient was the cavities of the upper incisors teeth. The parents noticed this condition one month ago. The patient did not complain of pain, but the patient's parents were worried that the condition would get worse. Based on the anamnesis, the patient's condition is healthy, and weight and height are

appropriate. According to her mother, the patient does not like eating sweet foods and regularly brushes his teeth at the correct time and twice a day. Brushing is also carried out under parental supervision. However, fluoride toothpaste was not given when the patient brushed his teeth because his parents feared being swallowed. The patient has no history of drinking milk using a bottle. The mother said that the patient has a problem eating the main food. She always eats for a long time.

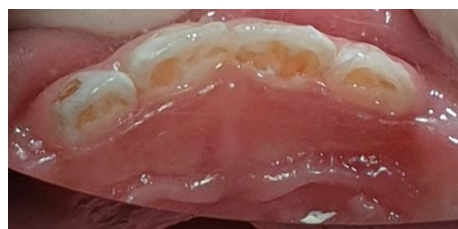
The results of the extra-oral examination showed that the head, neck, and surrounding structures were in normal condition. Intraoral examination revealed a carious lesion within the dentinal margin of the maxillary central incisor area. During the initial visit, the patient cried so that during treatment, he was accompanied by sitting on his mother's knee-to-knee position. Hence, the patient is too young. It is difficult for the operator to check and do the treatment. The initial procedure was to perform oral prophylaxis and make temporary restorations with ITR. After the treatment, the patient's parents were educated to improve home-care so that the treatment would give good results.



(a)



(b)



(c)



(d)

**Figure 1.** (a-d): Pre restoration of labial surfaces (a); Post restoration of labial surfaces (b); Pre restoration of palatal surfaces (c); Post restoration of palatal surfaces.

## Case 2

A 2.5-year-old girl comes with her mother complaining of toothache when



eating and drinking. According to the patient's parents, the child did not want to eat and only drank milk. When she was sick, the patient's parents gave him medication to release pain; this condition lasted almost two months. The initial visit, the patient cried because of fear, did not want to be examined, and even opened his mouth. The patient was accompanied and carried by the mother in the dental chair during the examination.

The extra oral examination results showed no pathological conditions in the head, neck, and surrounding soft tissues. The results of the intra-oral examination showed that almost all teeth were carious to the dentin margin, and there were no swollen areas. The diagnosis results found reversible pulpitis in almost all primary teeth except for 71,81,82 because they were white spot lesions. Based on the caries risk factor assessment results, the patient is in the high-risk category.

The dental history found that it was the first time the patient visited the dentist. Based on the mother's information, the child had a habit of drinking milk from a bottle, which continued, especially when sleeping at night. The patient brushes his teeth twice in the morning and evening. Patients like to consume sugary foods and drinks in excess. The treatment plan carried out on the patient was restoration with the ITR technique for

cavitory lesions and fluoride varnish. Patients are given information and education on improving and maintaining oral dental Health at home by cleaning their teeth twice daily with fluoride toothpaste. Toothbrushing is carried out with assistance; patients are advised to stop using bottled milk and avoid consuming cariogenic foods.



(a)



(b)



(c)

**Figure 2.** (a-c). Pre-restoration (a); pre-restoration lower teeth incisor; pre-restoration upper teeth incisor.

## DISCUSSION

Dental caries begins with white-spot lesions in the upper primary incisors along the margin of the gingiva. If the disease continues, caries can progress, leading to the destruction of the crown. Early stages of dental caries are often without symptoms, while advanced stages may lead to pain, infections, and abscesses. Progressing dental caries in young children is faster, especially in primary dentition. Early detection is the key to managing dental caries in young children and preventing adverse problems associated with its occurrence. Less expensive and could be painless for children. Cavitation in dental caries occurs due to tooth substance (enamel and dentine) loss by acids formed by bacteria in dental plaque, accumulating on tooth surfaces. This process is due to the bacterial metabolism of sugars derived from dietary sugars.<sup>1,13</sup>

Dental caries in young children is closely related to the indiscipline factor in maintaining oral Health. Parents' misunderstanding or lack of education will impact the destruction of children's teeth when primary teeth start to erupt. The term of home-care needs special attention for parents or caregivers to prevent cavities in children; the parent has to teach and show good habits for children. For example, children must be taught to brush their teeth

regularly with fluoride toothpaste at least two times a day at the right time and proper technique with supervision until seven years old. A healthy diet and not consuming a lot of high glucose or cariogenic foods should also be attended. The habit of using dental floss is considered important because it can prevent the occurrence of proximal lesions. The most common etiology of early dental caries is drinking bottled milk while sleeping.<sup>5,15</sup>

Treatment decisions in cases of ECC are highly dependent on the assessment of caries risk factors, parents' habits of maintaining oral conditions, level of patient cooperation, and operator experience. Several journal references have provided recommendations for managing dental caries in early childhood regarding appropriate strategies and management. Dental caries must be treated immediately for non-cavitated or deep-cavitated lesions to improve children's quality of life. According to IAPD guidelines, treatment approaches have three stages primary, secondary and tertiary.<sup>2,3</sup>

The primary approach includes prenatal healthcare and limiting sugar intake in children under two years, not consuming bottled milk or liquids containing high sugar and consuming healthy and non-cariogenic foods, brushing teeth twice a day with fluoride paste of at



least 1,000 ppm in an appropriate time, and method, use of fluoride varnish based on caries risk factors for children. The use of fluoridated toothpaste is still a consideration for many parents, especially for children under 2 or 3 years, because parents are worried their children will swallow Fluoride content when brushing their teeth.<sup>2</sup>

The second stage is secondary prevention, and this stage aims to arrest the progression of caries before the cavitation lesion. In addition, more frequent fluoride varnish application and pit fissure sealant to susceptible molar is recommended. The last approach is tertiary, both non-invasive and invasive in cavitory lesions. A conservative approach through restoration should be carried out as early as possible to prevent extensive damage that could compromise the vitality of the pulp and prevent damage to the point where the tooth can no longer be sustained. Silver diamine fluoride is used to arrest cavitated lesions to prevent further damage, pain, and pulp exposure.<sup>2,3</sup>

The patient experienced the results of the anamnesis and etiological factors. The first case was a patient aged 1,2 years with caries on the upper incisors' labial and palatal surfaces. Even though the patient did not consume bottled milk and did not eat sweet foods excessively, incorrect brushing of teeth by not eliminating all plaque and

not using fluoride toothpaste was suspected to be the cause of early caries. In the second case, intraoral examination revealed that the patient had white spots and caries lesions almost all over the teeth. Information from parents stated that it was difficult for children to brush their teeth, had a habit of bottle-feeding, and liked to eat sweet foods. In both cases, there were no pulp caries, so based on several considerations related to the previous explanation, the operator decided to perform restoration with ITR. ITR could be applied to patients with behavior complaints, especially in young children.

According to AAPD in 2021, ITR can be one of the restoration therapies for uncooperative patients accompanied by the principles of non-pharmacological behavioral approach treatment. The simple procedure of ITR is considered an option for preventing further damage. ITR has a simple but temporary technique. Some experts recommend changing the ITR 6 months after the procedure. ITR is limited for early-stage cavity lesions without pulp involvement.<sup>1,3</sup>

ITR is a minimally invasive procedure in asymptomatic enamel-dentin caries lesions. Carious lesions may include proximal incisor areas, facial surface caries, cervical caries, and occlusal surface caries in primary teeth. The success of treatment

with ITR at an early age was 93% successful for single-surface lesions and 63% for multiple-surface molar lesions.<sup>9,12,13,16</sup>

In this case, the restoration procedure uses a hand instrument to remove gross decay without local anesthetic and is suitable for young children who may not cooperate during treatment.

Dental restoration is one of young children's most commonly used treatment needs. Glass ionomer cement is widely used as the material of choice for the ITR procedure. GIC offers particular advantages as a restorative material in primary dentition. It is because of their ability to release fluoride to inhibit secondary decay and adhere to dental hard tissue. Glass ionomer has biocompatible properties. It does not cause any irritation to the pulp. Thermal expansion, similar to the tooth structure, can protect an underlying base and dentin and binds strongly to enamel and dentin.<sup>17,18</sup>

The common complication, in this case, relates to the difficult procedure. It can be due to excessive movement and poor isolation. At the end of the visit, the parents are informed that the patient has to be disciplined to control oral hygiene and eliminate bad habits; parents know this is not definitive treatment and will require close follow-up and possible re-treatment.

The description above provides an overview of the success of dental caries treatment in young children with ITR. This process must be balanced with parental discipline in implementing home-care principles and the operator's efforts to assess caries risk factors in making good treatment plans to prevent worse conditions and recurrent infections.

## **CONCLUSION**

Dental caries in young children is multifactorial. Parents' role in preventing early caries is very important through good habits. Dental caries will greatly interfere with the quality of life because oral dental Health is closely related to the function of mastication, speech, aesthetics, and the function of primary teeth as natural space maintainers, which are very important at the next dentition. ITR can be an option for operators for early-stage lesions because it prevents further damage as a temporary restoration before a definitive one.

## **CONFLICT OF INTEREST**

We declare no potential conflict of interest in the scientific articles we write.

## **ACKNOWLEDGEMENT**

Our thanks go to the professionals who assisted in the research and preparation of the paper.

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