CHANGES IN ORAL FUNCTIONS IN PRESENCE OF FIXED ORTHODONTIC APPLIANCES WITH FEATURES INTRAORAL

Alterações de funções orais na presença de aparelhos ortodônticos fixos com recursos intraorais

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RESUMO

Objetivo: investigar as possíveis alterações de fala, mastigação e deglutição em usuários de aparelhos ortodônticos com recursos intraorais fixos no palato. **Método:** foram avaliados 28 pacientes de ambos os sexos, na faixa etária de 10 a 24 anos, em tratamento no Centro de Reabilitação Estética Orofacial em Campinas. Tais pacientes foram avaliados por fonoaudiólogas antes da colocação do aparelho e após trinta dias de uso de aparelho ortodôntico com recurso fixo. Todos os sujeitos foram avaliados previamente por ortodontistas e apresentaram indicação de colocação do recurso intraoral. O exame fonoaudiológico foi composto pela avaliação da mastigação, deglutição e fala, segundo protocolo especifico de motricidade orofacial, e de teste de fala na área de fonética. Os testes estatísticos aplicados foram: Teste de ANOVA, teste T-Student Pareado, Teste de Igualdade de duas proporções e Intervalo de Confiança para a média. Foram considerados significantes associações com p-valor < 0,05 . **Resultados:** para a amostra analisada, não houve alterações de mastigação e deglutição estatisticamente significantes após um mês de uso dos aparelhos selecionados. Na fala, 64,3% da amostra não apresentou alterações, mas em 25% dos pacientes observou-se a presença de distorção de grupos consonantais na presença de aparelhos do tipo disjuntor. **Conclusão:** o uso de aparelhos fixos com recursos intraorais, provoca modificações estatisticamente significantes somente na fala.

DESCRITORES: Fala; Mastigação; Deglutição; Ortodontia

INTRODUCTION

Functions performed by the hard and soft structures of the oral cavity and surrounding regions have vital importance for humans since it involves the feeding process[1]. Among these functions, chewing is the phenomenon that aims the mechanical degradation of food, through its crushing and grinding, degrading them even in smaller particles[2]. Chewing is a complex physiological process involving neuromuscular and digestive activities[3]. It can be considered as a functional unit and its components are: dentition, periodontal structures supporting maxillary and mandibular, temporomandibular joints, masticatory muscles and lips, cheeks and tongue, soft tissue lining the hard structures, as well the innervation and vasculature that supplying those components[3,4]. To develop the chewing effectively, it is important that all those structures involved in this activity are intact[5].

The alternated bilateral chewing is considered as the physiologically ideal for human. This pattern enables the distribution of masticatory force

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interspersing work and rest, promotes muscular and functional synchrony and balance, stimulates the development and/or maintenance of dental arches and occlusal stability [2]. But in more recent research, it was concluded that healthy people, without any structural oral alteration, may have chewing preference on one side (right or left) without compromising in facial growth.

The most common changes found in chewing are: open mouth, presence of noise, excessive muscle periorbicular participation, interposition of lips and chewing time, among others. After chewing, the process of swallowing starts, which role is the propulsion of the bolus of food and liquids from the mouth to the stomach[1,6]. It is a very complex neuromuscular activity that begins consciously and during the process there is integration of the central nervous system, which organizes the nerve impulses in the center of swallowing[6].

Swallowing process can be divided according to the anatomical and functional characteristics: oral, pharyngeal and esophagus-gastric. The oral phase of swallowing, which was the phase evaluated in this research, can be subdivided into the stages of preparation, qualification, organization and ejection[7,8]. The preparation occurs when the food is mixed with saliva and crushed by chewing. Qualification, which starts in association with the previous stage, identifies the bolus in its volume, consistency, density, humidification and several physical and chemical characteristics that matter for proper interaction with the bolus. During the organization, this bolus is usually placed on the dorsum of the tongue. Articular musculoskeletal structures, responsible for mouth morpho-functionality, organize themselves for the ejection that is accomplished by adjusting the oral walls and posterior projection of the tongue, creating propulsive pressure, conducting the bolus and transferring pressure to the pharynx[6-9].

The changes found in the oral phase of swallowing were classified as atypical[6]. But currently, these changes in swallowing may be considered as atypical or adapted. When there is an anatomical change, the structures can adapt themselves enabling the swallowing. So if there is malocclusion, the stomatognathic system keeps the functions, but fits itself to the existing changes. Therefore the adapted swallowing will be changed according to some physical alteration, presence of patterns and habits of the patient's family. If the change is not a consequence of other factors that interfere with swallowing (breathing, age, malocclusion, family habits and patterns, among others), it will be considered only as an inappropriate habit, and therefore classified as atypical swallowing[6,9].

Speech is a function assigned as a unique characteristic of human being, resulting from a complex interaction between innate biological capacities and environmental stimulation. It is a complex activity that includes the participation of the central nervous system and phonoarticulatory system of origin neuromuscular, where the stomatognathic system plays a fundamental role in this process[10,11]. Therefore, changes in this system (regardless of cause) may influence the quality and accuracy of articulatory sounds, and such etiological factors will cause phonetic changes. In contrast, a study conducted with children who had dental crowding and feeding pasty indicated that distortions in speech are not related to occlusion[11]. This study was in agreement with previous research that linked malocclusion and changes in speech.

Considering that the presence of physical changes in the oral cavity may generate changes in oral functions, as shown here so far, the presence of orthodontic appliances with fixed intraoral devices in palate may also result in changes in chewing, swallowing and speech. Devices like the transpalatal bar (steel wire that surrounds the hard palate, attached or embedded in the bands of the molars), breaker (which main function is to correct maxillary atresia) and expander (fixed device that promotes the slow expansion of the alveolar processes)[12] are widely used during orthodontic treatment and had the highest occurrence in this study.

Recent reports regarding the speech with the use of appliances (lingual brackets and palatal plate)[12-19] reported that after a maximum of seven days use of the devices, speech disorders, but some phonemes, were solved. Others have reported that the longer the duration of the orthodontic treatment, the greater the tendency of changes in chewing, but the same is not true for speech and swallowing[17].

The concern of the health professionals involved in this area should turn to the possible functional changes that may occur during orthodontic treatment with intraoral use of devices mentioned above. As there is controversy in the literature regarding this theme, this study aimed to investigate the possible changes in speech, chewing and swallowing in people using orthodontic appliances with fixed devices (intraoral) on the palate.

METHOD

This research is characterized as a longitudinal prospective, in which 28 patients (male and female) aged 10 to 24 years were evaluated. These patients were undergoing treatment at the Rehabilitation Center for Orofacial Aesthetic of Campinas – CEREO. They were evaluated by speech therapists

before placing the orthodontic appliance and after thirty days using it with the fixed intraoral device. Following devices were used: transpalatal bar (BTP), lingual arch, breaker, expander and grid lingual spur.

As inclusion criteria, the individuals should be patient of this same institution and have the indication of using the intraoral device by the orthodontist. Exclusion criteria were: people with any hearing, neurological and cognitive deficits, and patients with no frontal teeth (incisors). The phono-audiological test was composed by chewing and swallowing evaluation using the changes features of the specific orofacial motricity protocol – MBGR[20] (Figure 1), and verifying the presence or absence of these changes.

Speech was evaluated by a list of words and pictures taken from ABFW[21] protocol. For chewing evaluation a solid food was used (wafer biscuit covered with milk chocolate) following the same protocol, in which standardized portions of the same food were offered and patients were oriented to chew naturally. The choice of this food was due to the low cost, easy acceptance by the patients and longer shelf[3]. Following items were observed: incision, crushing, number of cycles, lip closure, chewing pattern, speed, noise, atypical muscle contractions and preferred side.

Swallowing examination was performed initially using the same solid food, analyzing several items, such as lip closure, tongue posture, lower lip position, contraction of orbicularis, chin and neck muscles and head movement. Then the liquid was offered to the patient. At the first time it should be swallowed as usual and at the second time the patient was oriented to put the liquid in your mouth, take the glass out of the lips and then swallow. Those tests permitted a better visualization of swallowing.

All evaluations were documented on video, in which the camera (Sony Carl Zeiss lens with 7.2 Mega Pixels) was placed one meter and half away from the patient and supported on a tripod. Observational assessment of the videos was done by at least two speech therapists with experience in orofacial motricity.

All characters stated during observation that did not correspond to the normal range were considered as changes. At the swallowing evaluation the following items were analyzed: projected head, excessive contraction of periorbicular muscles, lips and/or tongue interposal, cheeks inflation and excessive noise. At the chewing evaluation, the changes observed were: non lip closure, excessive contraction of periorbicular muscles, simultaneous bilateral or unilateral chewing, lingual kneading, reduced number of chewing cycles.

At the speech evaluation ABFW test was used to assess the phonetic of the patients. The word list of ABFW protocol was used for phonetic evaluation in which the patient executed imitation, nomination and spontaneous conversation[21]. Phone omissions, substitutions and distortions were considered as changes in the speech.

Data obtained in this study are presented in graphs. All the patients signed an Informed Consent Form. The study was evaluated and approved under the number 058/09 by the Ethics Committee of CEFAC – Centre of Specialization in Clinical Speech. Statistical tests applied were ANOVA test, Student's paired t-test, test for Equality of Two Proportions and confidence interval for the average. Associations were considered significant with p-value <0.05.

RESULTS

The mean age of the patients was 14.50, with a standard deviation of 3.51. Of them, 17 were female and 11 male. Figure 2 represents the distribution of types of devices.

Table 1 is presented below, containing the comparisons of speech evaluation before and after thirty days of placing the intraoral device.

Significantly statistical differences were found between both evaluation periods for the distortion and SA distributions. In case of distortion there was an increase from 0% to 14.3%. For SA there was a reduction from 100% to 67.9%. Results for the distribution of chewing change are described below (Table 2).

Regarding the characterization of the qualitative variables results, the distribution of swallowing changes in the first, second and third tests are described below (Tables 3, 4 and 5).

No statistical differences were observed between both evaluation periods for the relative frequency distributions for the parameters of chewing and swallowing evaluations. Table 6 shows the relationship of intraoral devices with the changes in the chewing and swallowing functions (1st, 2nd and 3rd tests).

Although there are differences in the means between devices in all tests, they are not statistically significant. It is worthy to note that only some levels of response were shown for the analysis of relationships, because many devices were extremely low sampled (1, 2 or 3 occurrences). Thus, only those more prevalent were selected.

Chewing: □ **appropriate** □ **amended:** *origin [ ] functional [ ] anatomical [ ] articular [ ] others*_____

Usual Chewing
Incision: (0) anterior (1) lateral (1) other
Grind: (0) posterior teeth (0) efficient
(1) anterior teeth (1) inefficient
(1) used tongue
Chewing Pattern: (0) bilateral alternated
(0) unilateral preferential: ___
(1) bilateral simultaneous
(2) cronic unilateral: ___
Labial sealing: (0) systematic (1) unsystematic (2) absent
Speed: (0) appropriate (1) increased (1) decreased
Noise: (0) absent (1) present
Atypical Muscles Contractions: (0) absent (1) present *(describe)*:
_____
Others: _____

Swallowing: □ **appropriate** □ **amended:** *origin [ ] functional [ ] anatomical [ ] articular [ ] others*_____
1ª Proof *(habitual of solids)*
Labial sealing: (0) appropriate (1) parcial (2) absent
Tongue position: □ can't see (0) behind the teeth (1) against the teeth (2) between the teeth
Lower Lip Position:(0) touch with superior (1) behind the upper incisors **Containment of food:**(0) appropriate (1) parcial (2) inadequate
Contraction of Orbicularis:(0) appropriate (1) few (2) pronounced
Mentalis Contraction:(0) absent (1) few (2) pronounced
Cervical Musculature Contraction: (0) absent (1) few (2) pronounced
Head Movement: (0) absent (1) present
Noise: (0) absent (1) present
Coordination: (0) appropriate (1) choking (1) cough
Residue after swallowing: (0) absent (1) present
Observations: _____

2ª Proof*(habitual of liquids - water)*
Tongue position: □ can't see (0) behind the teeth (1) against the teeth (2) between the teeth
Lower Lip Position:(0) touch with superior (1) behind the upper incisors
Containment of Liquid:(0) appropriate (1) inadequate
Liquid Volume: (0) satisfactory (1) increased (2) decreased
Contraction of Orbicularis:(0) appropriate (1) few (2) pronounced
Mentalis Contraction:(0) absent (1) few (2) pronounced
Cervical Musculature Contraction: (0) absent (1) few (2) pronounced
Head Movement: (0) absent (1) present
Noise: (0) absent (1) present
Rhythm: (0) sequential (1) one sip at a time
Coordination: (0) appropriate (1) choking (1) cough
Observations: _____

3ª Proof *(directed liquid) Put some water into your mouth and swallow it onlyafter the order from the appraiser*
Labial sealing: (0) appropriate (1) parcial (2) absent
Tongue position: (0) behind the teeth (1) against the teeth (2) between the teeth
Lower Lip Position:(0) touch with superior (1) behind the upper incisors **Containment of Liquid:**(0) appropriate (1) partial (2) unappropriate
Contraction of Orbicularis:(0) appropriate (1) few (2) pronounced
Mentalis Contraction:(0) absent (1) few (2) pronounced
Cervical Musculature Contraction: (0) absent (1) few (2) pronounced
Head Movement: (0) absent (1) present
Noise: (0) absent (1) present
Coordination: (0) appropriate (1) choking (1) cough
Observations: _____

Figure 1 – Speech Pathology exam –MGBR Protocol

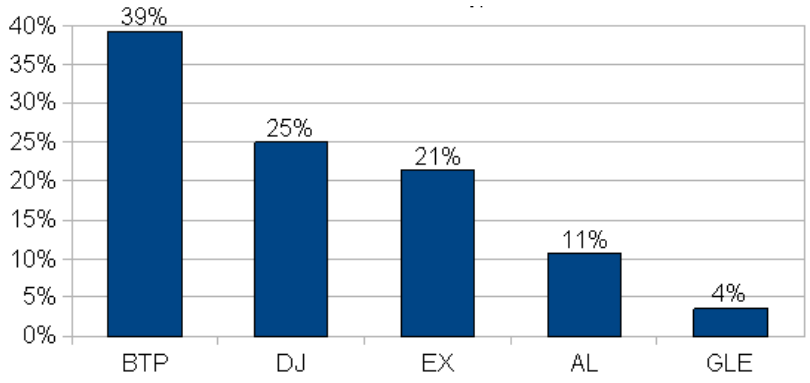
DISCUSSION

Current orthodontic practices aims to reduce the need for patient cooperation, through development of devices that operate more efficiently in orthodontic/orthopedic corrections causing less discomfort[22]. To select the device best suited to orthodontic treatment, the orthodontist assesses mainly the growth potential of the patient and the possible degree of cooperation during treatment. Thereby treatment is more efficient with the right choice of devices to orthodontic treatment[22]. According to the case, orthodontists may apply intraoral devices that cause speech, chewing and swallowing changes.

Maciel et al[23] assessed the need of speech therapy in patients treated in the orthodontic clinic of the Federal University of Juiz de Fora and verified that 92% of those had changes in chewing and swallowing, and 52% had some speech dysfunction. The longer the duration of orthodontic treatment, the greater the tendency of patients to present changes in chewing, tough this correlation was not found for swallowing and speech.

Patients using acrylic plate[17,18] and lingual braces[14,15] had speech disorders during the first month of use because there were changes in anatomical configuration of the oral cavity, as well as the points of consonant phonemes articulation. The palatal plate, for example, can even change the posture and movements of the intrinsic muscles of the tongue and thus change the mobility of the tongue (vibration and popping). The single phoneme which continued changed after the first month of lingual braces use was the vibrant [r]. The same occurs for that using functional orthopedic devices[19]. There are changes of speech and swallowing during use of those devices, and in some cases there is need of functional adaptations for speech and swallowing.

Even the brackets (lingual and labial) of orthodontic devices may cause discomfort for its users[13]. Complaints like sores on the tongue, cheek and lips, difficulty for eating, speaking and oral



Legend: BTP: Transpalatal Bar; DJ: Breaker; EX: Expander; AL: Lingual Arch; GLE: Grid Lingual Spur

Figura 2 – Distribuição de tipo de aparelho

Table 1 – Compares moments to distribution of speech disorders

Speech disorders	Before		After		P-value
	N	%	N	%	
SA	0	0%	1	3,6%	0,313
DFA	0	0%	1	3,6%	0,313
DG	0	0%	1	3,6%	0,313
Distortion	0	0%	4	14,3%	0,038
DPP+DFAD+DG	0	0%	1	3,6%	0,313
Worsening in hiponasality and improvement in frontal lisp for /s/ and /z/	0	0%	1	3,6%	0,313
SA	28	100%	19	67,9%	0,001

Legend: SA: No disorders; DPP: distortion of posterior plosives phonemes; DFAD: distortion of dental anterior fricatives phonemes; DG: group distortion; DFA: distortions of anterior phonemes. Equality of two proportions test.

Table 2 – Compares moments to chewing distribution

Chewing		Before		After		P-value
		N	%	N	%	
CMA	R0	16	57,1%	19	67,9%	0,408
	R1	12	42,9%	9	32,1%	0,408
FL	R0	26	92,9%	26	92,9%	1,000
	R1	2	7,1%	2	7,1%	1,000
I	R0	27	96,4%	26	92,9%	0,553
	R1	1	3,6%	2	7,1%	0,553
PM	R0	17	60,7%	17	60,7%	1,000
	R1	8	28,6%	7	25,0%	0,763
	R2	3	10,7%	4	14,3%	0,686
R	R0	25	89,3%	25	89,3%	1,000
	R1	3	10,7%	3	10,7%	1,000
T	R0	25	89,3%	25	89,3%	1,000
	R1	3	10,7%	3	10,7%	1,000
V	R0	24	85,7%	24	85,7%	1,000
	R1	4	14,3%	4	14,3%	1,000

Legend: CMA: Atypical Muscles Contractions; FL: Labial sealing; I: Incision; PM: Chewing Pattern; R: Noises; T: Grind; V: Speed; R0: 1º. Moment; R1: 2º. Moment. Relative Frequency Distribuition.

Table 3 – Compares moments of swallowing distribuition 1ª proof

Swallowing 1ª Proof		Mean	Median	Standard Deviation	N	IC	P-value
FL	Before	0,07	0,0	0,38	28	0,14	0,326
	After	0,11	0,0	0,42	28	0,15	
PLI	Before	0,18	0,0	0,39	28	0,14	0,663
	After	0,21	0,0	0,42	28	0,15	
CA	Before	0,00	0,0	0,00	28	- x -	1,000
	After	0,00	0,0	0,00	28	- x -	
CO	Before	1,00	1,0	0,82	28	0,30	0,490
	After	1,07	1,0	0,81	28	0,30	
CM	Before	0,96	1,0	0,74	28	0,28	0,490
	After	1,04	1,0	0,74	28	0,28	
CMC	Before	0,36	0,0	0,56	28	0,21	0,161
	After	0,29	0,0	0,53	28	0,20	
MC	Before	0,14	0,0	0,36	28	0,13	0,573
	After	0,18	0,0	0,39	28	0,14	
R	Before	0,00	0,0	0,00	28	- x -	1,000
	After	0,00	0,0	0,00	28	- x -	
C	Before	0,00	0,0	0,00	28	- x -	1,000
	After	0,00	0,0	0,00	28	- x -	
Total	Before	2,71	3,0	2,19	28	0,81	0,485
	After	2,89	3,0	2,23	28	0,83	

Legend: FL: Labial Sealing; PLI: Lower Lip Position; CA: Containment of food; CO: Contraction of Orbicularis; CM: Mentalis Contraction; CMC: Cervical Musculature Contraction; MC: Head Movement; R: Noise; C:Coordination. Student's t-test

Table 4 – Compares moments for swallowing distribution 2ª proof

Swallowing 2ª Proof		Mean	Median	Standard Deviation	N	IC	P-value
PLI	Before	0,04	0,0	0,19	28	0,07	1,000
	After	0,04	0,0	0,19	28	0,07	
CL	Before	0,00	0,0	0,00	28	- x -	1,000
	After	0,00	0,0	0,00	28	- x -	
VL	Before	0,14	0,0	0,36	28	0,13	0,573
	After	0,11	0,0	0,31	28	0,12	
CO	Before	0,46	0,0	0,64	28	0,24	0,212
	After	0,61	0,0	0,74	28	0,27	
CM	Before	0,54	0,5	0,58	28	0,21	0,031
	After	0,75	1,0	0,75	28	0,28	
CMC	Before	0,11	0,0	0,31	28	0,12	1,000
	After	0,11	0,0	0,31	28	0,12	
MC	Before	0,04	0,0	0,19	28	0,07	0,083
	After	0,14	0,0	0,36	28	0,13	
R	Before	0,07	0,0	0,26	28	0,10	1,000
	After	0,07	0,0	0,26	28	0,10	
RI	Before	0,07	0,0	0,26	28	0,10	1,000
	After	0,07	0,0	0,26	28	0,10	
C	Before	0,00	0,0	0,00	28	- x -	1,000
	After	0,00	0,0	0,00	28	- x -	
Total	Before	1,46	1,0	1,55	28	0,57	0,110
	After	1,89	1,5	1,81	28	0,67	

Legend: C: Coordination; CL: Liquids Containment; CM: Mentalis Contraction; CMC: Cervical Musculature Contraction; CO: Contraction of Orbicularis; MC: Head Movement; PLI: Lower Lip Position; R: Noise; RI: Rhythm; VL: Liquid Volume; R0: 1º. Moment; R1: 2º. Moment. Student's t-test

Table 5 – Compares moments for swallowing distribution 3ª proof

Swallowing 3ª Proof		Mean	Median	Standard Deviation	N	IC	P-value
FL	Before	0,07	0,0	0,38	28	0,14	1,000
	After	0,07	0,0	0,38	28	0,14	
PLI	Before	0,07	0,0	0,26	28	0,10	1,000
	After	0,07	0,0	0,26	28	0,10	
CL	Before	0,00	0,0	0,00	28	- x -	1,000
	After	0,00	0,0	0,00	28	- x -	
CO	Before	1,07	1,0	0,72	28	0,27	0,103
	After	0,93	1,0	0,72	28	0,27	
CM	Before	0,82	1,0	0,72	28	0,27	0,326
	After	0,75	1,0	0,70	28	0,26	
CMC	Before	0,21	0,0	0,42	28	0,15	0,161
	After	0,14	0,0	0,36	28	0,13	
MC	Before	0,11	0,0	0,31	28	0,12	0,326
	After	0,07	0,0	0,26	28	0,10	
R	Before	0,04	0,0	0,19	28	0,07	0,326
	After	0,00	0,0	0,00	28	- x -	
C	Before	0,00	0,0	0,00	28	- x -	1,000
	After	0,00	0,0	0,00	28	- x -	
Total	Before	2,39	2,0	1,71	28	0,63	0,030
	After	2,04	2,0	1,77	28	0,66	

Legend: C: Coordination; CL: Liquids Containment; CM: Mentalis Contraction; CMC: Cervical Musculature Contraction; CO: Contraction of Orbicularis; FL: Labial Sealing; MC: Head Movement; PLI: Lower Lip Position; R: Noise; R0: 1º. Moment; R1: 2º. Moment. Student's t-test

Table 6 – Compares appliances to mean total gain

Appliance Type		Mean	Median	Standard Deviation	Min	Max	N	IC	P-value
Swallowing 3ª Proof	BTP	-0,11	0	0,33	-1	0	9	0,22	0,099
	DJ	-0,14	0	0,38	-1	0	7	0,28	
	EX	-0,60	-1	0,55	-1	0	5	0,48	
Swallowing 2ª Proof	BTP	0,22	0	1,09	-2	2	9	0,71	0,521
	DJ	1,00	0	2,16	-1	5	7	1,60	
	EX	0,20	0	0,45	0	1	5	0,39	
Swallowing 1ª Proof	BTP	0,44	0	0,73	0	2	9	0,47	0,203
	DJ	0,43	0	1,27	-1	3	7	0,94	
	EX	-0,60	0	1,34	-3	0	5	1,18	
Chewing	BTP	-0,11	0	0,60	-1	1	9	0,39	0,280
	DJ	-0,14	0	0,38	-1	0	7	0,28	
	EX	0,40	0	0,89	0	2	5	0,78	

Legend: BTP: Transpalatal Bar; DJ: Breaker; EX: Expander; Analysis of Variance – ANOVA

care, adaptation period and general problems were analyzed. Patients with lingual devices had greater difficulty, with sores on the tongue and speech difficulties that have not disappeared in at least 23% of them after three months of treatment. In contrast the patients with labial devices also had these problems but they disappeared in about 30 days.

Stamm et al[14] compared the effect of two lingual brackets systems regarding to oral comfort, speech, chewing and oral hygiene. For that, 42 native German speakers completed questionnaires immediately after insertion of lingual brackets, 24 hours and three months later. Of this group, 18 patients were treated with prefabricated brackets and 24 with customized brackets. The group using customized brackets had fewer problems with speech, chewing, space for the tongue and oral care. In addition there was less sores and lesions on the tongue in this group.

Another study aimed to compare the oral discomfort between two groups who used different techniques of positioning lingual brackets. For this purpose, a questionnaire applied on a 24 hour period of use of the device and three months later. In this questionnaire the following items were evaluated: oral discomfort, difficulty in oral functions, and professional qualifications. Both groups reported problems of space in the oral cavity for the tongue, as well as the frequent wound therein. They also reported difficulties in speaking, chewing and swallowing, but a significant improvement over a period of three months[15].

Recent studies confirmed that the individualized lingual brackets, launched recently, provides greater comfort and easiness in speaking, compared with the traditional technique lingual brackets. According to the authors, the lingual technique has some disadvantages such as the restriction of space and position of the tongue, mastication and oral hygiene[24].

This present research corroborates with those studies in which changes in speech, chewing and swallowing of patients using orthodontic/orthopedic appliances, and that after a month of use the vast majority of patients evaluated showed no changes,. It was observed that most of the individuals tested showed no speech disorder, swallowing and chewing after 30 days of using the intraoral device.

All intraoral appliances used by orthodontists produce changes in oral functions, because they behave like a foreign body within a system already constituted[19]. That's because the device will occupy a space within the oral cavity, reducing the intraoral vertical dimension, undermining movements of the tongue[17]. Therefore, device users will have to adapt to these resources and, as observed, it happens after the first month of use. It is also observed that 25% of this sample were using breaker devices, which are big appliances that may affect the articulation of the phonemes, as well as chewing and swallowing.

Among the oral functions, speech was one that had the greatest number of changes, specifically on that using breaker. That's because during the speech, particularly in the production of consonants, precise and fine movements of the articulators active (tongue, lips and palate) in the oral cavity are necessary. In the presence of a foreign body, these movements are reduced. To date, the most found change was distortion of consonantal groups. These are meetings of two consonants without the presence of a vowel intermediate, in which very precise and followed movements are required to its production. Then when appliances which are pivot points of these segments consonant are used

there will be distortion, corroborating with the results found in this study.

Regarding to other oral functions, few changes were found within 30 days of intraoral device use. It was observed then an adaptation of the stomatognathic system to the presence of the device. Therefore, the functions of chewing and swallowing remained unchanged compared to the first evaluation.

An interdisciplinary work between odontology and speech therapy has as goal to solve the problems of people seeking treatment specifically of stomatognathic system[25]. Patients using such devices are often referred to speech therapists. Therefore, that is the importance of studying whether there are changes in some functions, what would be those changes and whether there is adaptation of the stomatognathic system in the presence of intraoral devices. New researches involving specific types of devices (such as expander and breaker) and data collection immediately and/or a few days after placing the device are important to identify the adaptation time and the changes that each intraoral device may cause.

Thus, speech therapy can help with an intervention and/or orientation protocol to patients and orthodontists aiming to anticipate the possible changes that may occur during the process of adaptation and the time needed for that. Orientation process should be adopted prior to placement of intraoral device, in particular about potential changes and alterations in speech. This orientation will contribute to not create false expectations for the patient and consequently the changes will be better accepted.

CONCLUSION

From the results obtained it is concluded that:

1. There were statistically significant changes in speech only in the presence of the breaker device.
2. There were no statistically significant changes in the functions of chewing and swallowing.

ABSTRACT

Purpose: to investigate possible changes in speech, chewing and swallowing in users orthodontic appliances with features (intraoral) fixed on the palate. **Method:** a total of 28 patients of both sexes, in the 10-24 age-group, were evaluated. These patients were being treated at the CEREO — Centro de Reabilitação Estética Orofacial (Aesthetic and Orofacial Rehabilitation Center) in Campinas, São Paulo. They were evaluated by speech therapists before they had their orthodontic appliances installed and also 30 days after they were using these appliances with feature. All subjects were previously evaluated by orthodontists from the CEREO and were candidates to the installation of intraoral features. The speech therapist's test was composed of two parts: the first was the evaluation of chewing, swallowing and speech, according to the MBGR protocol and the second was a phonological evaluation of language. The statistical tests applied were: Two Proportions Equality Test, Chi-Square Test for Independence. We considered significant the associations with p-value <0.10. **Results:** for the sample analyzed, there were no statistically significant changes in chewing and swallowing after one month of use of intraoral features. In speech, 64.3% of the sample did not change, but in 25% of the patients it was observed a distortion of consonant clusters in the presence of circuit breaker type appliances. **Conclusion:** the use of fixed orthodontic appliances with intraoral features causes statistically significant changes only in speech.

KEYWORDS: Speech; Mastication; Deglutition; Orthodontics

REFERENCES

1. Douglas CR. Fisiologia da Deglutição. In:Douglas CR. Fisiologia normal e patológica aplicada à odontologia e fonoaudiologia. São Paulo: Pancast; 1998.p. 273-87.
2. Pastana SG, Costa SM, Chiapetta ALML. Análise da mastigação em indivíduos que apresentam mordida cruzada unilateral na faixa etária de 07 a 12 anos. Rev. CEFAC. 2007;9(3):351-7.
3. Whitaker ME, Júnior AST, Genaro, KF. Proposta de protocolo de avaliação clínica da função mastigatória. Rev. CEFAC. 2009;11(3):311-23.
4. Silva MC, Costa MLCVM, Nemr K, Marchesan IQ. Frênulo de língua alterado e interferência na mastigação. Rev. CEFAC. 2009;11(3):363-9.
5. Lucend CV, Silva HJ. Mastication: phisiology and development aspects.Rev. Neurobiologia. 2011;74(2):139-44.
6. MARCHESAN, I. Q & JUNQUEIRA, P. Atipia ou adaptação: como considerar os problemas da deglutição? In: Junqueira P. & Dauden ATBC. Aspectos atuais em terapia fonoaudiológica. São Paulo, Pancast,1998. p. 11-23.
7. Yamada EK, Siqueira KO, Xerez D, Koch HA, Costa MMB. A influência das fases oral e faríngea na dinâmica da deglutição. Arq Gastroenterol. 2004;41(1):18-23.
8. Silva LM. Disfagia orofaríngea pós acidente vascular encefálico no idoso. Rev. Bras. Geriatr. Gerontol. 2006;9(2):93-106.
9. Marchesan IQ. Deglutição: diagnóstico e possibilidades terapêuticas. In: Marchesan IQ. Fundamentos em Fonoaudiologia: aspectos clínicos da motricidade oral. Rio de Janeiro: Guanabara Koogan; 1998.p. 51-8.
10. Douglas CR. Fisiologia da Fala. In:Douglas CR. Fisiologia normal e patológica aplicada à odontologia e fonoaudiologia. São Paulo: Pancast; 1998.p. 323-37.
11. Pena CR, Pereira MMB, Bianchini EMG. Alimentação, apinhamento dentário e fala. 2008; Rev CEFAC.10(1):58-67.
12. Junior PA, Sousa JEP. Utilização do aparelho expander para correção das atresias maxilares. Rev Dental Press. 2007;6(5):69-75.
13. Caniklioglu C, Öztürk Y. Patient discomfort: a comparison between lingual and labial fixed appliances. The Angle Orthodontist. 2004;75(1): 86-91.
14. Stamm T, Hohoff A, Ehmer U. A subjective comparison of two lingual bracket systems. Eur J Orthod. 2005;27:420-6.
15. Stamm T, Hohoff A, Ehmer U. Comparison of the Effect on Oral Discomfort of Two Positioning Techniques with Lingual Brackets. The Angle Orthod. 2004;74(2):226-33.
16. Martinez H, Mora E, Prato R. Influencia de los aparatos dentalis ortodônticos emla produccion y percepcion del habla. Rev. CEFAC. 2006;8(4):467-9.
17. Rodrigues AC, Turra GS, Pires MH, Senandes NC, Chiappetta ALML. A influência do uso de cobertura palatina acrílica na cavidade oral.Rev. CEFAC. 2004;6(1):29-33.
18. Villanueva P, Lizana ML, Huber H, Morán D, Fernández MA, Palomino HM. Modificaciones em La articulación de fones em pacientes com aparato ortodôntico fijo lingual. Rev. CEFAC.2007;9(4):483-9.
19. Matsuoka E, Santos DAG, Marchesan IQ. Padrões de fala e deglutição em usuários de aparelho ortopádico funcional com e sem o uso do aparelho.Rev. CEFAC. 2006;8(2):198-204.
20. Marchesan IQ, Berretin-Felix G, Genaro KF, Rehder MI. Exame Miofuncional Orofacial – MBGR. Rev. CEFAC. 2009;11(2):237-55.
21. Andrade CRF, Befi-Lopes BM, Fernandes FDM, Wertzner HF. Teste de Linguagem Infantil: Nas Áreas de Fonologia, Vocabulário, Fluência e Pragmática -ABFW. São Paulo: Pró-fono; 2000.p.5- 40.
22. Quaglio CL, Henriques RP, Henriques JFC, Freotas MR. Classe II divisão 1 associada à deficiência transversal maxilar. Tratamento com disjuntor tipo Hyrax e aparelho de Herbst: relato de caso clínico. Rev Dental Press. 2009;14(5):118-28.
23. Maciel CTV, Barbosa MH, Toldo CA, Faza FCB, Chiappetta ALML. Disfunções orofaciais nos pacientes em tratamento ortodôntico. Rev. CEFAC. 2006;8(4):456-66.
24. Araújo AM, Silva FO, Ursi WJS, Werneck EC. Conforto e fonação com a nova geração de braquetes ortodônticos linguais individualizados. Rev. CEFAC. 2009;11(4):701-7
25. Amaral EC, Bacha SMC, Ghersel ELA, Rodrigues PMI. Inter-relação entre odontologia e fonoaudiologia na motricidade orofacial. Rev. CEFAC. 2006;8(3):337-51.

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