Title of paper: Orthodontic Scar: A Narrative Review

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ORTHODONTIC SCARS: A NARRATIVE REVIEW

Abstract: Orthodontic management add up to the improvement in facial esthetics, functioning and extraoral balance. It helps patients by the astonishing improvement in the aesthetics, functioning of the teeth, their appearance and overall dental health. But orthodontic treatment away from its benefits also has implicit pitfalls and limitations in terms of tissue damage. Fortunately, in orthodontics risks are tiniest and infrequent. However, all potential risks and control should be considered and addressed when making the decision to undergo orthodontic treatment. All preventive procedures should be contemplate during and after orthodontic treatment to reimpose the normal health of soft and hard tissues. Hence, the orthodontist should be watchful and prudent enough in assessing and monitoring every aspect of these tissues at any given stage and time in order to achieve a healthy and successful final result.

Keywords:, Enamel decalcification, Enamel fracture, Orthodontic scars.

INTRODUCTION

Malalignment, spacing of teeth, proclination, crowding have been everlasting esthetic problems since ages. Orthodontic treatment has come an essential part of the esthetic dentistry in the hunt for a perfect smile. It also helps by significantly improving mastication, speech, appearance, overall dental health and self-esteem. If the orthodontist is not keen eyed, orthodontic appliances at times can cause harm to the related hard and soft tissues during and after treatment.[1]

Orthodontic scars may be defined as a reversible or irreversible, soft or hard tissue damage, that are expressed clinically either intra/extraorally, during or after the orthodontic treatment.[2]

Orthodontic scars may be present during and/or after treatment. Most or some of them are reversible damages. Hard tissue damage can be irreversible and results in enamel decalcification. Hence, it is important that the patient should be addressed about such possibilities before start of orthodontic treatment.[3]

Orthodontic scars are broadly classified as follows:

1. Lesions of enamel

- Enamel decalcification/white spot lesions

2. Periodontal tissues

- Gingivitis and/or gingival enlargement
- Gingival recession
- Dark triangles

3. Soft tissues

- **Direct damage** caused by factors of removable and/or fixed appliance components (Fixed appliances and components causing impingements, ulcerations and lacerations)
- **Indirect damage** by allergic reaction to Nickel and Latex
- **Soft tissue complications** related to implants **(**Ulceration of overlying soft tissue, Peri-implantitis)

LESIONS OF ENAMEL

Enamel Decalcification/White Spot Lesions

White spot lesions around orthodontic attachments is one the most frequent problem during and after fixed orthodontic treatment.[4]

Subsequent production of acid by the bacterial plaque due to plaque accumulation around the appliance components and bonding materials results in demineralization and alteration in the appearance of the enamel surface.[5] Early, lesions appear as opaque and white spots that may progress to caries if demineralization continues. It needs preventive measures, such as fluoride application and other oral hygiene maintenance protocols. Clinically, they may be detected as early as 1 to 2 months into treatment. Their prevalence[6] among orthodontic patients ranges from 2 to 96%.

Physical Damages on Enamel (Enamel Fracture/ Enamel Wear)

Enamel damage occurs mostly during debonding of orthodontic brackets and that too in ceramic brackets. Incisal edges of the upper anterior teeth are the frequently affected areas including buccal cusps of upper posterior teeth and upper canine tips[7]. Special care is required in large restorations (composite build-up), since these can result in fracture of unsupported cusps and incisal edges. Enamel cracks may also generate during debonding.[8]

Zachrisson[9] found the prevalence of pronounced cracks in relation to the total number of cracks was 6% for debonded/banded teeth and 4% for untreated teeth. Most common causes of erosion are carbonated beverages and pure citrus fruit juices and should be avoided in patients with fixed appliances.[10]

PERIODONTAL TISSUES

Gingivitis/Gingival Enlargement

Gingival inflammation is the first and most common clinical tissue response that can be seen in almost all orthodontic patients. It is transient. It does not lead to any further complications, such as loss of gingival attachment. Gingival hyperplasia or enlargement is commonly observed around orthodontic bands and leads to pseudopocketing and illusion of attachment loss. However, even this condition is transient and usually needs debanding for some weeks.[11]

Gingival Recession

Alveolar bone loss and gingival recession are seen mostly in adult orthodontic patients. Bands are more plaque retentive as their margins are often placed subgingivally which induces more gingival inflammation than bonding with composite resins.[12]

Dark Triangles

Dark triangles are unaesthetic open gingival embrasure usually between incisors during the course of orthodontic treatment due to loss of gingival attachment as a result of periodontal disease or while correcting rotated or crowded anterior teeth.[13]

SOFT TISSUE

Direct Damage caused by Removable and/or Fixed Appliance Components

Removable Appliances

Retainers given after completion of orthodontic treatment form the bulk of removable appliances. Sometimes, Hawley's retainer may also be used to correct minor anterior corrections, such as mild spacing or single tooth rotations, crossbite etc. The acrylic component and wires such as retentive clasps, springs, canine retractors etc at times may cause tissue impingement due to sharp edges.[14]

Fixed Appliance and Its Components

Archwire, Brackets, Bands, Transpalatal Arch

During the initial phase of treatment such as insertion of bands, brackets, wires and other auxilliaries lacerations and ulcerations of the gingiva and oral mucosa are seen. Dental wax over the brackets and rubber tubing of unsupported wires should be used to reduce pain and discomfort due to trauma caused during this phase.[3]

Headgear

Headgear appliance sometimes causes injury if it is displaced either during sleep or rough play. Headgear strap most commonly causes facial skin damage.[15]

Samuels and Jones[16] classified the types of headgear injuries as follows (based on percentage occurrences):

1. Accidental disengagement of head strap while playing (27%)

2. Incorrect handling (27%)

3. Disengagement by another child (19%)

4. Disengagement while asleep (27%)

Safety features are added to reduce the risk of injury to the patients. The use of safety bows, rigid necks straps and snap release products are mandatory to prevent the bow from disengaging from the molar tubes. After fitting the headgear both verbal and written safety instructions should be given to patients and should be advised not to wear the appliance while playing outdoor sports.

Loops, Utility Arches

These are archwires that are usually used during orthodontic treatment for space closure, space maintenance or intrusion. Utmost care must be taken during their fabrication because they extend into the vestibular area, which may cause tissue impingement, ulcerations and other types of tissue damage. Careful fabrication and monitoring of such wire components are essential to avoid problems.[17]

Indirect Damage by Allergic Reactions

Nickel Allergy

Austenitic stainless steel used in orthodontic braces contains 18% chrome, 0.15% carbon and 8% nickel. Nickel is capable of causing a late-phase, type IV hypersensitivity reaction as it is potentially allergenic. Such a reaction will be characterized by signs such as gingival overgrowth, angular cheilitis and labial desquamation in the oral cavity. Orthodontic wires and brackets must be resistant to corrosion and ion release as they maintain proximity to the oral mucosa for long periods of time. They should not generate allergic responses. The material used should be well tolerated by oral tissues in the oral environment.[18]

Soft Tissue Complications related to Mini implants

The introduction of microimplants to orthodontics as a skeletal anchorage option has led to their use in critical anchorage situations. **The following type of complications can occur with miniscrews:**

1. Peri-implantitis- Peri-implantitis is inflammation of the gingiva around the implant. It results from improper oral hygiene maintenance. Counseling of patient should be done to maintain high level of oral hygiene throughout treatment.
2. Screw Fracture during Removal- Applying lateral forces during implant removal can result fracture. It is important not to shake the screwdriver when removing it from the screw head. It is uncommon if taken out straight. If the micro-implant is left for a very

long time, this also could lead to fracture on removal as a result of partial or full osseointegration.[19]

Implant failure (mobility/fracture) can also occur if the screw is too narrow or the neck area is not strong enough to withstand the stress of removal.[20]

Conclusion

Most orthodontic scars are short term and self-correcting in nature. One deviation to this rule strongly, is enamel decalcification and fractures, which require post-treatment rehabilitation. However, during the course of treatment these scars should be observed and treated, and if left unobserved they may cause complications in the form of infections resulting in pain and discomfort. To minimize the chances of such scars orthodontists keen observation should be there.

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