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Review

Orthodontic treatment of periodontal defects. A systematic review

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ARTICLE INFO

Article history:

Received 2 October 2009

Accepted 20 April 2010

Keywords:

Furcation defect

Gingival recession

Infrabony/intrabony/angular defect

Orthodontics

Systematic review

ABSTRACT

Several studies have been published focusing on the possibility to treat patients affected by periodontal defects by means of orthodontic treatment. The aim of this systematic review is to evaluate the efficacy of the orthodontic treatment applied to the therapy of infraosseous defects, gingival recessions, and furcation lesions. To establish an appropriate search strategy, the PICO assessment worksheet was used. Only Randomized Controlled Trials and Systematic Reviews were selected for this review. The electronic search (from January 1966 to January 2008) and the hand search (from January 1988 to January 2008) were conducted by three independent reviewers. There were no language restriction.

No Randomized Controlled Trials and Systematic Reviews were identified during the investigated period and therefore it was not possible to perform meta-analysis. It appears important to encourage the researchers to produce Randomized Controlled clinical Trials aimed to investigate the efficacy of the orthodontic treatment, alone or in combination with the periodontal therapy, for the resolution of periodontal defects.

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1. Introduction

Periodontal infection is able to determine defects that involve alveolar bone and soft tissues, such as infrabony/suprabony defects and furcation lesions.¹ Traumatic injuries, due to improper tooth-brushing habit, may also cause periodontal damage such as gingival recessions.² Several non-surgical and surgical periodontal techniques have been developed to treat the infrabony defects and furcation lesions.^{3–5} Many surgical techniques have been proposed also to treat

gingival recessions in order to improve aesthetics and dental hypersensitivity.^{6–8} All these therapeutic approaches *per se* demonstrate optimal clinical results showing the reconstruction of the infrabony defects, the stability of the surrounding treated area in correspondence of furcation defects, and the reconstruction of the mucogingival tissues around gingival recessions.

During the last decades, several reports (oral communications and articles) have described the possibility to treat patients with periodontal defects by means of orthodontic therapy, alone or in combination with periodontal therapy.^{9–13}

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doi:10.1016/j.pio.2010.04.013

It has been reported that orthodontic treatment might contribute to improve the healing of the infrabony defect, thus changing the anatomy of the defect area. Tooth up-righting and forced eruption (extrusion) may reduce pocket depth, while bodily movement of the tooth into the defect may reduce the entire volume of the lesion, creating a more suitable condition for periodontal surgical therapy. In his clinical and histological study, Brown¹⁴ reported the reduction of deep pockets and the related infrabony defects in teeth tilted mesially. Later, Ingber¹⁵ showed the favourable clinical and histological results of the treatment of 1- or 2-wall infrabony defects using extrusive tooth movement, based on the fact that the orthodontic tension created within the periodontal ligament stimulates the bone formation. In addition, damage at the periodontal attachment of the adjacent teeth was not observed.

Little information is provided about the use of orthodontic treatment in cases with furcation lesions¹³ and gingival recessions.¹⁴

The purposes of this systematic review of the literature are:

1. to identify within the orthodontic and periodontal literature Randomized Controlled clinical Trials (RCTs) dealing with orthodontic therapy alone or in combination with periodontal techniques to treat periodontal defects (infrabony defects, gingival recessions, and furcation lesions);
2. to perform a meta-analysis on this issue based on the available RCTs.

2. Materials and methods

2.1. Inclusion criteria and outcome measures

At the beginning of this study, the PICO assessment worksheet was used in order to define the topic and to plan the search strategy.¹⁶ The question addressed by the present systematic review was: "What is the clinical efficacy of the orthodontic treatment applied to the therapy of infrabony defects, gingival recessions, and furcation lesions?"

The population selected for this study consisted of adult patients, aged 18 years and over. All the selected studies should present a minimum follow-up of 6 months and they had to be performed on human beings (animal and laboratorial studies were not considered eligible for the review).

The types of study included in this systematic review were Randomized Controlled Trials (RCTs) and Systematic Reviews (SR). The comparative interventions considered eligible for this review were *Orthodontic Treatment (every type) versus Periodontal Therapy (every type)*; *Orthodontic Treatment (every type) plus Periodontal Therapy (every type) versus Periodontal Therapy (every type) alone*; *Orthodontic Treatment (every type) versus Orthodontic Treatment (every type)*.

Studies presenting any of the following outcome measures were evaluated:

1. Outcomes for the periodontist: Missing Teeth during the follow-up period (MT); Clinical Level Gain (CAL Gain); Probing Depth Gain (PD Gain); Gingival Recession Reduction (RecRed); Biological Complications (Complic).

2. Outcomes for the patients: Pain during and after treatment (Pain); Esthetic Satisfaction (Esthetic); Treatment time satisfaction (Time); Cost of treatment (Cost).

2.2. Search strategy

For the identification of the studies included or considered for this review, a search strategy was conducted referring to the period January 1st, 1966 – January 31st, 2008. The search strategy used a combination of controlled vocabulary (MeSH) and free text terms based on the following: *orthodontic treatment / therapy*; *infrabony / intraosseous / intrabony / infrabony / angular defects*; *gingival recession*; *furcation defects*. There was no language restriction.

Two searching strategies were adopted for this review: electronic search and hand-search. The electronic search utilized was Medline (Pubmed) and the period investigated was from January 1966 to January 2008. The following terms were searched:

- "Orthodontics"[MeSH] AND "therapy"[Subheading] AND "Gingival Recession"[MeSH]
- "Orthodontics"[MeSH] AND "therapy"[Subheading] AND "Furcation Defects"[MeSH]
- "Orthodontics"[MeSH] AND "therapy"[Subheading] AND ("Periodontal Pocket"[MeSH] OR "Periodontal Diseases"[MeSH]) AND "Intrabony Defect" "[All Fields]
- "Orthodontics"[MeSH] AND "therapy"[Subheading] AND ("Periodontal Pocket"[MeSH] OR "Periodontal Diseases"[MeSH]) AND "Infrabony Defect" "[All Fields]
- "Orthodontics"[MeSH] AND "therapy"[Subheading] AND ("Periodontal Pocket"[MeSH] OR "Periodontal Diseases"[MeSH]) AND "Intraosseous Defect" "[All Fields]
- "Orthodontics"[MeSH] AND "therapy"[Subheading] AND ("Periodontal Pocket"[MeSH] OR "Periodontal Diseases"[MeSH]) AND "Angular Defect" "[All Fields]

A similar electronic search was performed in The Cochrane Oral Health Group's Trials Register and The Cochrane Central Register of Controlled Trials (CENTRAL).

For the investigative period from January 1988 to January 2008, the following journals were manually searched: *Journal of Periodontology*, *Journal of Clinical Periodontology*, *International Journal of Periodontics and Restorative Dentistry*, *American Journal of Orthodontics and Dentofacial Orthopedics*, *The Angle Orthodontist*, *European Journal of Orthodontics*.

2.3. Methods of the review

The titles and abstracts (when available) of articles searched manually were scanned independently by two blinded examiners (G.I. and J.M.) by means of a cross-over method. The titles and abstracts (when available) of articles searched electronically were scanned independently by a third examiner (R.R.). For studies that met the inclusion criteria the full article was obtained. In case of disagreement about the inclusion of the study, this was resolved by discussion. Where resolution was not possible, a third review author was consulted. All studies meeting the inclusion criteria underwent quality assessment and data extraction.

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