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Electromyographic evaluation during orthodontic therapy: comparison of two elastodontic devices

Introduction

Neuromuscular orthodontics is assuming increasingly significant clinical and scientific roles in dentistry. the use of surface electromyography (sEMG) and kinesiography can be of fundamental. Initially employed for the treatment of temporomandibular disorders (TMDs), this approach have proven to aid the planning, control of the therapy, and remote control of orthodontic treatments. The evaluation of muscle activity can support the determination of the mandibular and cranial growth vectors in the treatment of TMDs and in follow-up management to reduce the risk of recurrence after orthodontic therapy. Nowadays, orthodontic therapies with elastodontic appliances are spreading a lot. There is a complete array of activators for every type of mouth, according to the skull conformation, body features, and dental arch shape. The hypothesis was that soft appliances should be more comfortable for the patient.

Methods

Eighty-two patients aged 7–11 years were clinically examined at the Dental Clinic of the University of L'Aquila, Italy. The same clinician performed all examinations, which included the acquisition of dental panoramic radiographs, extraoral and intraoral photographs, and alginate impressions of both dental arches. Based on these data, the orthodontist created a treatment plan specific to each patient according to the index of orthodontic treatment needs described by Brook and Shaw. The following exclusion criteria were applied: presence of epilepsy, systemic disease, TMD, or periodontal disease; and lack of written informed consent from a parent or legal guardian. The inclusion criteria were: skeletal and dental class II malocclusion (divisions 1 and 2) and deep bite. Ultimately, 66 patients aged 7–11 years were enrolled in the study and divided into the test and control groups. The test group comprised 36 patients (18 male, 18 female; mean age, 9.19 ± 1.43 years) treated with the Eptamed device. The control group comprised 30 patients (15 male, 15 female; mean age, 9.16 ± 1.41 years) treated with the another brand device. The two groups exhibited the same orthodontic features. All patients underwent sEMG analysis, with muscle tone evaluated with the eyes closed, at baseline (T0; prior to the initiation of orthodontic therapy) and 6 months after treatment initiation (T1). Registration of Scan 9, which shows the activity of the muscles (masseters, anterior digastrics, sternocleidomastoid, and anterior temporalis) in the resting position, was performed at both timepoints.

Results

Statistical significance was set at $p \leq 0.05$. Data are presented as mean (standard deviation). Eptamed vs. another brand device, unpaired t test. Although values for the right and left sides showed improvement in patients treated with the Eptamed device relative to those treated with the another brand device, no difference was significant at T0 or T1. From T0 to T1, the sum of sEMG values changed from 15.1 to 14.9 μV in the test group and from 15.2 to 15.5 in the control group; these differences were not significant.

	T0			T1		
	Eptamed	[redacted]	p-value	Eptamed	[redacted]	p-value
	n=36	n=30		n=36	n=30	
RTA	2.2 (1.2)	2 (1.0)	0.4703	2.3 (1.2)	2.2 (1.3)	0.7466
LTA	2.2 (1.1)	2.3 (1.2)	0.7254	2.0 (1.0)	2.5 (1.2)	0.0694
RMM	1.9 (0.9)	1.7 (0.8)	0.3482	1.7 (0.8)	1.9 (0.9)	0.3430
LMM	1.8 (1.0)	2 (1.1)	0.4423	1.8 (0.9)	2.0 (0.8)	0.3482
RDA	1.4 (0.9)	1.5 (0.6)	0.6051	1.5 (1.1)	1.9 (0.9)	0.1156
LDA	1.3 (0.8)	1.6 (1.1)	0.2050	1.6 (1.2)	2.0 (1.2)	0.1823
RTP	1.9 (1.1)	2.0 (1.5)	0.7561	1.8 (1.4)	2.3 (1.4)	0.1534
LTP	1.9 (1.2)	1.8 (0.9)	0.7078	2 (1.4)	2.1 (1.1)	0.7517
Sum sEMG	15.1 (7.2)	15.2(7.6)	0.9565	14.9(6.9)	15.5(7.1)	0.7296
Mean sEMG	1.9 (0.8)	1.8(1.0)	0.6532	1.7(0.5)	2.1 (1.3)	0.0934

Conclusion

The results of the study indicate that these elastodontic devices, which should only be worn at night, are effective in aligning the teeth, **advancing the jaw**, nasal re-education and tongue posture. They can also bring cervical benefits.