



Oral Rehabilitation of a Patient with Amelogenesis Imperfecta using Removable Overlay Denture: A Clinical Report

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ABSTRACT

Aim: The aim of this study was oral rehabilitation of 17-year-old patient with amelogenesis imperfecta using removable overlay denture in order to satisfy her esthetic and functional expectations and enhance her self-image.

Background: Amelogenesis imperfecta (AI) is a group of genetic disorders that primarily affect the quality and quantity of amelogenesis in both primary and permanent dentitions. The main clinical characteristics are severe attrition, tooth sensitivity and unesthetic appearance.

Case report: This clinical report illustrates the oral rehabilitation of a 17-year-old girl with hypoplastic-hypomature type of AI with cobalt-chromium (Co-Cr) overlay removable partial denture (ORPD) that is one of the most economical and biocompatible replacements for noble metal and nickel-chromium (Ni-Cr) alloy.

Conclusion: The presented case report suggests that Co-Cr ORPD can be a good temporary or even permanent treatment option for AI patients with limited budget, low esthetic concerns or medical limitations.

Clinical significance: There are major advantages in cast metal ORPDs; they are simpler, less traumatic and less expensive than fixed prosthetic options. This case report supports their use in patients with amelogenesis imperfecta.

Keywords: Amelogenesis imperfecta, Hypoplastic enamel, Diagnosis, Oral, Denture, Partial, Removable, Case report.

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INTRODUCTION

Amelogenesis imperfecta (AI) is a hereditary disorder encompassing a heterogeneous group of developmental

problems which alter the enamel structure. Generally both the primary and permanent dentitions are involved. The dentin and root form of the affected teeth are usually normal.^{1,2}

AI is caused by mutations in genes that control amelogenesis like amelogenin and follow inheritance patterns of autosomal-dominant (AD), autosomal-recessive (AR), or X-linked modes of transmission.¹⁻³ Classifications of this disorder are primarily based on phenotype and mode of inheritance. The most commonly used classification was proposed by Witkop in 1988.⁴ Although in recent years new classifications based on molecular diagnosis methods have been proposed,⁵ Witkop classification is still extensively used in the literature. Based on the enamel appearance and hypothesized developmental defects, AI is classified into four main groups and 15 subgroups (Table 1).^{6,7}

Clinical problems of AI patients mainly include poor esthetics, sensitive teeth, loss of occlusal vertical dimension, chewing difficulties, tooth wear and open bite.^{8,9}

Treatment plan of AI is related to many factors, including patients' age, socioeconomic status, type and severity of the disorder and intraoral condition. Treatment starts from childhood and continues throughout adolescence. An interdisciplinary approach is necessary in evaluation, diagnosis and treatment of AI including a combination of periodontal, orthodontic, prosthodontic, surgical and restorative methods.⁹⁻¹¹

Recently, most cases of AI are restored with adhesive restorative techniques, overdentures, fixed partial dentures, full-ceramic crowns, PFM crowns and inlay/onlay restorations. Overdenture has been suggested for children as it is alterable to accommodate their growth process.¹¹⁻¹⁵ Overlay denture can be used as a provisional or permanent prosthesis in some patients and can provide reversible and relatively inexpensive option.¹⁶

Table 1: Witkop classification of amelogenesis imperfecta

Characteristics of four main amelogenesis imperfecta types			
Type	Clinical appearance	Radiographic appearance	Inheritance
Hypoplastic (type I)	Multiple enamel pits, severe attrition of the enamel leads to opening of the proximal contact area, snow-capped appearance, thin enamel layer with yellow or brown color, permanent teeth eruption problems	The enamel contracts well with the dentin	AD, AR X-linked D
Hypomaturation (type II)	The enamel is mottled in appearance, relatively normal in thickness, but it is softer than normal, the teeth appear as creamy opaque to yellow brown, often with open bite and dental sensitivity. Hypomineralization is often manifested as enamel chipping or wearing	Radiodensity of the enamel is similar to the dentin	AD, AR X-linked D
Hypocalcified (type III)	The teeth is opaque white or yellowish brown, the enamel surface is rough, the enamel has a normal thickness, the enamel chips away easily, and there are dental sensitivity, open bite, heavy calculus formation	Enamel has contrast similar to or less than dentin, unerupted crowns have normal morphology	AD, AR
Hypomaturation/hypoplasia/taurodontism (type IV)	Similar to both the hypoplastic and hypomature types, in addition to taurodontism and anterior open bite with skeletal basis	Enamel contrast normal to slightly more than dentin, large pulp chambers	AD

CASE REPORT

A 17-year-old girl was referred to the Department of Prosthodontics of Shiraz Dentistry School (Shiraz University of Medical Sciences, Iran) for treatment of her unpleasant appearance and dysfunction. Her dental characteristics were similar to hypoplastic-hypomature type of AI.

Her medical history showed no special problem. Extraoral examination showed normal facial ratios and symmetry of the face with convex profile. TMJs and masticatory muscles were normal. Maximum mouth opening was in the normal range, and there was no deviation or deflection in opening or closing. The lymph nodes were normal. When smiling, her high lip line showed about 6 mm of the cervical gingival tissues (gummy smile). Intraoral examination revealed severe attrition of all the teeth, over-retention of the primary teeth, thin enamel layer and yellowish brown appearance of the teeth. Oral hygiene was good and there was no calculus on the teeth and no anterior open bite. The gingiva was normal in color and appearance. OVD was not decreased (Fig. 1). Radiographic examination showed multiple permanent teeth impaction (13, 14, 15, 17, 18, 24, 25, 26, 27, 28, 32, 33, 34, 35, 37, 38, 42, 43, 44, 45, 47, 48), and overretention of the deciduous teeth (53, 55, 73, 75, 83, 85). The enamel was undetectable even on the impacted teeth and there was evidence of pulp stones in the pulp chambers of the teeth (Fig. 2). Cephalometric radiograph revealed bimaxillary protrusion.

After mounting the casts with facebow in CR, the proposed treatment plans were as follows:

1. *Orthodontic extrusion of the teeth after surgical exposure and fixed restorative approaches:* Mini-implants were

used as anchorage because of inadequate tooth structures for bands or brackets. After considering this ideal approach, an special problem occurred: Frequent debonding of the brackets even with the best dentin



Fig. 1: Intraoral view of the patient with amelogenesis imperfecta

bonding methods. After about 1 year, no considerable eruption occurred. Furthermore, the conical shape of the tooth crowns and their impaction made it impossible to use bands instead of brackets. Root canal therapy using post and core in the impacted teeth was impossible because of the depth of the impaction, pulp stones and lack of predictability (Fig. 3).

2. *Removable acrylic overdenture:* Try-in of the teeth arrangement showed that this approach was appropriate in the lower arch but the upper lip did not allow the use of acrylic base and artificial teeth because of the severe protrusion of the upper lip and aggravation of the gummy smile.
3. *Cast removable overlay denture:* It seemed a suitable approach for the upper arch because the absence of labial flange helps to maintain the lip contour and the esthetic aspects could be approved with the use of porcelain labial veneer and the retention could be improved with friction between the teeth and overlay copings.

The teeth with poor prognosis were extracted. The lower remaining two teeth were endodontically treated and prepared for overdenture (coronal reduction). In the upper arch, conservative gingivectomy was considered to improve the retentive quality of the exposed teeth. One month later, in order to eliminate the undercuts and provide adequate space for framework, axial and occlusal conservative

preparation in the upper teeth was done. Then the final impression of the both jaws was poured and mounted with facebow and CR records in semiadjustable articulator. The lower teeth were arranged according to the lip corners and retromolar pads as guides.

A diagnostic wax-up was done on the mounted casts to establish the occlusal plane, tooth contour and position and desired esthetic for final restoration. After indexing the proposed teeth position, the overlay framework was waxed up opposing the lower overdenture. In order to minimize acrylic tooth attrition, the contact point of the lower incisal edge was placed on the upper metal substructure. The framework was cut back according to the index for even porcelain application (Fig. 4) and then casted with Co-Cr alloy (because of Ni allergy history of the patient), and checked intraorally for marginal fit. The metal copings covered the exposed teeth of the maxillary arch up to the first premolar on the left and second premolar on the right and extended with a saddle like configuration up to the left and right tuberosities to support the acrylic base and teeth on the residual posterior ridges.

Feldespatic porcelain was added by using the wax up index as a guide. Overlay denture with baked porcelain was checked intraorally and adjusted. The porcelain was glazed and the posterior maxillary acrylic teeth were arranged on a wax rim (Fig. 5). Then the lower acrylic overdenture was processed with heat-cure acrylic resin and the posterior part of the upper overlay was prepared with visible light cure (VLC) resin to prevent porcelain fracture during flasking procedure.

The intended occlusion was bilaterally balanced and refined with remounting. The upper overlay and lower overdenture were delivered to the patient (Fig. 6). Postdelivery instructions included fluoride application at the time of denture insertion, removing denture at night and chlorhexidine mouth rinsing before going to sleep.

Follow-up: During the follow-up appointments, the patient was monitored to evaluate the function and appearance of the prosthesis, enquire about her satisfaction, and examination of any further tooth eruption. During 1 year follow-up, there was no evidence of considerable tooth eruption and also caries. The patient's self-esteem improved distinctly, and she did not try to hide her teeth during smile anymore (Fig. 7).

DISCUSSION AND CLINICAL SIGNIFICANCE

AI is a serious problem that can result in reduced quality of life and some physiological and psychological problems. From this point of view, these patients need extensive and multidisciplinary approach treatments. As long as failure of the permanent teeth eruption in these patients is more



Fig. 2: Panoramic radiograph of the patient



Fig. 3: Orthodontic extrusion of the teeth



Fig. 4: Overlay framework waxed up and cuted back



Fig. 5: Posterior denture teeth arrangement on partial overlay denture

than normal people,¹⁷ prosthetic methods for replacing the impacted teeth are the necessary parts of their treatment plan that should be revised according to each case's special condition.

Overlay removable partial denture (ORPD) is a subset of overdentures that has part of its components covering the occlusal surface of the abutment teeth to restore them into functional occlusion.¹⁸ According to the literature, there are three main indications for ORPD as follows:

1. As interim prosthesis for accurate evaluation of the proper OVD in severely worn dentitions.
2. As interim and permanent prosthesis for patients with hereditary disorders and severe malocclusion resulting from cleft palate, skeletal malocclusion or open bite.

3. As interim or permanent prosthesis for patients with medical or financial limitation for FPDs.^{16,18-23}

There are major advantages in cast metal ORPDs; they are simpler, less traumatic and less expensive than fixed prosthetic option. Several case raports support their successful use in patients with congenital and acquired anomalies.¹⁸⁻²² In several parameters, the results are similar to extensive fixed restorations with compromise in esthetic and risks of material fracture.²³

While there are limited studies on longevity of ORPDs, it appears that wear, fracture or debonding of occlusal materials are primary causes of failure; therefore, these potential risks as well as esthetic and functional limitations should be discussed with the patient. In the present case, the patient tolerated the use of overlay partial denture and overdenture well after routine recall visits.

CONCLUSION

The presented case report suggests that Co-Cr ORPD can be a good temporary or even permanent treatment option for AI patients with limited budget, low esthetic concerns or medical limitations. Due to the potential risks for material fracture, wear or debonding, regular recall and maintenance visits are essential to ensure the long-term success of ORPDs.



Fig. 6: Partial overlay and overdenture *in situ*



Fig. 7: Follow-up intraoral view after 1 year (the patient has slightly opened her mouth)

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REFERENCES

1. Aren G, Ozdemir D, Firatli S, Uygur C, Sepet E, Firatli E. Evaluation of oral and systemic manifestations in an amelogenesis imperfecta population. *J Dent* 2003;31:585-91.
2. Neville BW, Douglass DD, Allen CM, Bonquot JE. Abnormalities of teeth. *Oral and Maxillofacial Pathology*. Pennsylvania: Elsevier (2nd ed). 2004;89-94.
3. Kim JW, Simmer JP, Hu YY, Lin BP, Boyd C, Wright JT. Amelogenin p.M1T and p.W4S mutations underlying hypoplastic X-linked amelogenesis imperfecta. *J Dent Res* 2004; 83:378-83.
4. Seymen F, Kiziltan B. Amelogenesis imperfecta: A scanning electron microscopic and histopathologic study. *J Clin Pediatr Dent* 2002;26:327-35.
5. Aldred MJ, Savarirayan R, Crawford PJ. Amelogenesis imperfecta: A classification and catalogue for the 21st century. *Oral Dis* 2003;9:19-23.
6. Sanjay Saraf. Textbook of oral pathology. Chapter 3: Developmental disorders of oral and paraoral structure. Published by gitendarpvig (1st ed). 2006;49-51.
7. Kostoulas I, Kourtis S, Andritsakis D, Doukoudakis A. Functional and esthetic rehabilitation in amelogenesis imperfecta with all-ceramic restorations: A case report. *Quintessence Int* 2005;36:329-38.
8. Crawford PJ, Aldred M, Bloch-Zupan A. Amelogenesis imperfecta. *Orphanet J Rare Dis* 2007;4(2):17.
9. Hoppenreijts TJ, Voorsmit RA, Freihofer HP, van't Hof MA. Open bite deformity in amelogenesis imperfecta (Part 2): Le Fort I osteotomies and treatment results. *J Craniomaxillofac Surg* 1998;26:286-93.
10. Ozturk N, Sari Z, Ozturk B. An interdisciplinary approach for restoring function and esthetics in a patient with amelogenesis imperfecta and malocclusion: A clinical report. *J Prosthet Dent* 2004;92:112-15.
11. Sazegara H, Seyedan K, Behnia H, Ghaderi P. Prosthetic and surgical approach for oral rehabilitation in a patient with amelogenesis imperfecta: A clinical report. *J Dent Tehran Univ Med Scien Iran* 2007;4:92-96.
12. Canger EM, Celenk P, Yenisey M, Odyakmaz SZ. Amelogenesis imperfecta, hypoplastic type associated with some dental abnormalities: A case report. *Braz Dent J* 2010;21:170-74.
13. Siadat H, Alikhasi M, Mirfazaelian A. Rehabilitation of a patient with amelogenesis imperfecta using all-ceramic crowns: A clinical report. *J Prosthet Dent* 2007;98:85-88.
14. Akin H, Tasveren S, Yeler DY. Interdisciplinary approach to treating a patient with amelogenesis imperfecta: A clinical report. *J Esthet Restor Dent* 2007;19:131-35.
15. Toksavul S, Ulusoy M, Türkün M, Kümbüloğlu O. Amelogenesis imperfecta: The multidisciplinary approach. A case report. *Quintessence Int* 2004;35:11-14.
16. Patel MB, Bencharit S. A treatment protocol for restoring occlusal vertical dimension using an overlay removable partial denture as an alternative to extensive fixed restorations: A clinical report. *Open Dent J* 2009;3:213-18.
17. Seow WK. Dental development in amelogenesis imperfecta: A controlled study. *Pediatr Dent* 1995;17:26-30.
18. Farmer JB, Connelly ME. Treatment of open occlusions with onlay and overlay removable partial dentures. *J Prosthet Dent* 1984;51:300-303.
19. Lee H, Oster C. A technique to fabricate metal occlusal surfaces for the overlay removable partial denture. *J Prosthet Dent* 2006;96:456-57.
20. Zarati S, Ahmadian L, Arbabi R. A transitional overlay partial denture for a young patient: A clinical report. *J Prosthodont* 2009;18:76-79.
21. Jahangiri L, Jang S. Onlay partial denture technique for assessment of adequate occlusal vertical dimension: A clinical report. *J Prosthet Dent*. 2002;87:1-4.
22. Windchy AM, Morris JC. An alternative treatment with the overlay removable partial denture: A clinical report. *J Prosthet Dent* 1998;79:249-53.
23. Kolodney H Jr, Akerly WB. A composite resin veneer occlusal surface on an overlay partial denture. *Compendium* 1991;12:66, 68,70.

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