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Case Report

Systematization of oral hygiene in a pediatric patient: Case report.

Sistematización de la higiene oral en un paciente pediátrico: Reporte de Caso.

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Abstract: Oral hygiene is an important step in the control of the biofilm, a factor related to diseases such as gingivitis and tooth decay. The systematization of oral hygiene in children is a set of measures that seeks to achieve sequential learning, thus guaranteeing a better elimination of the biofilm. **Objetive:** To show a sequence of systematized steps in oral hygiene in a pediatric patient with a definitely positive behavior. **Case Report:** Six year old female patient, without relevant medical history. On clinical intraoral examination presented biofilm accumulation and swollen gums. The presumptive diagnosis was marginal gingivitis associated with biofilm, the treatment included a preventive phase with motivation and education. The control of the disease evolution was carried out with a card of Systematization Technique of Oral Hygiene, the methodology included the recording of the educational sessions using videos and photographs. **Results:** the adequate use of the amount of toothpaste was achieved, the integrity was improved to 100%, the brushing time increased from 24 to 120 seconds and it was possible to add tongue brushing and not rinsing after brushing within the oral hygiene routine. **Conclusion:** The patient was able to clean all dental surfaces, using homogeneous times for each surface, following an orderly sequence in toothbrushing, as well as to acquire knowledge regarding the amount of toothpaste to use, tongue brushing and not rinsing after toothbrushing. The systematization of oral hygiene allowed us to achieve these achievements in six sessions.

Keywords: *Child; Toothbrushing; Pediatric Dentistry; Oral Hygiene; Learning; Biofilms.*

Resumen: La higiene oral es un paso importante para el control de la biopelícula, la cual es un factor relacionado con enfermedades como gingivitis y caries dental. La sistematización de la higiene oral en niños es un conjunto de medidas que buscan lograr un aprendizaje secuencial, garantizando así una mejor eliminación del biofilm. **Objetivo:** Mostrar una secuencia de pasos sistematizados en la higiene oral en un paciente pediátrico con comportamiento definitivamente positivo. **Reporte de un Caso:** Paciente femenino de 6 años, sin antecedentes médicos relevantes. Al examen clínico intraoral presentó acumulación de biofilm y encías inflamadas. El diagnóstico presuntivo fue gingivitis marginal asociada a biofilm, el tratamiento incluyó una fase preventiva con motivación y educación. El control de la evolución

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se realizó con una ficha sobre la Técnica de Sistematización de Higiene oral, la metodología incluye el registro de las sesiones educativas usando vídeos y fotografías. **Resultados:** se logró el uso adecuado de la cantidad de dentífrico, se mejoró la integridad al 100%, el tiempo de cepillado pasó de 24 a 120 segundos y se consiguió integrar el cepillado de la lengua y el no enjuague post cepillado dentro de su higiene oral. **Conclusión:** La paciente consiguió realizar la limpieza de todas las superficies dentales, tiempos homogéneos para cada superficie, una secuencia ordenada en su cepillado dental, así como adquirir conocimientos en la cantidad de dentífrico utilizado, el cepillado de la lengua y el no enjuagarse después del cepillado dental. La sistematización de la higiene oral permitió conseguir estos logros en 6 sesiones.

Palabra Clave: *Niño; Cepillado Dental; Odontología Pediátrica; Higiene Bucal; Aprendizaje; Biopelículas*

INTRODUCTION.

Oral hygiene in children is the most important measure to reduce the accumulation of biofilm.[1] However, it must be systematized,[2] considering aspects such as: type of toothbrush and toothpaste, amount of toothpaste, toothbrush grip, pre-wetting of toothbrush, consistency of the brushing, sequence, isochronicity, total brushing time, tongue cleaning or brushing, and rinsing after toothbrushing.

Manual toothbrushes are as effective at reducing plaque and gingivitis as electric toothbrushes.[1] Both methods are effective in the administration of fluoride .[2]

Toothpastes have different concentrations of fluoride.[3] The use of toothpastes with 1500 ppm and 1100 ppm of fluoride reduces the increase in carious lesions compared to toothpastes without fluoride or with only 550 ppm.[4]

The average amount of toothpaste applied to the brush is 0.36 g, and its retention in the mouth is 72% (0.27g).[5] The amount of fluoride in saliva after brushing with 0.25g of toothpaste (size of a pea) and subsequent rinsing with water was 0.33g.[6]

The type of toothbrush grip in children can be distal oblique, oblique, power, spoon, and precision. The most common is distal oblique, and it is also more effective in removing biofilm,[7] resulting in a reduction of up to 70%.[8] Pre-wetting the toothbrush does not affect its cleaning capacity.[9] A systematic brushing sequence reduces up to 50% more biofilm compared to not following it.[10-11]

Isochronicity results in a balanced distribution of brushing time on each tooth surface. Adults present non-isochronical brushing.[12]

The total tooth brushing time has a significant effect on the removal of biofilm.[13] Brushing for two minutes removes 41% more biofilm compared to brushing for one minute.[11] Brushing for two minutes increases fluoride levels in biofilm to 0.53 mg/g.[14]

Oral hygiene should also include the tongue.[15] Tongue brushing is associated with an improvement in periodontal status.[16] and to controlling halitosis in children.[17] Scraping and brushing the tongue have shown to reduce the counts of salivary *Streptococcus mutans* in children.[15-18]

There is no high-quality evidence regarding post-brushing rinsing.[19] Clinical guidelines for children recommend spitting out the excess of toothpaste and not rinsing with water after brushing.[2-20] There may be a greater retention of residual fluoride in saliva when rinsing is not performed after toothbrushing.[21]

However, one study reported the mean concentration of fluoride in saliva in children who brushed with 1500ppm fluoride toothpaste without rinsing was 0.031 ppm, and 0.034ppm in children who performed post-brushing rinsing.[22]

The aim of this case report is to describe a sequence of systematized steps during oral hygiene in a pediatric patient showing a positive behavior.

CASE REPORT.

This case report was reviewed by the Institutional Ethics in Research Committee CIEI-IMT "DAC" UNMSM, code CIEI-IMT-16–2020. The informed consent was obtained from the patient's mother.

Six-year-old female patient with gingivitis. Instruction for the Oral Hygiene Systematization Technique was established, with evaluation and reinforcement of biofilm control.

An Oral Hygiene Systematization Technique (OHST) sheet for children was created including the following items: type of toothbrush and toothpaste, amount of toothpaste, pre-wetting of the brush, type of toothbrush grip, brushing consistency, sequence, isochronicity (time), tongue brushing, post-brushing rinsing, and

biofilm control with Greene and Vermillion oral health index, at the beginning and end of each session.

Sessions were scheduled once a week, according to the methodology described in Table 1.

The OHST began with the selection of the toothbrush type. From the first session onwards, a pediatric manual toothbrush for children over 6 years of age and toothpaste containing 1000ppm of fluoride was used .

The amount of toothpaste in the first session was greater than the size of a pea. From the third session onwards, the child began to use the appropriate amount for her age (the size of a pea).

Pre-wetting of the toothbrush was not carried out by the patient, this behavior was maintained in the following sessions. The type of toothbrush grip used by the patient was distal oblique throughout, from the first to the sixth session (Figure 1).

For the brushing sequence, the patient was instructed to start in the upper jaw with the vestibular, palatal, and occlusal surfaces, following the same sequence for the lower jaw. The consistency of the brushing was calculated based on the total amount of brushed surfaces: In the first session it was 24%, but by the sixth session, 100% consistency was achieved.

To evaluate the brushing time, the oral cavity was divided into 17 sectors (Figure 2), including the tongue, and 7 seconds of brushing per sector was assigned to achieve 2 minutes of total brushing duration. The total brushing time was 24s, 37s, 47s, in the first, second and third sessions, respectively. In the fourth and fifth sessions it was 1 minute, and finally, in the sixth session it was 2 minutes.

Tongue brushing, despite instruction, was performed by the patient only from the third to the sixth session.

Figure 1. **Toothbrush grip employed by the child.**

Figure 2. **The 17 areas into which the oral cavity was divided.**

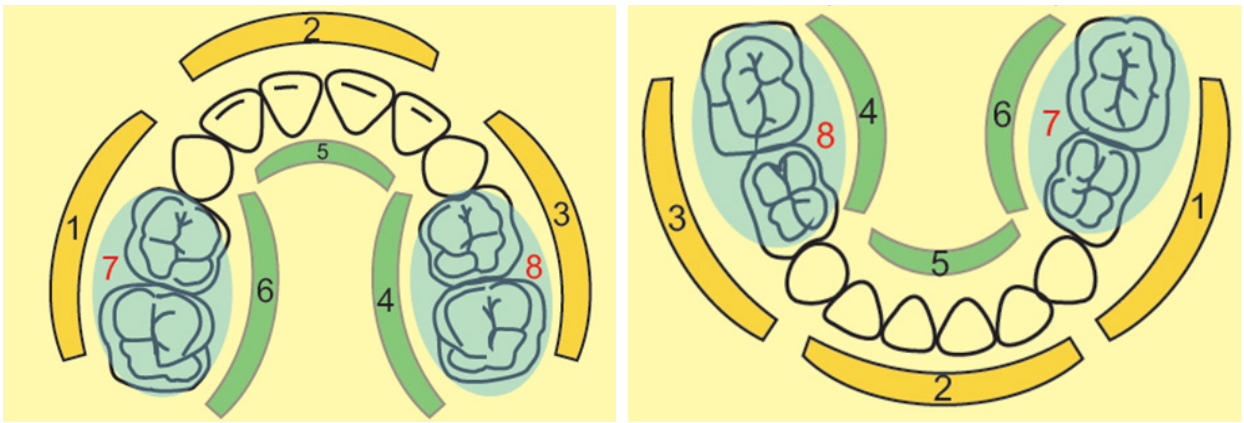

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Figure 3. Oral Hygiene Index performed with bacterial plaque developer at the initial session.

A. Frontal photograph. **B.** Left side photograph. **C.** Right side photograp. **D.** Frontal photograph. **E.** Left side photograph. **F.** Right side photograph.

Table 1. Methodology employed in the scheduling of sessions for the Oral Hygiene Systematization Technique (OHST).

SESSIONS	METHODOLOGY
1st Session	Initial Oral Hygiene Index
	Video recording of the brushing technique (Horizontal Technique).
	Final Oral Hygiene Index (Greene and Vermillion)
	Oral hygiene instruction.
	Video analysis
	Data recorded in the Oral Hygiene Systematization Technical Sheet (OHST)
2nd Session	Initial Oral Hygiene Index
	Video recording of the brushing technique (Horizontal Technique).
	Final Oral Hygiene Index (Greene and Vermillion)
	Oral hygiene instruction.
	Video analysis
	Data recorded in the Oral Hygiene Systematization Technical Sheet (OHST)
3rd Session	Initial Oral Hygiene Index
	Video recording of the brushing technique (Horizontal Technique).
	Final Oral Hygiene Index (Greene and Vermillion)
	Oral hygiene instruction.
	Video analysis
	Data recorded in the Oral Hygiene Systematization Technical Sheet (OHST)
4th Session	Initial Oral Hygiene Index
	Video recording of the brushing technique (Horizontal Technique).
	Final Oral Hygiene Index (Greene and Vermillion)
	Oral hygiene instruction (upper jaw only)
	Video analysis
	Data recorded in the Oral Hygiene Systematization Technical Sheet (OHST)

5th Session	Initial Oral Hygiene Index
	Video recording of the brushing technique (Horizontal Technique).
	Final Oral Hygiene Index (Greene and Vermillion)
	Oral hygiene instruction (lower jaw only)
	Video analysis
	Data recorded in the Oral Hygiene Systematization Technical Sheet (OHST)
6th Session	Initial Oral Hygiene Index
	Video recording of the brushing technique (Horizontal Technique).
	Final Oral Hygiene Index (Green and Vermillion)
	Video analysis
	Data recorded in the Oral Hygiene Systematization Technical Sheet (OHST)

Table 2. Results of the items evaluated in the Oral Hygiene Systematization Technique (OHST).

Sessions	Selection of toothbrush	Type of toothpaste ppm	Amount of toothpaste	Pre-wetting of toothbrush	Consistency (%)	Isochronicity total brushing time	Movement	Rinsing after	Brushing of the tongue brushing	Biofilm persistence (green and vermillion index)
1st	Pediatric	1000	+ pea size	no	24	24″	Horizontal Circular	Yes	No	Poor/ Regular
2nd	Pediatric	1000	rice grain size	no	41	37″	Horizontal Circular	Yes	No	Regular/Good
3rd	Pediatric	1000	pea size	no	70.5	47″	Horizontal Circular	No	Yes	Regular/Regular
4th	Pediatric	1000	pea size	no	50	1 min	Horizontal Circular	No	Yes	Good/Good
5th	Pediatric	1000	pea size	no	50	1 min	Horizontal Circular	No	Yes	Good/Good
6th	Pediatric	1000	pea size	no	100	2 min	Horizontal Circular	No	Yes	Good/Good

The instruction of avoiding rinsing was reinforced, ensuring that from the third to the sixth session the patient did not rinse after toothbrushing.

The amount of biofilm was assessed using the Greene and Vermillion index, before and after the instructions in each of the sessions. In the first session the patient had a poor initial result. From the fourth session onwards, good results were achieved. (Figure 3)

In each session the brushing technique (horizontal) was recorded on video and on the OHST sheet file. Each of these items was evaluated to observe the evolution of the patient. (Table 2)

There were improvements in the amount of toothpaste used, integrity of brushed surfaces, sequence, total brushing time, tongue brushing, avoiding rinsing after tooth brushing, and in the oral hygiene index, in the six sessions.

DISCUSSION.

The OHST instructs the pediatric patient in a didactic and systematic manner. Currently, systematization has also been reported in adults, Schlueter*et al.*[12]

Deery *et al.*,[1] SIGN,[2] recommend the use of electric or manual brushes. In the present case report, the patient used a manual toothbrush.

The SIGN Guide,[2] and the Ministry of Health of Peru[20] recommend the use of fluoride toothpaste in concentrations greater than 1000ppm in children, in agreement with the one used by the patient. Denbesten *et al.*,[6] suggest the use of fluoride toothpaste the size

of a pea (0.25g) for children aged 4 to 5 years. In the present case, the patient used the amount of toothpaste equivalent to the size of the brush initially, and three sessions were required to correct it.

The type of brush grip used by the patient from the first session was distal oblique, which was reinforced based on the studies conducted by Sharma *et al*.,[7] and Pujar *et al*.[8]

Slot *et al*.,[11] recommend following a brushing sequence to achieve greater effectiveness in reducing biofilm (50% more). For this reason, the patient was instructed to follow an ordered sequence of tooth brushing, which was done from the fourth session.

Van Der Sluijs *et al*.,[9] found that pre-wetting a toothbrush does not affect the stiffness of the bristles or its cleaning capacity. For this reason, in the present case it was indicated not to pre-wet the toothbrush. Schlueter *et al*.,[12] reported the importance of iso-chronicity. The patient was instructed to perform isochronical brushing, starting from the fourth session.

Creeth *et al*.,[13] and Pujar *et al*.,[8] conclude that brushing for 2 minutes is more effective in reducing biofilm. The patient reached this goal in the sixth session.

The behavior of not rinsing with water after tooth brushing was incorporated from the third session. The clinical guidelines of the Ministry of Health of Peru[20] and SIGN 138[2] recommend spitting out the excess of toothpaste and not rinsing after toothbrushing. Winnier *et al*.,[18] found a significant reduction in the dental plaque index when brushing the tongue, and the patient incorporated this recommendation in the third session.

Sandstrom *et al*.,[23] evaluated the brushing behavior in children from 6 to 12 years of age by recording the visible bacterial plaque through photographs and using the Greene and Vermillion oral hygiene index, the same tool used in this case report.

Learning to perform optimal oral hygiene in school-age children requires several sessions. These achievements were made in 6 sessions.

Conflict of interests: All authors declare no conflict of interest.

Ethics approval: Informed consent was obtained from the child's guardian and approval was obtained from the Institutional Ethics in Research Committee CIEI-IMT "DAC" UNMSM, code CIEI - IMT - 16 – 2020.

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