

Avoidable Complication and Patient Care during Orthodontic Treatment

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Abstract

Aim:

Orthodontic treatment helps in improving facial and dental aesthetics. Orthodontic treatment involves the usage brackets, bands, wires inside the oral cavity. During the course of treatment, proper care of the appliances by the patient and the Orthodontist is essential.

Objective:

Helps in better treatment and to avoid any complication during the course of the treatment.

Background:

The brackets and bands provide for a rough surface which leads to increased plaque and calculus accumulation. Arch wires, brackets and bands can also lead to ulcerations in the oral mucosa. The Orthodontic tooth movement also leads to certain complications like root resorption, gingival enlargement, loss of tooth vitality etc. This is further complicated by the allergic tendencies of the patient to certain materials used in Orthodontic therapy.

Reason for the study:

Hence it is imperative that the patient as well as the dentist is made aware of the various complications that can occur with Orthodontic treatment and how to deal with them. This review would serve to do the same.

INTRODUCTION

Every treatment in the dental specialty has its own set of complications orthodontic therapy being no exception. Dental aesthetics are a key factor in overall physical attractiveness, which also contributes to self-esteem.¹ This is one of the main reasons for patients to undergo Orthodontic treatment. Although Orthodontic treatment has many recognized benefits, including improvement in dental health, function, appearance, and self-esteem, nevertheless Orthodontic appliances can cause unwanted complications if adequate care is not taken during the treatment. It is important that the patients are aware of these potential risks, so that they can know their responsibilities and the expectations placed on them during the treatment. This ensures in achieving successful results without any adverse effects during and after completion of orthodontic treatment.

RISK OCCURRENCE

The context of risk occurrence in Orthodontic treatment can be general therapeutic and specific therapeutic². Patient feature, Orthodontist related factors, patient-doctor relationship are the factors which comes under general therapeutic context. The specific therapeutic context refers to factors related to placement of orthodontic appliances, mechanism of action of the orthodontic devices, reaction of the appliances with the oral and extra oral environment, material properties and technical particularities of various Orthodontic appliances.

THE SCARS OF ORTHODONTICS

Based on various studies these Orthodontic complications are classified as

1. lesions of enamel-enamel decalcifications
enamel wear/fractures

2. root- root resorption
ankylosis
3. pulp-ischemia
pulpitis
necrosis
4. periodontal tissues- gingival recessions
alveolar bone loss
dark triangles
5. soft tissues- damage by removable and fixed appliances
ulcerations, components impingement, alopecia due to head gears,
Allergic reaction to nickel or titanium, and others.
6. Temperomandibular joint-condylar resorption
Temperomandibular dysfunction

ENAMEL LESIONS

Enamel damage that appears as a side effect of the orthodontic therapy is relatively largely related to the bonding and debonding technique. By current knowledge, bonding of Orthodontic appliances may induce irreversible changes of tooth surface. The bond strength of these materials is directly related to the resin tags formed, that cannot be removed at orthodontic treatment end. A variety of factors may be involved in bonding of brackets like the concentration of etchant, depth of resin tags, bonding material and so on. The extent of etching depth depends on numerous factors, among those being the acid type and concentration, time of application, enamel surface characteristics. There is high chance of plaque accumulation on the buccal surface of the teeth because of the placement of brackets. The acidic byproducts of the bacteria in plaque are responsible for the subsequent enamel demineralization and formation of white spot lesions. During debonding and removal of the residual

material there is a risk of tooth damage, irreversible complication being seen as hard to avoid. Frequency and gravity of enamel loss is usually smaller when metallic braces and bonding materials based on glass ionomer cements are used. More severe modifications were seen when ceramic brackets and adhesive resins were used as bonding materials. The Orthodontist has a big role in preventing this irreversible enamel damage by using an appropriate debonding technique³. Local factors like plaque and debris are also factors for change in appearance of enamel⁴. A high standard of oral hygiene by using interdental brushes may be necessary for prevention of local factors and to avoid any localized white spot lesions. Fluoride containing cements, argon laser, self-ligating brackets, chlorhexidine varnish and bonding agents are few advanced ways for prevention of decalcification⁵.

ROOT DAMAGES

External apical root resorption (ARR) is an undesirable complication of Orthodontic treatment that results in permanent loss of tooth structure from the root apex. In order to minimize the severity of root resorption a good knowledge of etiopathogenic mechanism is mandatory. Although this aspect presents a series of ambiguities, mainly two categories of factors are incriminated for root resorption appearance, namely related to patient characteristics and to orthodontic technique. Both issues are important to be assessed, the first ones in order to identify high risk patients, and the last ones in order to ensure an orthodontic intervention predisposing at minimum to this unwanted side effect⁶. Among risk factors of root resorption related directly to orthodontic technique the most important seem to be: treatment time, the amount of root apex displacement, the type and amount of orthodontic force, and also the type of orthodontic appliance used. The treatment goal in the external apical root resorption is to remove or destroy bacteria to allow healing to take place in the periradicular space. Calcium hydroxide as an intracanal medicament best destroys the bacteria. A side effect, however of using calcium hydroxide for long term is weakening of the root structure in immature teeth. Risk factors associated with an increased incidence and severity of root resorption include the pre-treatment root form or length, previous dental trauma and the type of mechanics used. Teeth with blunted, pipette-shaped, or short roots are at increased risk of resorption. Root-filled teeth are not necessarily at greater risk of root resorption and may safely be moved using orthodontic appliances. Root shortening is almost inevitable in patients with fixed appliances. Fortunately this is usually minimal, affecting the apical 1–2 mm only. Such resorption should not compromise the long-term health of the teeth⁷. Socket sclerosis is a very rare asymptomatic complication during orthodontic closure of extracted spaces. Surgical removal of sclerosed bone can help to overcome this problem.

PULPAL ATROCITIES

Orthodontic patients may suffer from transient pulp ischaemia, causing pain and discomfort in the first few days after adjustment of an appliance. This usually settles within

a week, although pulp death/necrosis following Orthodontic treatment is occasionally reported⁸. If appropriate forces are used, pulp damage is unlikely to be a significant problem.

PERIODONTAL DAMAGE

Periodontal complication is one of the most commonly cited part in clinical practice. Following placement of a fixed appliance there is gingival inflammation in almost all Orthodontic patients.

Fortunately, this inflammation is usually transient and does not lead to attachment loss.⁹ However in some cases there can be various forms gingivitis to periodontitis, dehiscence, fenestrations, interdental fold, gingival recession or overgrowth, black triangles. Severe damage can considerably interfere with the teeth prognosis^{10,11}. Gingival recession and alveolar bone loss are reported due to tooth movement in the presence of inflammation¹². Careful management of orthodontic treatment is recommended when previous periodontal alterations are identified. Orthodontic intervention may aggravate a previous condition, which may lead to severe disease form, sometimes difficult to control. Adult patients may be at risk of periodontal problems, particularly patients who seek orthodontic treatment because of pre-existing periodontal disease. In these cases the patient is sufficiently motivated to maintain excellent oral hygiene during treatment. Three-monthly periodontal checks and routine scaling and polishing are advisable after which the treatment can be carried out with modifications in the force mechanics¹³. Dark triangles can be seen as an unesthetic open gingival embrasure between the incisors during the course of orthodontic treatment due to loss of gingival attachment as a result of periodontal disease or during correction rotated or crowing in anterior teeth¹⁴. Porcelain veneer crowns can be suggested in the maxillary anteriors which are most commonly affected post treatment with dark triangles

SOFT TISSUE COMPLICATION

The soft tissue complications can be intraoral and extraoral due to removable, fixed and headgears. The most common intra oral complications are oral ulcerations. Laceration to gingiva and oral mucosa may present as ulceration. Archwires, brackets, bands and long unsupported stretches of wire resting against the lips can also lead to ulcerations. Excessive muscular activities of the cheek or tongue may also act as triggers. Therefore the clinicians should assess and monitor every aspect of orthodontic procedure during and after treatment to achieve an uneventful, secure, and successful final result^{15,16}. Careful use of instruments, careful fitting and adjustment of the appliances should be done to avoid oral ulcerations during Orthodontic treatment. Topical medicines can be used for management of such ulcers. Some individuals continually damage their appliances leading to extra, unscheduled appointments and Prolonged treatment times¹⁶. These patients must be recognized early, counsel them about diet and habits and take extra precautions, such as placing bands rather than bonds. Improper hygiene of the removable orthodontic appliances is sometimes associated with stomatitis

appearance, which may sometimes be over infected with *Candida albicans*¹⁷. Headgear appliance was linked to facial and intraoral trauma, appearing accidentally during game, sleep or incorrect handling. It has also been reported that in very rare cases pressure induced alopecia is also one complication of headgears. To minimize the risk of injury, headgear now has safety features that stop it being accidentally displaced or recoiling back into the face or eyes. Patients should be given both verbal and written safety instructions after fitting headgear¹⁸. Hypersensitivity reactions can occur associated to the well-known allergens like nickel, cobalt, chromium, latex and polymers. The most frequent form is the contact dermatitis of the face and neck, but lesions can appear also on the oral mucosa and gingiva, and rarely even systemic reactions may occur. Nickel allergies are the most frequent ones in the industrialized countries, manifesting usually as a type IV hypersensitivity reaction.¹⁹

TEMPEROMANDIBULAR COMPLICATIONS

Post-orthodontically temporomandibular disorders are usually part of the craniomandibular dysfunction, which includes beside joint modifications also muscle and dental impairments. By the current research knowledge, it isn't clearly elucidated the relation between temporomandibular alterations and orthodontic intervention, usually being found contradictory opinions, explication varying. Some sustain that, by the state of morpho-functional equilibrium present after orthodontic intervention, optimal conditions for this side effects prevention are created. Other believe that, because of the premature occlusal contacts present during therapy, there is a greater risk for this complication to appear²⁰. The management of temporomandibular joint disorders can be recording signs and symptoms before treatment; advice patients seeking Treatment for such disorder that there may not be an improvement with orthodontics. Idiopathic condylar resorption may be associated with a number of systemic and local factors and it can also be stated that orthodontic treatment is also one of the cause for it. This association may, in fact, be coincidental and not reflect a specific cause-and-effect relationship.²¹

CONCLUSION

In conclusion, the risks associated with Orthodontic treatment and the complications are a result of a multifactorial process, including aspects related to patient, Orthodontist and the technical features of orthodontic appliances and procedures. These can be prevented or limited through identification and implementation of best treatment alternative for each individual case. Patient's compliance is an important factor that can contribute to a high standard outcome, with minimum side effects. Before the course of treatment, the referring practitioner, patient and orthodontist should lighten on the risks and the benefits of treatment. With vigilant selection, diagnosis, treatment planning, monitoring and timely intervention we can ensure that the majority of our patients benefit the best outcome of the treatment with less or no complication.

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