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ORIGINAL RESEARCH

Orthodontic dental movement and its association with the presence of gingival recession

Movimiento dentario ortodóntico y su asociación con la presencia de recesiones gingivales

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ABSTRACT

The objective of the present study was to determine association between orthodontic movement type and gingival recession after orthodontic treatment. **Material and methods:** A series of clinical cases of 15 young patients. Circumstances of the protective periodontium of anterior upper and lower teeth were assessed before and after orthodontic treatment. Gingival recession type was assessed with Miller's classification, orthodontic movement type was classified into: vestibular inclination, protrusion, retrusion, intrusion, extrusion and combined movements. **Results:** Out of 180 teeth examined, 22.2% exhibited Miller class I gingival recession; 27.5% of all gingival recessions were associated to vestibular inclination movements. No association was found between type of orthodontic movement and presence of gingival recession ($p > 0.05$). **Conclusion:** The amount of postoperative gingival recessions observed after orthodontic treatment was negligible and did not show association with orthodontic movement type.

RESUMEN

El objetivo del estudio fue determinar la asociación del tipo de movimiento ortodóntico y recesiones gingivales luego del tratamiento ortodóntico. **Material y métodos:** Serie de casos clínicos que incluyó a 15 pacientes jóvenes a quienes se evaluó la condición del periodonto de protección de los dientes anterosuperiores y anteroinferiores antes y después del tratamiento ortodóntico. El tipo de recesión gingival fue evaluado a través de la clasificación de Miller; el tipo de movimiento ortodóntico fue clasificado como: movimientos de vestibularización, protrusión, retrusión, intrusión, extrusión y movimientos combinados. **Resultados:** De un total de 180 piezas dentarias evaluadas, el 22.2% evidenció recesiones gingivales Miller clase I. El 27.5% de recesiones gingivales fueron asociadas con movimientos de vestibularización. No se encontró asociación entre el tipo de movimiento ortodóntico y la presencia de recesiones gingivales ($p > 0.05$). **Conclusión:** La cantidad de recesiones gingivales postoperatorias al tratamiento ortodóntico es pequeña y no posee asociación con el tipo de movimiento ortodóntico.

Key words: Gingival recession, connective tissue, periodontal disease, orthodontic movement.
Palabras clave: Recesión gingival, tejido conectivo, enfermedad periodontal, movimiento ortodóntico.

INTRODUCTION

Recession of marginal gingival tissue is defined as the displacement of apical gingival margin towards the enamel-dentin junction with exposition of the root surface to the oral environment.[1] Essential etiology of gingival recession lies with direct or triggering factors, mainly gingival inflammation, which can be caused by accumulation of bacterial plaque or mechanical means (brushing, trauma). Within the realm of indirect or predisposing factors, we can find the following: gingival biotype, thickness of bone cortical plates, amount of keratinized gingiva, root prominence and orthodontic movement.[2] With respect to orthodontic treatment, it has not yet been demonstrated that it might cause gingival recession. Nevertheless, it has been reported that movement of teeth towards a vestibular direction, outside of the alveolar bone sheath, generates loss of oral cortical plate and decrease in gum thickness due to the narrowing of gingival tissue fibers.[3] Vassalli[4] systematic review did not find compelling evidence to support or refute relationship between orthodontic movements and onset of gingival recession. Nevertheless, he reported that clinical studies have shown that tilted teeth and incisors previously mobilized out or their socket, exhibited greater tendency to develop gingival recessions. Other

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authors have indeed found positive correlation between prominent roots and presence of gingival recession[5] as well as between misplaced teeth and gingival recession.[6] It has been clearly shown in primates that vestibular inclination, extrusion and rotation of incisors result in gingival recession and loss of clinical attachment.[7] Nevertheless, the amount of labial movement, magnitude of the force, presence or absence of bacterial plate, as well as gingival inflammation might alter soft tissue during orthodontic treatment.[8,9] In the present research project, association between type of orthodontic movement and presence of gingival recession was assessed, after having conducted orthodontic therapy. We hypothesized that there was no association between orthodontic movement and gingival recession in upper and lower anterior teeth.

MATERIAL AND METHODS

Design

The present study was of an observational, prospective and longitudinal nature (series of clinical cases).

Population

Fifteen patients participated in the present study. Patients were systemically healthy, ages ranging 18-30 years, and had attended the Dental Clinic Orthodontic Service at the Faculty of Dentistry, San Marcos University (Universidad Mayor de San Marcos) during 2013-2015. Sample was selected in a non-probabilistic, convenience fashion.

Bioethical considerations

Study protocol and informed consent were approved by the ethics committee of the School of Dentistry, National University of San Marcos, and were developed according to ethical norms of the Helsinki Declaration.[10]

Selection criteria

All patients were questioned with respect to treatment requirements in order to correct tooth malposition or malocclusion in upper and lower sectors. Subjects required to exhibit probing depths lesser than 4 mm aqs well as being non smokers (considered as ASAI). At study initiation they had to show efficient dental plaque control with Oral Hygiene Index (OHI) lesser than 20%. Patients had to be diagnosed with mild to moderate malocclusions in anterior sectors without need of complex orthodontic treatment.

Exclusion criteria

The following patients were excluded: patients with systemic diseases (ASA II, III, IV), pregnant females, smokers, alcoholics, patients in a treatment plan including complex surgical procedures in the anterior section (considered class II and III), patients with diagnosis of deep open- or cross-bite in the anterior section, as well as those patients who could not exhibit a suitable and correct control of dental plaque.

Variable recording

Preoperative data were assessed before initiating orthodontic treatment. Main variables recorded were: Presence of gingival recession (GR), such as apical migration of the gingival margin with respect to the enamel-cement junction line and catalogued according to Miller's classification (class I, II, III, and IV).[11] Gingival recession and gingival biotypes were assessed with a 15 mm WHO millimetric periodontal probe. Evaluation was conducted at the level of anterior upper and lower teeth. The same data were re-assessed at the end of orthodontic treatment, additionally, the type of orthodontic movement was recorded according to appliances and treatment plan selected by the orthodontist. Types of movement were catalogued as: vestibular inclination, lingual inclination, intrusion, extrusion, protrusion, retruded version, rotated version, combined movements and lack of movement. Each movement was assessed in all teeth, if modification of movement was found during the 2-3 years of the orthodontic treatment, movement was considered of a combined nature.

Data analysis

Statistical package SPSS 21 for data analysis was used. Qualitative variables were expressed in function of graphs and frequency tables. McNemar's test was used to determine significance levels of clinical changes between two times. Association between variables was achieved with χ^2 test and Fisher's exact test. $P < 0.05$ was accepted for refutation of the null hypothesis.

RESULTS

Fifteen patients were evaluated: seven males and eight females, average age 22 ± 3.75 years; 180 anterior upper and lower teeth were assessed from the whole group of patients, (from canine to canine).

At a preoperative level, 169 teeth (93.9%) did not show gingival recession; 11 cases (6.1%) exhibited class I recession. At postoperative level, 140 teeth