

Assessment of Treatment for Functional Posterior Cross-bites in Patients at the Deciduous Dentition Phase

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The aim of this study was to clinically assess the results of treatment for functional posterior cross-bites by means of selective grinding in individuals at the deciduous dentition phase over a period of 12 months. From a total of 1,011 children examined in the 2-to-6-year age bracket, 26 with functional posterior cross-bites were selected. The sample was divided into 2 groups of 13 children each, group 1 receiving the treatment proposed and group 2 serving as the control group. Treatment was followed up by exercises designed to alter the children's muscular memory. The results showed that correction of functional posterior cross-bite was achieved for all the children treated, the correction remaining stable 12 months later. No self-correction of malocclusion occurred among the control group.

Key Words: cross-bite, occlusal adjustment, deciduous dentition.

INTRODUCTION

Most of the cross-bites encountered in deciduous dentition have a functional cause, the etiological factor being premature contact, normally located in the deciduous cuspids (1-5). Early intervention, at the deciduous dentition phase, could avert the formation of severe structural deformities in permanent dentition (6).

The treatment recommended for deflective contacts involves occlusal adjustment manipulating the patient's bite into a centric relation followed by a set of myo-functional exercises (2,3,7,8). When adjustment is insufficient to produce uncrossing of the bite, orthodontic treatment is prescribed, the type of appliance employed depending on the complexity of the case (9).

Grinding should be done at an angle of 45 degrees to the long axis of the tooth or at an angle of over 30 degrees producing incline planes that allow the

lower jaw to assume an adequate position. Selective grinding would produce a slight increase in the width of the maxillary arch and a slight reduction in the width of the mandibular arch. The pressure exerted on the incline planes would move the maxillary cuspids in a buccal direction and the mandibular ones in a lingual direction. When the width of the maxilla in the deciduous inter-canine and inter-molar regions is equal to or slightly greater than the width of the corresponding mandibular regions, grinding is recommended but in cases where the mandibular measurements are wider than those of the maxilla, mechanotherapy is preferable.

Posterior cross-bites are not self-correcting and should be treated as soon as they are diagnosed. The diagnosis of unilateral and bilateral cross-bites continues to be empirical and, in the absence of a reliable reference point for determining the correct lateral position of the mandible, use of an average line is question-

able.

During research of a method using occlusal grinding and incline resin bite-planes cemented to the dental cusps to correct unilateral cross-bite, Kantomaa observed that the width of the dental arch in the region of the first deciduous molars spontaneously increased 1.4 mm following treatment (10). Myers et al. noted that radiographic measurements of the articulation space indicated that functional posterior cross-bites among children affected the condylar position (11). This demonstrated that, prior to corrective treatment, both the vertical and the horizontal spaces measured were significantly smaller on the side where the cross-bite was located.

MATERIAL AND METHODS

Sample Selection

A sample of 26 children was selected from 18 municipal day-care centers and pre-schools in the city of Florianópolis (southern Brazil) following examination of 1,011 children in the 2-to-6-year-old age bracket (492 boys and 519 girls) (Table 1). The sample was divided into two groups: group 1 consisting of 13 children receiving treatment and group 2 comprised by 13 children serving as the control group. Children at the mixed dentition phase were excluded except in cases where the first permanent molars were in a state of infra-occlusion. Prior consent of parents or guardians was obtained for all the children before treatment commenced. The control group also received adequate treatment upon conclusion of the study.

Before selection of the sample, a letter of presentation from the Florianópolis Municipal Education Department was requested providing due institutional authorization for the study to be carried out. The educational establishments and the children participating in the study were chosen at random without the adoption of any prior criterion. Meetings were held with parents and guardians at all establishments involved in the study to explain the problem of malocclusion and to provide necessary information about how treatment of the children was to be performed.

Check-ups were made during two visits and were carried out by the main researcher, who selected cases of functional cross-bite for subsequent treatment.

The children were placed in a recumbent posi-

tion on a mattress always beside their teachers so as to obtain greater cooperation and to reduce anxiety. During the clinical examination, the examiner was positioned behind the children telling them to open and close their mouths in order to detect the presence of posterior cross-bites.

With the jaw positioned in a centric relation, the definitive diagnosis of malocclusion was made. The technique used was described by Dawson (12) and recommended by Celenza (13). This technique consists of bilateral manipulation with the child lying on his back with his head tilted back to avoid muscular action and his mouth open approximately 1 cm. Children who presented unilateral posterior cross-bites in the maximum habitual intercuspitation position (MHI) with mandibular deviation and when in centric relation no longer presented a cross-over condition but rather premature tooth contact were classified as suffering from functional posterior cross-bite and therefore considered apt to participate in the study. The personal details for each child in both groups were recorded during the first encounter.

Each patient was photographed in frontal norm in both the MHI position and in centric relation. Photographs were taken both prior to and 12 months after treatment.

Treatment

The treatment consisted of ten 30-min sessions for each child in group 1, 20 min being used for occlusal adjustment and 10 min for myo-functional exercises performed with the aid of a mirror. The parents or guardians were instructed to repeat the exercises at home for 5 min at least once a day (7).

The sessions were held weekly for patients from group 1. The control group attended only the initial session and another session at the end of the 12-month period, when treatment of the children in group 2 commenced.

Occlusion was registered on an Accu Film II® (Parkell, NY, USA) carbon tape, occlusal adjustment being achieved by selective grinding at any point of premature contact observed, as recommended by Kisling (7). High-speed water and air-cooled diamond 3215 and 3216 points (KG Sorensen, Denmark) were used. The technique employed for manipulation in centric relation was that proposed by Guichet, with only one

hand being placed on the child's chin to facilitate mandibular retrusion (14). The change in manipulation technique was due to operational difficulties.

After grinding, each patient received topical application of fluoride to prevent post-grinding sensitivity.

Assessment of Treatment

An initial assessment was made immediately upon completion of occlusal adjustment, subsequent assessments being carried out 6 and 12 months after treatment.

Final assessment consisted of a clinical examination and comparison of the initial (Figure 1) and final photographs (Figure 2). Treatment was considered to be successful when a child presented a normal transversal relation 12 months after treatment with absence of crossed or protruding teeth and no mandibular deviation

in the MHI position. The relation of the first permanent molars was disregarded in the assessment of the results.

RESULTS AND DISCUSSION

Premature contacts in functional posterior cross-bites occur mostly in the area of the deciduous cuspids (90%), and selective grinding has been recommended for treatment (2,4,5). According to Vigorito, when deciduous cuspids erupt, they present a tip-to-tip relation, provoking deviation of the mandible (15). The present study has found that premature contacts occur mostly in the cuspids (84%) followed by the deciduous molars (16%). No deflective contact was observed in the first deciduous molars.

Brandão suggested that, when grinding alone fails to correct deviation of the mandible, composite resin should be placed solely on the occlusal plane of the deciduous teeth (direct flat surfaces) to correct posterior cross-bites (16).

Despite the claims regarding a possible tendency to recidivist malocclusion following occlusal adjustment with periodic readjustments being required to allow unimpeded closure (17), this was not confirmed by the results obtained in the present study (Table 1).

Early treatment of cross-bites has been recommended

Table 1. Results of treatment of 2-6-year-old children (N=13 per group).

	Correction (%)	Readjustment (%) after 12 months	1 st permanent molar		
			Normal relation	Tip	Cross
Experimental group	100	0	13	0	0
	Spontaneous correction (%)		1 st permanent molar		
			Normal relation	Tip	Cross
Control group		0	0	1	12



Figure 1. Child with posterior cross-bite before treatment in the maximum habitual intercuspitation position (MHI).



Figure 2. Twelve months after treatment with absence of crossed or protruding teeth and no mandibular deviation in the MHI position.

by several researchers, stressing that correction at the deciduous dentition phase avoids severe structural deformities in permanent dentition. (3,6,18,19). Among the 13 children treated in the present study, all functional posterior cross-bites were corrected, no cuspal relation being observed in any dental element. Moreover, all previously unaligned average lines proved coincidental following treatment.

However, others do not recommend routine treatment of cross-bites in deciduous dentition because of the occurrence of spontaneous correction (20). No self-correction was detected among the control group in the 12 months under observation, nor was any spontaneous improvement of malocclusion observed, though perhaps a greater length of time is required for observation to obtain more detailed information on this aspect. The results of this study confirm the findings of Kutin and Hawes, who report that posterior cross-bites are not self-correcting (21) (Table 1).

The main difficulty encountered following correction of posterior cross-bites by selective grinding was in erasing the functional muscular memory. Some children required as many as 10 memorization exercise sessions, performed with the use of mirrors to visualize and stabilize the new occlusal status (3,13). The favorable results observed in this study may be due to the fact that the exercises were continued at home with the help and cooperation of the children's parents.

Total correction of posterior cross-bites (64%) was also achieved by Kurol and Berglund by means of selective grinding (22); however, they observed spontaneous correction in 45% of the cases studied. This high rate of self-correction was attributed to the elimination of sucking habits, which normalized transversal relations.

In the present study, 16% of the children were observed to suck feeding bottles, 23% sucked pacifiers, 31% sucked their thumbs and 16% bit their nails. These rates remained unaltered in both groups throughout the 12 months in which the children were under observation, regardless of advice as to the importance of eliminating such deleterious habits. One possible explanation for the lack of spontaneous correction in the control group is the fact that the attempts to make the patients abandon these habits during the period covered by the study were unsuccessful.

All the children in group 1 presented first permanent molars in normal transversal relation, both in the

maximum habitual intercuspitation position (MHI) and in centric relation. These findings are in agreement with those of others who reported a normal transversal relation in the first permanent molars in 84.3% (23), 91.4% (21), 100% (10) of their cases.

It is important to note that Thilander et al. reported a correction rate of only 27.2% for posterior cross-bites treated by selective grinding, compared to a 21.4% spontaneous correction rate for this type of malocclusion (8). This study covered a period of 8 years, so the children were observed from the deciduous to the permanent dentition phase. This might affect the results when compared with research confined to the deciduous dentition phase, as was the case of the present study, in which all the cases treated with selective grinding produced full correction and no cases of self-correction were observed.

RESUMO

O objetivo deste estudo foi avaliar clinicamente o resultado do tratamento das mordidas cruzadas posteriores de origem funcional, através de desgaste seletivo, em indivíduos na fase de dentição decídua, durante o período de 12 meses. Foram examinadas 1011 crianças, com idades entre 2 e 6 anos, selecionando-se 26 indivíduos que apresentavam mordida cruzada posterior funcional. A amostra foi dividida em 2 grupos de 13 crianças cada, sendo o grupo 1 o que recebeu o tratamento proposto e o grupo 2 servindo como controle. Após o tratamento, foram realizados exercícios com o objetivo de modificar a memória muscular da criança. Os resultados possibilitaram constatar que houve correção da mordida cruzada posterior funcional em todas as crianças tratadas, ocorrendo estabilidade da correção após 12 meses. O grupo controle não apresentou nenhum caso de autocorreção da maloclusão.

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