

A Rare Case of Apical Root Resorption during Orthodontic Treatment of Patient with Multiple Aplasia

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Abstract:

External apical root resorption is an adverse effect of orthodontic treatment. It reduces the length of root and breaks the integrity of teeth and dental arch. Orthodontics is the only dental specialty that clinically uses the inflammatory process to correct the mal-aligned teeth. Hence, it is necessary to know the risk factors of root resorption and do everything to reduce the rate of root resorption. Hence, all predisposing factors which are systemic as well as local should be considered before treatment begins. This case report describes the incidence of root resorption following orthodontic treatment and the teeth affected in the patient with multiple aplasia.

Key Words: Apical root resorption, external resorption, multiple aplasia, orthodontic treatment

Introduction

External apical root resorption (EARR) is an undesirable complication of orthodontic treatment that results in permanent loss of tooth structure from the root apex. Hence, it can be avoided with the more accurate management of orthodontic treatment. The studies indicate that patients undergoing orthodontic treatment are more likely to have severe EARR.¹⁻⁴ While this is not the only factor responsible for EARR, the effect of orthodontic treatment can be a major trigger.^{2,5} Hence, it is important to understand the role of orthodontics in the occurrence of EARR.

The etiology of EARR is multifactorial; these factors consist of individual biologic characteristics, genetic effect, and the

effect of orthodontic forces.^{2,4} Risk factors for EARR can be categorized as patient-related and treatment-related factors. Patient-related factors include; genetics, type of bone, systemic factors, asthma and allergies, chronic alcoholism, the extent of malocclusion, tooth morphology, a previous history of root resorption in any tooth, alveolar bone density, root proximity to cortical bone of each jaw, endodontic treatment, and patient age and sex, and multiple missing teeth. Orthodontic treatment-related risk factors include; the treatment duration, amount of applied force, direction and type of tooth movement, amount of apical movement, and method of force application.²

In the orthodontic treatment of the patients with aplasia, an inherent complication is the increased risk of apical root resorption (Liar, 1995). The purpose of orthodontic treatment may be to upright teeth and close spaces or to establish optimal conditions for prosthetic restorations. Apical root resorption is particularly unfavorable if the teeth are intended to be used as an anchorage for prosthetic restorations. It is thus important to consider the risk of root resorption during treatment planning of patients with aplasia.

This case report shows the extent to which the teeth can be affected by the process of root resorption along with multiple aplasia.⁷

Case Report

A 16-year-old male patient reported to the department with the chief complaint of an unpleasant smile. Patient is undergoing orthodontic treatment since last 7 years in a private orthodontic clinic.

Past dental history

At 7 years of age patient had retrognathic mandible, proclined maxillary anterior teeth, incompetent lips, acute nasolabial

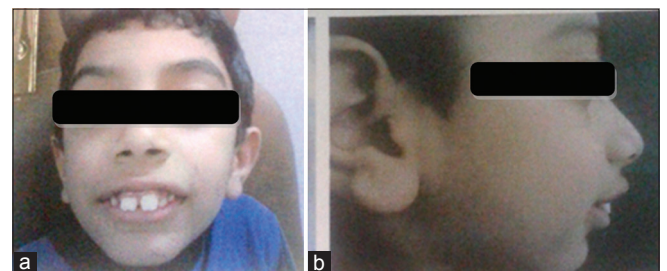


Figure 1: Pretreatment photographs, (a) Frontal view, (b) profile view.

angle, deep mentolabial sulcus, convex profile, increased lower facial height, increased maxillary incisor exposure, lower lip trap with gummy smile (Figure 1).

On orthopantomogram (OPG) examination, patient has missing tooth buds of 14, 23, 24, 32, 33, 34, 35, 42, 43, 45 (Figure 2).

Clinical examination

On extraoral examination, the patient has convex profile, steep forehead, and retrognathic chin with incompetent lips. Patient has obtuse nasolabial angle, deep mentolabial sulcus (Figure 3). On intraoral examination, patient has Angle's Class II Division I malocclusion, with Class II molar relation



Figure 2: Pre-treatment orthopantomogram.



Figure 3: Extraoral photographs, (a) Frontal view, (b) profile view, (c) 45° view.

bilaterally with retroclined upper incisors and deepbite (Figure 4). On palpation, Grade I mobility observed in 11 and 21. No tenderness was observed on percussion of the teeth.

Radiographic examination

On OPG examination, patient has root resorption in 11, 12, 13, 16, 21, 22, 26, 31, and 41. The crown root ratio had been altered to a great extent (Figure 5).

On intraoral periapical (IOPA) examination, patient has extensive root resorption in 11, 12, 21, 22, and moderate root resorption on 15, 25, and mild root resorption in 16, 26 (Figure 6).

On IOPA examination, 11 and 21 showing apical root resorption more than 1/3 of initial root length (Class D), 12 and 22 showing apical root resorption 2 mm to 1/3 of the initial root length (Class C), 13 showing apical root resorption <2 mm (Group B), and 16, 25 and 26 showing irregular root contour (Group A).⁷

Lateral cephalograms (Table 1) indicated retroclined upper incisors with retrognathic mandible and Class II molar relation

Table 1: Cephalometric values of patient.

Parameter	Patient's value
SNA	75°
SNB	70°
ANB	5°
Mandibular plane to SN	37°
FMA	29°
IMPA	89°
U1 to NA	15°
L1 to NB	23°
U1 to L1	138°
S Line	
Upper	1.5 mm
Lower	0.5 mm

IMPA: Incisor mandibular plane angle, FMA: Frankfort mandibular plane angle

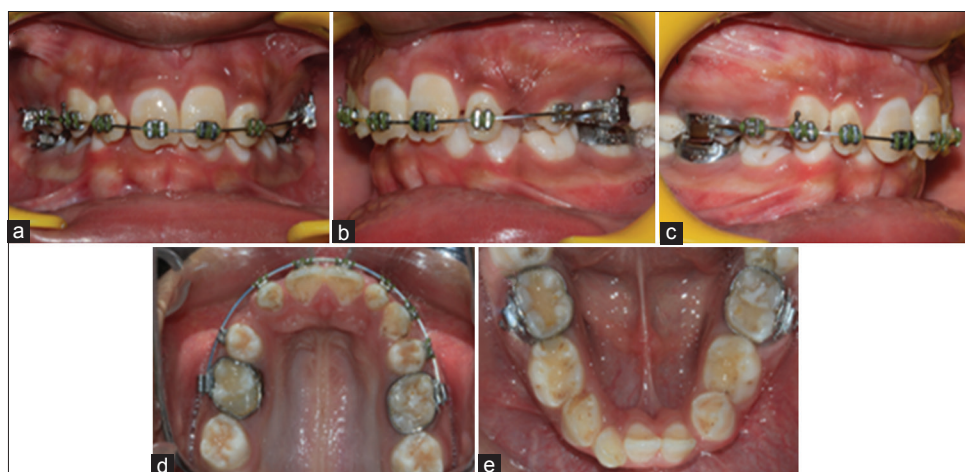


Figure 4: Intraoral photograph, (a) Frontal view, (b) left side, (c) right side, (d) maxillary occlusal view, (e) mandibular occlusal view.



Figure 5: Mid treatment orthopantomogram.



Figure 6: Mid treatment intraoral periapical (IOPA), (a) IOPA showing 11, 12, 21, (b) IOPA showing 13, 14, (c) IOPA showing 16, 17, (d) IOPA showing 21, 22, (e) IOPA showing 25, 26, (f) IOPA showing 26, 27.



Figure 7: Mid treatment lateral cephalogram.

bilaterally with incompetent lips and increased the lower facial height (Figure 7).

Discussion

The duration of force applied or active treatment is also one of the risk factors related to orthodontics. As in this reported case the duration of active treatment is around 6 years. According to Segal *et al.*,⁸ the longer the duration of active treatment and longer duration of force application proved to be highly correlated with EARR.

Kjaer⁹ demonstrated a relationship between some dental anomalies, particularly ectopia and agenesis of teeth and a tendency to root resorption during orthodontic treatment. In patients with multiple agenesis, the risk root resorption must be considered carefully because the teeth are often intended to serve as prosthetic abutments. Two variables - Treatment with rectangular archwires and intermaxillary elastics and duration of treatment are significantly related to the severity of root resorption. This may reflect the difficulty of controlling the force applied when fewer teeth are available for anchorage.

A major consideration is the management of apical root resorption detected early during active orthodontic treatment. Reitan¹⁰ recommended a temporary suspension of treatment in cases showing a strong tendency to root resorption.

Conclusion

Radiographic follow-up is indicated after 6-9 months of orthodontic treatment with fixed appliances.

If root resorption is noted in follow-up radiograph. Then orthodontic treatment should be paused for 2-3 months, with an inactive arch wire.

We, as orthodontic should take appropriate precautions in avoiding such unwanted sequelae by introducing light forces and using proper mechanotherapy especially in cases like multiple aplasia to achieve a healthy, well-balanced ideal occlusion without any complication because there is difficulty in controlling force applied when fewer teeth are available for anchorage.

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