

ADULT ORTHODONTICS

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Abstract: Orthodontics is a complete discipline and "it does not matter if the patient is young or old". Adult orthodontics deals with achieving a balance between achieving optimal proximal and occlusal tooth contact, acceptable dentofacial aesthetics, normal function and reasonable stability. The paper provides important information and a systematic overview of most common health problems in adult patients as diabetes, hypertension, TMJ disorders, osteoporosis, osteopenia. Adults have greater chances of caries and periodontal problems and have absence of growth, so growth modification is not a treatment option. The movement of the teeth in adults is more difficult than in young patients. The initial response of orthodontic force is slower in adults because the cellular response is delayed. The article focuses on biomechanics of orthodontic treatment in adults. Orthodontic forces used in the treatment of adults should be weaker than in children. The initial forces should further be kept low. Tooth extrusion should be avoided as there is no compensatory growth of the ramus. Adjunctive, comprehensive and surgical-orthodontic treatment are presented in this study. Adult orthodontic treatment objectives are analyzed and described in detail. The article focuses on periodontal aspects of orthodontic treatment in adults. The main problem of adult during orthodontic treatment are bone loss and gingival recession. Potential benefits of orthodontic treatment are presented in this study. Orthodontic treatment can be justified as part of periodontal therapy if used to reduce plaque accumulation, correct abnormal gingival and bony shapes, improve aesthetics, and facilitate prosthetic rehabilitation. Evaluation and maintenance of periodontal health before, during and after orthodontic treatment is very important.

Keywords: adult orthodontics, orthodontic movement in adults

1. INTRODUCTION

Orthodontics is a complete discipline and "it does not matter if the patient is young or old". The field of interest of adult orthodontics is achieving a balance between mutual occlusal contacts of the teeth on the one hand and normal function, dentofacial aesthetics and stability on the other hand. (J.L Ackerman 1978) An adult is defined as a person who is fully grown. 16 years in women and 18 years and older in man, can be considered adults, although growth remains. There are three classifications of adult patients according to their age: adults aged 18 to 25 years, adults aged 26 to 35 years and adults from 36 years and older. The frequency of malocclusions in adults is equal to or greater than in children and adolescents. 15% of orthodontic patients are adults. Young adults are under 35 years usually about 20 years. Young adults wanted but did not receive orthodontic treatment during adolescence. They usually seek the maximum from orthodontic therapy and seek interdisciplinary consultation also. Old adults are over 35 years usually 40s or 50s. Old adults have other dental problems and orthodontics, treatment is part of a larger treatment plan. They do not require ideal results. Orthodontic treatment is actually an additional procedure to periodontal and restorative dentistry. (Fastlicht J. 1982).

Why do adults require orthodontic treatment?

Adults require orthodontic treatment because they refused orthodontic treatment as children, as a result of many reasons when they were younger: no information about orthodontics, no orthodontist located near, parents could not afford orthodontic treatment, they did not receive adequate orthodontic treatment as children, or they did but relapse occurred. With age people become more aware of the look, and over time, diastema and spacing appear and improperly positioned teeth contribute to periodontal ligament (PDL) pathology also. (Vanarsdall RL, Musich DR 2005). According to Graber (Graber TM et al. 2012) classification of adult orthodontic treatment is: physiological occlusion, psychological rehabilitation, corrective orthodontics, orthognatic surgery, periodontal surgery and treatment of TMJ disorder. Basic objectives of orthodontic treatment in adults are achievements of : normal occlusion, stomatognathic function, stability and dentofacial aesthetics (Graber 2005). Additional goals of adult

treatment are : most favorable distribution of teeth,parallelism of abutment teeth for easier insertion and better prognosis of multiple prosthetics,restorations, avoiding devitalization, extreme preparations, redistribution of occlusal and incisal forces and adequate space and correct root position. (Graber 2005).

2. THE AIM

The aim of this systematic review was to obtained and published data related to adult orthodontics treatment, its biomechanics, ortho-perio interrelations and periodontal aspects of orthodontic treatment in adults.

3. MATERIAL AND METHODS

Materials needed for this paper were obtained from literary publications and conclusions from scientific and clinical studies, by searching the modern scientific databases of PubMed, Google Scholar and Elsevier in the last 20 years.

4. RESULTS AND DISCUSION

The reasons and the motives for orthodontics are: internal motivations (improving appearance or function), external motivation (persuading others or expected influence on others), desire for better aesthetics, functional problems with speech or mastication providing a favorable base for prosthetic rehabilitation. (Gebeile-Chauty S, Gay-Brevet K 2011).Most common health problems in adult patients are diabetes, hypertension, TMJ disorders, osteoporosis, osteopenia. Adults receive relevant medications,therefore medical consultation and referral is important before and during treatment. Osteoporosis is bone mineral density (BMD) of 13-18% usually in postmenopause women between 45-50 years. In this condition bone metabolisam must be checked, because the treatment of osteoporosis during orthodontic therapy with Bisphosphonates, Cacitonin, ERT can compromise bone remodeling. (Meeran NA, et all. 2011). Oral manifestations of osteoporosis are: progressive alveolar bone loss, recession, reduction of the attached gingiva, reduction of the posterior maxillary width, reducing the height of the toothless ridge and tooth loss. Adults have greater chances of caries and periodontal problems, therefore other types of dental treatment are almost always needed and treatment planning must involve all dentists who will play a role in the treatment. (Subhiksha KC at all.2020) Malocclusions in adults worsen with advancing age, as a result of an imbalance in occlusion associated with age. Aging is associated with biochemical changes such as reduction of alveolar vascularization and blood perfusion, altered bone mineralization and increased stiffness of collagen . But these changes do not hinder orthodontic treatment. (Kharbanda O 2013). The changes observed in PDL in adults because of aging are seen in: gingiva, periodontal ligament (PDL), alveolar bone and cement. Gingival changes are: reduced keratinization, reduced oxygen consumption, reduction of connective tissue cells, thinning of the oral mucosa and an increase in the width of the attached gingiva. The changes observed in PDL:are increase elastic fibers, increase the width of the ligaments, decreased vascularity and decreased mitotic activity. The changes observed in alveolar bone and cement are: continuous increase in the amount of cement, decreased vascularity, reduction of healing capacity and osteoporosis. (Ong MA et.all 1998)

Psychological considerations in adults

Adults respond to orthodontic treatment differently from children and adolescents, they are almost always intensely interested in their treatment and want to understand what is happening and why, so they need more clinical time in explanations. They experience more pain than younger patients or are less tolerant of it - so pain control medications are more important to them. They require an aesthetic appliance, ceramic, lingual braces and clear aligners.Even highly motivated adults manifest concerns about the appearance and visibility of the orthodontic appliance and would like to reduce or avoid the visibility of the orthodontic appliance. (Pabari S, et all.2011)

Biomechanics of orthodontic treatment in adults

Orthodontic treatment planning in adults must be without expecting that growth. Precise control of biomechanics during tooth movement is necessary, which will allow correction of malocclusions in transversal, sagittal and vertical directions. Orthodontic forces used in the treatment of adults should be weaker than in children. (Bishara SE. 2001). Tooth extrusion should be avoided as there is no compensatory growth of the ramus.Therefore, open and deep bites can be corrected with either active intrusion and / or orthogonal surgery. During adult orthodontic treatment, maintaining vertical control and a good facial profile is of great importance. (Profitt 2007). In children, tooth extrusion is more tolerant as a result of the condylar growth and the vertical development of the alveolar process during growth, versus adults where posterior tooth extrusion will cause bite opening, backwards rotation of the mandible, increased facial height and oj and ob.(Subi Singh et al.2022)

5. TYPES OF AN ADULT ORTHODONTIC TREATMENT

Adult orthodontic treatment might be comprehensive, adjunctive and surgical-orthodontic treatment.

Comprehensive orthodontic treatment

Comprehensive orthodontics for adults has the same goal as for children and adolescents, to create excellent tooth and face appearance, dental occlusion, and stability. Comprehensive orthodontics for adults tends to be difficult and technically demanding. (Profitt 2007).

Adjunctive orthodontic treatment

The goal of adjunctive orthodontic treatment is to cause teeth movements that will facilitate and help other dental interventions with the ultimate goal of improving functions and appearance. (Savana K. et al 2014). Adjunctive orthodontics implies limited goals of orthodontics. The appliances are needed only for a part of the dental arch - segmental technique. Six months is the period in which the treatment should end. This treatment includes: repositioning teeth that have moved away after extraction or loss of bone mass so that ideal fixed or partial dentures can be made or implants can be placed; alignment of the front teeth to enable more aesthetic restorations, while maintaining a good interproximal bone contour and shape of the embrasures; cross-bite correction if it compromises jaw function; forced eruption of badly broken teeth to expose sound root structure on which crowns should be placed or to level / regenerate the alveolar bone. (Kalia S, Melsen B. 2001)

Surgical-orthodontic treatment

For some adults and malocclusions, surgery is the only possible solution. SARPE (Surgically Assisted Rapid Palatal Expansion) is an orthodontic technique that is used to expand the maxillary arch. This technique includes treatments from both oral and maxillofacial surgery and orthodontics. This procedure is usually completed in adult patients with maxillary sutures that are fused and cannot be expanded using other techniques. A complete lateral osteotomy from the pterygopalatine junction to the aperture piriformis is most effective. (Arnelt W, McLaughlin R. 2004).

HYBRID devices are used, which are completely or partially anchored to the bone. Advantages are: greater expansion of the maxillary skeleton and facial bones, reduced stress and detrimental impact on the anchor teeth and more stable results. (Slavnic S, Marcusson A. 2010)

6. PERIODONTAL ASPECTS OF ORTHODONTIC TREATMENT IN ADULTS

As long as the periodontal disease is under control, there are no contraindications for orthodontic adult treating. (Boyd et al. 1989) There are three risk groups: adult with rapid progression (10%), adults with moderate progression (80%) and adults without progression despite the presence of gingivitis (10%). The main problem of adult during orthodontic treatment are bone loss and gingival recession. A predisposing factor for bone loss during orthodontic treatment is age. The average bone loss in adults who have not undergone orthodontic treatment is 0.07 to 0.11 mm. The average bone loss in an orthodontic patient is 0.31 mm, indicating that there is an increase in the rate of periodontal disease. Adult orthodontic patients are more likely to develop periodontal pockets than adolescents, because there is a correlation between age and cumulative loss of attached gingiva. (Del Santo M. 2012). Evaluation and maintenance of periodontal health before, during and after orthodontic treatment is very important. For orthodontists, adult patients are a big challenge, because despite having conditions that can complicate treatment, they still have high aesthetic requirements. Adult patients present a challenge to orthodontists because they have high aesthetic requirements and often have dental conditions that can complicate treatment, such as tooth abrasion, poorly contoured restorations, and periodontal disease. As a result of advanced periodontal disease, pathological tooth migration occurs which results in inclination or extrusion of one or more incisors, diastema, or spacing. (Vanarsdall RL, Musich DR 2005).

Periodontal problems during orthodontic treatment

There are periodontal problems with short-term and reversible effects such as gingivitis, gingival enlargement and no loss of attachment, and periodontal problems with long term and irreversible effect: irreversible gingival recession, root resorption, and attachment loss. (Del Santo M. 2012).

Periodontal problems after completion of orthodontic treatment

Problems after completion of orthodontic treatment are black triangles, luxation of teeth, relapsed, mouth breathing, tongue squeezing. (Del Santo M. 2012).

Ortho-perio interrelations

The main goal of periodontal therapy is to restore and maintain the health and integrity of the periodontal support. Loss of periodontal support causes pathological migration of teeth. (Ong MA et al. 1998)

7. MANAGING TREATMENT FOR ADULT ORTHODONTIC PATIENTS WITH PERIODONTAL PROBLEMS

Periodontal problems should be identified before orthodontic treatment. An orthodontist should do a screening periodontal examination such as: periodontal probing, evaluating attached gingiva and studying appropriate radiographs. The treatment for adult with periodontal problems can be divided into pre-orthodontic periodontal

therapy and post- orthodontic periodontal therapy. (Elliasson LA, et.all.1982). Pre-orthodontic periodontal therapy consists of: pre-orthodontic gingival surgery and pre-orthodontic osseous surgery. Pre-orthodontic gingival surgery can be gingival grafting, treatment of gingival recession and root coverage, according to esthetics, tooth sensitivity and the patient's wishes. Pre-orthodontic osseous surgery refers to treatment of osseous craters, hemiseptal defects, three wall infrabony defects, furcation defects and treatment of root proximity. Post- orthodontic periodontal therapy takes at least 6 months after band removal. A nightguard is indicated to control parafunction and can be used as a retainer also. (Elliasson LA, et.all.1982, Ong M A Wang HL.2002)

Potential benefits of orthodontic treatment: (Ong M A Wang HL.2002)

- Improving the width of the attached gingiva
- Induction of bone formation. It is possible to re-establish the biological width of the teeth with subgingival restoration in a forced eruption
- Closing the spaces after tooth extraction prevents complications from periodontal disease.

8. CONCLUSIONS

The role and meaning of adult orthodontics involves much more than restoring lost space in the dental arch. In everyday practice, we are faced with an unlimited number of problems and solutions, much more so than those typical for adolescents. The treatment plan needs to be formulated on the basis of careful evaluation of a complex interaction of various biological, psychosocial and mechanical factors.

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