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Original Article

Relationship between handedness and toothbrush-related cervical dental abrasion in left- and right-handed individuals

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Abstract *Background/purpose:* Cervical tooth abrasion is the loss of tooth material at the cementoenamel junction, and is usually related to faulty brushing habits. In this study, we attempted to evaluate the effects of handedness on tooth-brushing abrasion in terms of brushing habits in left- and right-handed adults.
Materials and methods: In total, 488 subjects participating in the study were divided into 2 groups according to hand preference (group I; left-handed and group II; right-handed), and were interviewed about their brushing habits, and their clinical oral conditions such as the plaque index (PI), gingival index (GI), and tooth wear index (TWI) were determined. Handedness was determined by a questionnaire that focused on handedness using the Turkish version of the Edinburgh Handedness Inventory.
Results: This study showed that there were no statistically significant differences between groups I and II according to daily tooth-brushing habits, PI, or GI. Statistically significant differences were found between men and women according to the clinical oral scores and brushing habits ($P < 0.01$). However, there were no statistically significant differences between the mean TWI scores of left- and right-handed groups ($P = 0.12$). It was found that an increased frequency and longer duration of tooth-brushing significantly increased the TWI scores in both groups ($P < 0.01$). It was also found that TWI scores were statistically higher in subjects who brushed horizontally rather than vertically ($P < 0.01$). Correlations between clinical oral scores (TWI, PI, and GI) and brushing habits were statistically significant ($P < 0.01$).

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Conclusion: The oral-hygiene performance of females was better than males. Brushing habits of patients were related to the severity of cervical wear. But no statistically significant relationship was found between hand preference and tooth-brushing abrasion in this study.

Introduction

Cervical tooth wear or tooth abrasion is defined as the loss of tooth substance that occurs in the absence of carious mechanisms at the cementoenamel junction of a tooth.[1–3] Cervical abrasion may vary in clinical presentations among individuals, and may cause painful sensations linked to dentinal hypersensitivity and impair an individual's oral-hygiene performance during tooth-brushing.[4] Since dental and periodontal problems are usually linked to the oral-hygiene performance of individuals, tooth-brushing is obviously important. Tooth-brushing is the simplest and most effective way to meet oral-hygiene requirements for removing bacterial plaque from tooth surfaces. However, cervical dental abrasion and gingival recession in the vestibule area are mostly caused by improper tooth-brushing.[5,6] Problems with brushing are commonly related to technique, duration, daily frequency, and the force applied when brushing.[7–10] In addition, traumatic cervical dental abrasion caused by tooth-brushing may also depend upon the manual dexterity and cognitive ability of individuals.[11] Hand preference was stated as one of the most important parameters affecting cognitive abilities and proficiency.[12–16] Although several studies evaluated the effects of brushing variables on tooth abrasion,[4,17,18] there is a lack of investigations assessing the relationship between hand preference and cervical tooth defects. Therefore, the present study investigated the relationship between abrasion caused by tooth-brushing and hand preference in left- and right-handed individuals in terms of gender and brushing habits.

Materials and methods

Study population

The present study was carried out in Erzurum, Turkey, in 2009, and included 488 subjects (253 females and 235 males) who reported to the Department of Periodontology (Faculty of Dentistry, Atatürk University). Subjects participating in the study were divided into 2 groups according to their hand preference. Handedness was determined by a questionnaire that focused on handedness using the Turkish version of the Edinburgh Handedness Inventory.[19] The left-handed group (group I) included 79 and the right-handed group (group II) 409 persons.

Evaluation of clinical oral conditions and oral-hygiene performance

A dental examination was performed in a dental chair using a standard operating light, an explorer, a periodontal probe, and a mouth mirror. All measurements were made by a single clinician (Dr. Mehmet Özgöz) in order to achieve better standardization. Clinical oral indices, which are indicators of oral-hygiene performance, such as the plaque index (PI) and gingival index (GI), were evaluated. The PI is a classification of bacterial plaque accumulation on tooth surfaces. It is scored as follows; 0: no plaque on tooth surfaces; 1: tooth appears clean but plaque may be removed from its gingival third with a probe; 2: moderate accumulation of plaque deposits visible to the naked eye; and 3: heavy accumulation of soft material filling the niche between the gingival margin and tooth surface.[20] The GI is a classification of gingival inflammation that measures gingival bleeding. It is scored as follows; 0: normal gingiva, no inflammation, discoloration, or bleeding; 1: mild inflammation, a slight color change, and mild alteration of the gingival surface, but no bleeding on pressure; 2: moderate inflammation, erythema and swelling, bleeding on pressure; and 3: severe inflammation, erythema and swelling, tendency for spontaneous bleeding, and possibly ulceration.[21] The brushing activity characteristics of the individuals such as the frequency of daily tooth-brushing (0: no brushing; 1: once a day; 2: twice a day; 3: 3 times a day), duration, and brushing technique were determined by an interview.

Measurement of tooth wear

The presence and type of cervical defects in each person were diagnosed using the tooth wear index (TWI),[22] and this index was evaluated between and within groups. The TWI scores were 0: no change in the contour; 1: minimal loss of contour; 2: a defect of <1 mm in depth; 3: a defect of 1–2 mm in depth; and 4: a defect of >2 mm in depth, pulp exposure, or exposure of secondary dentine. Scores were determined by measuring the defect depth at the cervical tooth area with a Williams type periodontal probe, and mean values were recorded for each patient.

Statistical analysis

Statistical analysis was performed using SPSS 11.5 software for Windows (SPSS Inc., Chicago, IL, USA). Scores of brushing habits and clinical oral conditions of subjects were determined by a one-way analysis of variance (ANOVA) and a multiple-range least significant difference (LSD) test between and within groups. Correlative analyses among TWI scores, clinical oral conditions, and tooth-rushing scores were carried out using Spearman's rank correlation.

Results

According to hand preference, the total percent of right-handed individuals was 84%, and left-handed was 16% in the