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Occlusion and Disocclusion Time Analysis in Young Patients Affected by Bruxism

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Abstract

Introduction: Bruxism is an involuntary parafunctional habit performed unconsciously during sleep by the jaw muscles in which the tooth rows are pressed against each other and move horizontally. The symptoms in the oral cavity are slightly elusive which makes it difficult to diagnose.

Aim: The aim of this study was to analyze the occlusion and disocclusion times in young adults affected by bruxism compared with healthy subjects.

Materials and methods: Thirty-four patients (15 men and 19 women) aged between 20-25 years were included in the study. They were allocated into two groups: group 1 – controls (n=13), and group 2 – patients who reported clenching or grinding their teeth (n=21). The study was conducted using a T-Scan Novus occlusion diagnostic device. The results obtained for the occlusion and disocclusion times were analyzed using the latest version of the T-Scan system software (ver. 9.1). The values for occlusion and disocclusion times of all subjects were recorded in the T-Scan.

Results: The occlusion times in the control group were found to be longer than those in the bruxism group. The disocclusion times of the subjects in group 1 were found to be shorter than those in group 2.

Conclusions: The T-Scan system makes it possible to quantify the occlusion and disocclusion times, which helps to diagnose an initial form of bruxism in individuals at a young age.

INTRODUCTION

Bruxism is defined as parafunctional grinding of teeth or an oral habit consisting of involuntary rhythmic or spasmodic non-functional gnashing, grinding or clenching of teeth in other than chewing movements of the mandible which may lead to occlusal trauma, whereas bruxomania is the grinding of teeth occurring as a neurotic habit during the waking state.[1] The term "bruxism" originates from the expression "*brychein odontas*", which is Greek for grinding the teeth. Bruxism can be explained as excessive grinding or clenching the teeth that is unconscious and occurs during the non-functional movements of the jaw.[2] "Bruxomanie" is a French term mentioned in 1907 for the first time by Marie and Pietkiewicz.[3]

Another term, sleep bruxism (SB) describes the spontaneous movement of the mandible associated with the clenching and grinding of the teeth during sleep. As a recurrent habit, present in a high percentage of the population, sleeping bruxism may cause different complications in

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the maxillofacial region. The poor manifestation of clinical symptoms makes the diagnosis of SB difficult.[4-6]

Bruxism may occur not only during sleep, but also during wakefulness as a semivoluntary 'clenching' activity, which was why the American Academy of Sleeping Disorders proposed two different terms to describe this disorder – sleep bruxism (SB) and awake bruxism (AB).[7]

The prevalence rates of AB and SB in the adult population are about 20% and 8%–16%, respectively. Both males and females are equally affected by SB, whilst AB affects mainly females. Sleep bruxism starts about the age of 1 year, usually after the first erupted teeth.[8] This disorder affects children very often (14%–20%), whereas the distribution in adults above 60 years is only 3%.[9,10]

Secondary bruxism can be observed as a side effect of drug abuse and in some neurological and developmental disorders. It might become possible in the future to further differentiate forms of bruxism according to the cause and clinical symptoms.[11] There are a number of other conditions that may coexists with bruxism such as orofacial pain, headaches, and temporomandibular joint disorder, the causal relationships between which and bruxism remaining unclear.[12]

The etiology of bruxism is rather complex. Along with the pharmacological agents and behavioral changes, occlusal correction is also needed.[13] Oral symptoms are vaguely manifested.

Using articulating paper, we can visualize fully the picture of the interceptive contacts and the contacts in maximum intercuspation, but it is impossible to distinguish them in size and time of onset. With the help of the computerized occlusal analysis, it is possible to determine, both objectively and quantitatively, the interceptive contacts and distinguishes them from contacts in centric occlusion.[14]

The common features of the occlusal relations, the centric and eccentric relations must be recorded in order to be analyzed.[15]

AIM

The aim of this study was to analyze the occlusion and disocclusion times in young adults affected by bruxism compared with such times in healthy subjects.

MATERIALS AND METHODS

The study recruited 34 patients (15 men and 19 women) aged between 20-25 years. They met the following criteria:
- intact dentition;
- occlusal Angel Class I;
- absence of periodontal disease;
- no temporomandibular disorders;
- no previous orthodontic therapy.

The patients were allocated into two groups: Group 1: control group – these were bruxism-free subjects. Group 2: the bruxism group – patients clenching or grinding their teeth. The control group included 13 persons, and the patients with bruxism were 21.

The studies were conducted using a T-Scan Novus computerized occlusal analysis system. The examination of the occlusal-articulatory relationship in central occlusion was performed by the method according to Kalachev.[16] The patient was seated in the dental chair with torso and lower limbs forming a 90-degree angle, his head tilted backwards about 25-30 degrees to the chest. A suitable size sensor was selected according to the size of the arch and placed in the recording handle. The apparatus was so positioned that the index tip of the holder was between the upper central incisors of the examined patient. To initiate the recording, a button on the handle was pressed and the patient was asked to close the lower jaw until complete contact between the teeth was reached. After the study, the stand with the sensor was removed from the patient's mouth. The recording, analyzed by the software, can be played back. With the same sensor per patient, 5 to 10 records (occlusion films) can be made.

The results obtained for the occlusion and disocclusion times were analyzed using the latest version of the T-Scan system software (version 9.1). In the T-Scan Novus recorded on all the subjects the values of OT (occlusion time) and DT (disocclusion time).

The selected films were carefully examined, and the OT and DT values in seconds **(Fig. 1)** were recorded from the force-time graph generated by the system.

The OT force-time graph is measured from the time between point A and point B, the blue colored interval; it shows the time in seconds from the first tooth contact to maximal intercuspal position (MIP). DT is determined by the time between point C and point D (the interval in
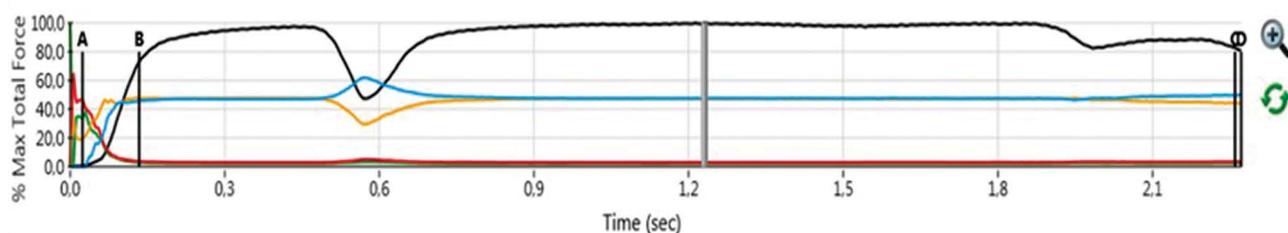

Figure 1. A force-time graph.

orange). DT shows the time in seconds, with the lower jaw shifting from the MIP to get into contact with the canines or the incisors (when moving the lower jaw forwards, to the left or to the right).

The reported OT and DT values for the two investigated groups were presented in separate tables (Microsoft Excel 2010).

Data were analysed statistically using the SPSS program (SPSS Inc., IBM SPSS Statistics) version 19.0 and compared.

RESULTS

In a frame of occlusion film in the MIP, we show the registered occlusal contacts in 2D and 3D images of the persons from the control group (**Fig. 2**) and the persons with bruxism (**Fig. 3**).

The mean occlusal time and the mean disocclusion time of the control group were 1.11±0.97 and 0.5±0.88 seconds, respectively. The mean OT and DT of patients with bruxism were 0.57±0.55 and 1.42±1.13 seconds, respectively.

The statistical analysis (descriptive statistics, t-test for equality of means) of the data from OT and DT of the two study groups found a statistically significant difference between the mean values of the groups, with the significance level set at $p<0.05$ and 95% confidence interval of the difference (**Tables 1, 2**).

The results from the statistical analysis of the data from OT and DT of the control group are shown in **Fig. 4**.

The results from the statistical analysis of the data from OT and DT of the bruxism group are shown in **Fig. 5.**
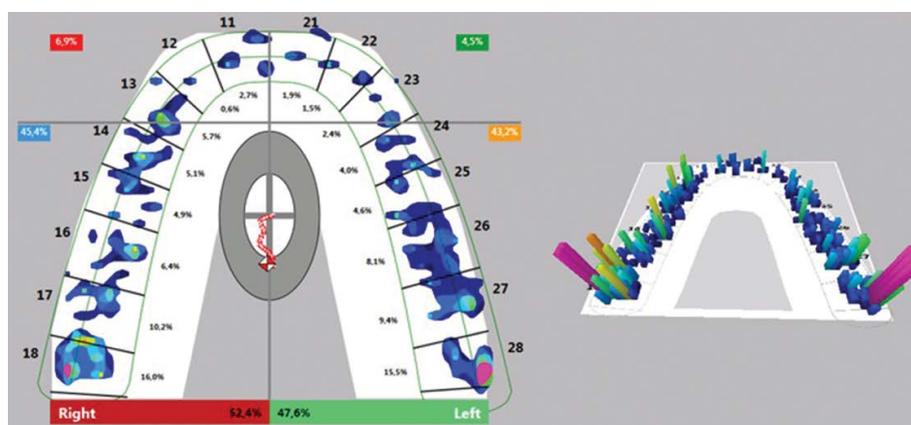

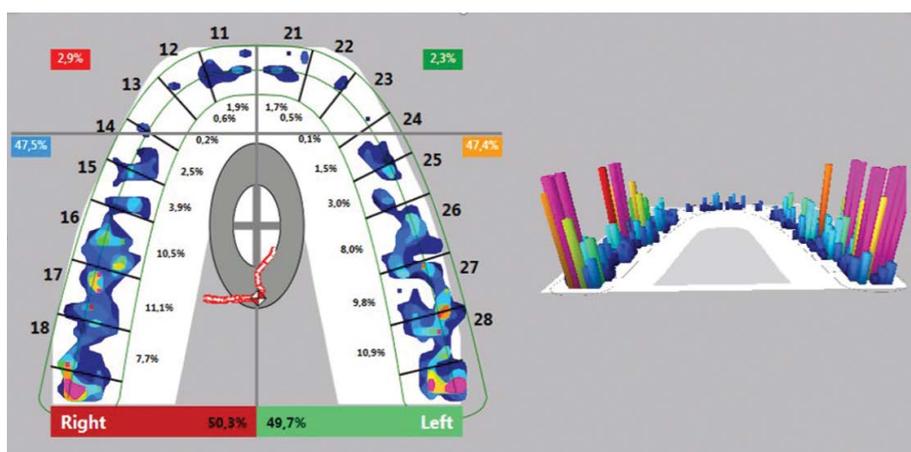**Figure 2.** Occlusal contacts in 2D and 3D images of the persons from the control group.


Figure 3. Occlusal contacts in 2D and 3D images of the persons with bruxism.

Table 1. Statistical analysis for OT

	n	Mean	Std. deviation	t	df	Sig. (2-tailed)	Mean difference	Std. error difference
Control group	13	1.1112	0.97459	2.937	66	0.005	0.54233	0.18466
Bruxism group	21	0.5689	0.54988	2.593	34.996	0.014	0.54233	0.20912

Table 2. Statistical analysis for DT

	n	Mean	Std. deviation	t	df	Sig. (2-tailed)	Mean difference	Std. error difference
Control group	13	0.5020	0.88252	-3.510	66	0.001	-0.91480	0.26063
Bruxism group	21	1.4168	1.13183	-3.721	62.389	0.000	-0.91480	0.24588
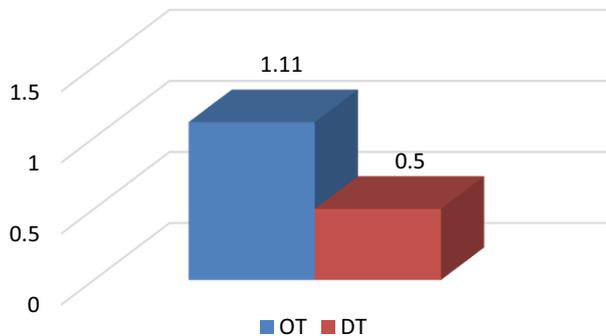
Figure 4. OT and DT of the control group.
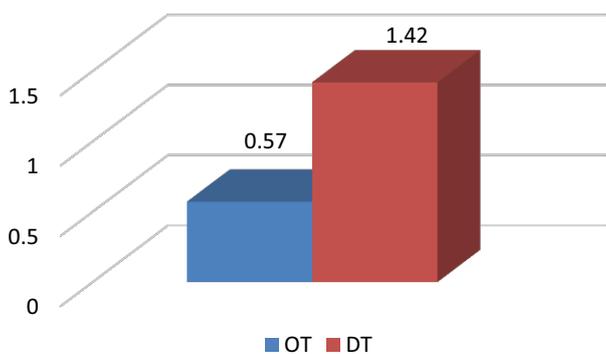
Figure 5. OT and DT of bruxism group.

DISCUSSION

Comparing the results for the two groups, we found that complete occlusal contact in healthy subjects took longer time than in patients with bruxism. This means that the teeth of a patient with bruxism get in occlusal contact faster than in the controls. OT is a dynamic parameter by which occlusion can be examined.[17]

Gümüş conducted a similar study demonstrating that the OT in the control group was greater than that of patients with bruxism.[18]

The DT in the test subjects in the control group was shorter than the DT of those with bruxism. It was found that the length of the trajectory of DT shows the activity of the masticatory muscles. The longer the disocclusion time, the greater is the activity of the masticatory muscles.[19]

CONCLUSIONS

T-Scan Novus system makes it possible to quantify the occlusal and disocclusion times in seconds, which helps to diagnose bruxism in individuals at a young age.

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Анализ времени окклюзии и дисокклюзии у молодых пациентов, страдающих бруксизмом

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Резюме

Введение: Бруксизм – это непроизвольная парафункциональная привычка, которая подсознательно выполняется во время сна мышцами челюстей и при которой зубные ряды прижимаются друг к другу и перемещаются по горизонтали. Симптомы в полости рта практически незаметны, что затрудняет диагностику.

Цель: Целью настоящего исследования было проанализировать время окклюзии и дисокклюзии у молодых людей, страдающих бруксизмом, по сравнению со здоровыми людьми.

Материалы и методы: В исследование были включены 34 пациента (15 женщин и 19 мужчин) в возрасте от 20 до 25 лет. Они были разделены на две группы: 1-я группа – контрольная (n=13) и 2-я группа – пациенты, которые сообщили о том, что они стискивают зубы или скрипят зубами (n=21). Исследование выполнено на диагностическом аппарате T-Scan Novus. Результаты, полученные для времени окклюзии и диссоклюзии, были проанализированы с помощью последней версии программного обеспечения для системы T-Scan (версия 9.1). Значения времени окклюзии и дисокклюзии на всех участках были записаны с помощью T-Scan.

Результаты: Время окклюзии в контрольной группе было больше, чем в группе бруксизма. Время дисокклюзии испытуемых в группе 1 было меньше, чем в группе 2.

Заключение: Система T-Scan позволяет количественно оценить время окклюзии и дисокклюзии, что помогает диагностировать раннюю форму бруксизма у молодых людей.

Ключевые слова

бруксизм, время дисокклюзии, время окклюзии, T-Scan Novus

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