

A Case Report of Caries Incident in a Patient Wearing an Essix Type Retainer

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Abstract

This report presents a rare case of multiple Class VI carious lesions developed in a young female patient due to full-time wearing of an Essix retainer combined with poor oral hygiene and high acidic diet. The demineralization during orthodontic retention and the hygiene instructions, including the retainer cleaning protocol, are highlighted.

Keywords: Essix retainer, Vacuum-formed retainer, Thermoplastic retainer, Class VI caries, Incisal caries, Demineralization.

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1. METHODOLOGY

This report has been completed in Princess Nourah bint Abdulrahman University (PNU). Institutional Review Board (IRB) Approval was taken. An appropriate patient consent form was attained for sharing imaging and clinical data. The patient understands that her name and initials will not be published. Data collected clinically, radiographically, and photographically about the patient's teeth and oral conditions were the focus point of this research. After a full examination, multidisciplinary consultations, and documentation of the case, a specific treatment plan was completed by Dr. Helaby.

2. CASE DESCRIPTION

A twenty-two years old, Saudi female patient came to PNU Dental clinics requesting affordable treatment options to enhance her smile confidence. The patient had worn an Essix retainer full-time -Even during eating and drinking- for both arches for one year after fixed orthodontic debonding. She only removed the retainer for cleaning -using only water- once a day.

The patient lost her retainer months ago before her first appointment at PNU dental clinic.

When diet counselling was performed, the patient revealed that she consumes three meals per day with a high carbohydrate rate. She also drinks three to four cups of soda per day. Low water intake also was mentioned. Regarding the oral hygiene habits, toothbrush used with fluoridated tooth paste once a day. Medical history showed a medically free 22 years old female with no known allergies. Clinical findings included generalized erythematous gingiva, Class II molar classification on the right side. In contrast, the left side molar is class I (Figure 1). Multiple incisal/cusp tips carious lesions, and recurrent caries were present in the upper and lower arch (Figure 2). Diagnoses involved plaque-induced gingivitis, multiple Class VI carious lesions related to upper and lower arches, caries assumed to be attributed to the incorrect usage of Essix retainer, multiple recurrent caries, and tooth #13 and #22 has necrotic pulp with asymptomatic apical periodontitis.



Fig-1: Lateral and frontal view, before the treatment.



Fig-2: Occlusal view, before the treatment.

3. TREATMENT

After a full mouth clinical examination and imaging, the treatment plan was made. Four phases were included in the treatment plan.

Phase one, the prevention phase. Since the patient considered as a high caries risk patient, she was advised to follow a simple daily protocol that includes:

- Eliminating between-meal snacking of fermentable carbohydrates and soft drinks and replace them with nuts, vegetables, and water as much as possible.
- In the morning, after breakfast, and at night, before bed, teeth brushing using a soft brush with high fluoride (5,000 ppm F) toothpaste.
- Flossing one time per day after brushing at night.
- Rinse with a chlorhexidine gluconate mouth rinse (0.12%) for one minute, the last thing at night before bed, this step only for the first week of each month.
- Daily use of a fluoride mouth rinse (0.05% sodium fluoride).

Phase two, periodontal treatment. Full mouth periodontal charting was performed to calculate the pockets depth as well as the plaque and bleeding index. After that, full mouth supragingival scaling was completed. Two weeks after, a follow-up appointment was scheduled. The gingival health was significantly improved.



Fig-3: Lateral and frontal view, after the treatment.

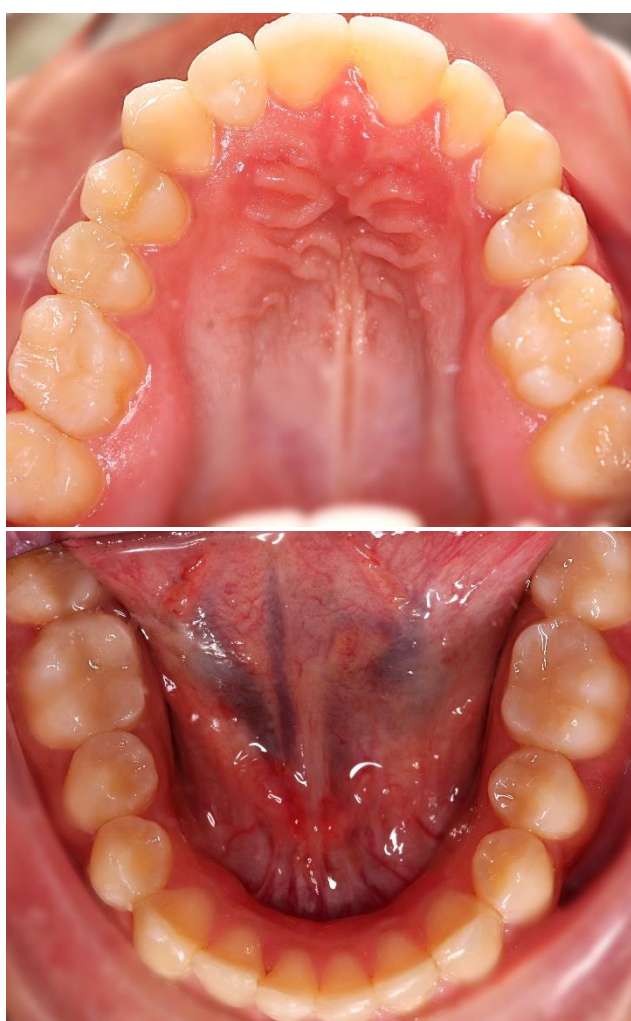


Fig-4: Occlusal view, after the treatment.

Phase three, operative measures. First, primary impressions were taken to study the case and create a wax-up for a smile analysis. After that, a Mock-up appointment was made to evaluate the pronunciation and estimate the smile appearance. New primary impressions were taken to fabricate new diagnostic casts. Then, Endodontic treatments were established for tooth #13 and #22. After root canal treatment, the teeth were closed with Glass Ionomer Cement. Subsequently, caries excavation and direct composite restorations were placed to restore the cavities in both arches. (Figure 3-4) Furthermore, two All Ceram crowns were placed to restore tooth #13 and #22. The patient's oral health improved significantly after the completion of the operative phase, leading to a boost in her smile confidence.

Phase four, maintenance. The recall visits scheduled every:

- 3-4 months for examination and fluoride varnish application.
- 6-12 months for Bitewing films until no cavitated lesions are showed.

4. DISCUSSION

4.1. Background and materials

To prevent relapse after orthodontic treatment and maintain the gained results over a long time, the retention phase is critical (Ramazanadeh *et al.* 2018). Orthodontists consider the Hawley retainer as a gold standard in retention (Jolley *et al.* 2016). But nowadays, vacuum-formed removable retainers or thermoplastic types of retainers such as Essix are widely used for many reasons (Ab Rahman *et al.* 2016). Being invisible, comfortable, and with short

manufacturing time and a reasonable price makes Essix appliance an excellent choice for the patients (R *et al.* 1995). Essix appliance was first introduced as an alternative to the traditional retainers (Sheridan and LeDoux 1993). Essix retainer is made from polyvinyl siloxane sheets that take the anatomical shape of the teeth (Ramazanzadeh *et al.* 2018). Another study reported that there are three types of materials that Essex retainer could be made of. Type A Essix is made from copolyester. Polypropylene or ethylene copolymer is used to make Essix retainer type C. Essix type A is more aesthetic than type C because of better clarity. However, type A tends to crack and tear. Type C Essix is stronger than type A but with low mechanical retention. After a while, manufacturers created the third type of Essix by combining the previous two types. The advantages of such creation outperformed the other types. But no creation is without flaws, these include less durability and more cracks and a high susceptibility to discoloration (Rinchuse *et al.* 2007). Regularly, the thicknesses of Essix are between 0.75 mm and 1 mm (Vaida *et al.* 2020).

4.2. Essix Application and maintenance

Though the design of Essix retainers is more comfortable than conventional retainers, Essix should not be used for an extended period, and patients should follow specific protocols. (Ramazanzadeh *et al.* 2018). In this case report, the patient had been using upper and lower Essix retainer full-time for one year, following the completion of fixed orthodontic therapy. Some of the recommended protocols for thermoplastic retainers are full-time wear for the first week and then during night-time only for at least one year. For better incisor alignment in the mandible, the patients should be advocated to wear Essix full-time for four months and then during night-time only for the remainder of the treatment (Ramazanzadeh *et al.* 2018). Many changes can occur in the oral environment when a patient is wearing removable orthodontic retainers. Our patient was eating her meals without removing the retainer. We assumed that this repeated scenario was the main reason behind the formation of caries. A study showed that the retainers introduce additional surfaces that biofilms may form on. Adolescent orthodontic patients are more caries-prone population due to biofilm formation. These biofilms can induce caries-causing bacteria that could migrate to tooth surfaces and accelerate caries' formation (Jolley 2016). Also, a previous study reported a high amount of *Streptococcus mutans* (*S. Mutans*) in children using removable appliances (Batoni *et al.* 2001). Essix should be used after cleaning both the inner surface of the retainer and the teeth surfaces. While the retainer works as a cover that prevents saliva from washing teeth, colonization of *S. Mutans* and *Lactobacillus* on dental surfaces increases (Türköz *et al.* 2012). The bacteria adhere to the teeth, break down carbohydrates in food/beverage remnants, and produce acid. The acidic environment with time leads to demineralization of the teeth surfaces that in contact

with the retainer's inner surface, i.e., the cusp tips of the posterior teeth and the incisal edges of anterior teeth. G.V. Black classifies this caries pattern as class VI.

4.3. Hygiene Recommendation:

Research on oral hygiene instructions represents a reduction in *S. Mutans* by 99% with brushing. The same study recorded three effective methods to clean the Essix retainer: the first one is brushing with fluoride toothpaste, the second is brushing with chlorhexidine gel, while the third method is the immersion of the retainer in a chlorhexidine solution. There was no statistical significance between any cleaning groups for any microorganisms' growth. Control groups who used both CHX mouthwash and gel to eliminate the microorganism were more effective than the group using only the fluoridated toothpaste. Nonetheless, brushing with fluoride toothpaste can be approved as an effective method for cleaning retainers in most cases. Whereas In patients where bacterial infection must be avoided because of immunosuppression or any other disease, chlorhexidine gel and mouthwash is suggested (Chang *et al.* 2014).

5. CONCLUSION

Even though oral hygiene is the patient's responsibility, hygiene education is the responsibility of the dental staff. Orthodontists, general dentists, and hygienists oversee:

- Give definite instructions about the Essix retainer wearing duration.
- Give an exact cleaning protocol for both teeth and retainer.
- Advocate the patients to attend monthly follow-up appointments for the first six months.
- For patients with poor oral hygiene or multiple incipient carious lesions, oral hygiene improvement should be observed while using Hawley retainer; then, the Essix retainer could be used.

6. ACKNOWLEDGMENT

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7. AUTHOR CONTRIBUTIONS

A. Alowid, B. Helaby, and L. ALQarni contributed to the conception, design, data acquisition, and interpretation, and critically revised the manuscript. All authors gave their final approval and agreed to be accountable for all aspects of the work.

8. CONFLICT OF INTEREST

The authors declare no potential conflicts of interest with respect to the authorship and/or publication of this article.

9. REFERENCES

1. Ab Rahman, N., Low, T. F., & Idris, N. S. (2016). A survey on retention practice among orthodontists in Malaysia. *The Korean Journal of Orthodontics*, 46(1), 36-41.
2. Batoni, G., Pardini, M., Giannotti, A., Ota, F., Rita Giuca, M., Gabriele, M., & Senesi, S. (2001). Effect of removable orthodontic appliances on oral colonisation by mutans streptococci in children. *European journal of oral sciences*, 109(6), 388-392.
3. Chang, C. S., Al-Awadi, S., Ready, D., & Noar, J. (2014). An assessment of the effectiveness of mechanical and chemical cleaning of Essix orthodontic retainer. *Journal of orthodontics*, 41(2), 110-117.
4. Jolley, R. D. (2016). The Effects of Orthodontic Appliance Base Plate Material, PMMA, Infused with Silver and a Novel Antibacterial Compound On Biofilm Formation.
5. Ramazanzadeh, B., Ahrari, F., & Hosseini, Z. S. (2018). The retention characteristics of Hawley and vacuum-formed retainers with different retention protocols. *Journal of clinical and experimental dentistry*, 10(3), e224.
6. Rinchuse, D. J., Miles, P. G., & Sheridan, J. J. (2007). Orthodontic retention and stability: a clinical perspective. *Journal of Clinical Orthodontics*, 41(3), 125.
7. Sampson, P., Little, R. M., Årtun, J., & Shapiro, P. A. (1995). Long-term changes in arch form after orthodontic treatment and retention. *American Journal of Orthodontics and Dentofacial Orthopedics*, 107(5), 518-530.
8. Sheridan, J. J., LeDoux, W., & McMinn, R. (1993). Essix retainers: fabrication and supervision for permanent retention. *Journal of clinical orthodontics: JCO*, 27(1), 37-45.
9. Türköz, Ç., Bavbek, N. C., Varlik, S. K., & Akça, G. (2012). Influence of thermoplastic retainers on Streptococcus mutans and Lactobacillus adhesion. *American journal of orthodontics and dentofacial orthopedics*, 141(5), 598-603.
10. Vaida, L. L., Bud, E. S., Halitchi, L. G., Cavalu, S., Todor, B. I., Negrutiu, B. M., & Bodog, F. D. (2020). The behavior of two types of upper removable retainers—Our Clinical Experience. *Children*, 7(12), 295.