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Prosthetic Rehabilitation of a Patient with Amelogenesis Imperfecta: A Clinical Case Report

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Abstract:*Amelogenesis imperfecta (AI) is a group of inherited disorders characterized by abnormal enamel formation. This article outlines the treatment aspect for rehabilitation of occlusion using telescopic overdenture for a patient having amelogensis imperfecta.*
Keywords:*Amelogensis Imperfecta, Telescopic overdenture, Primary coping.*

I. Introduction

Amelogenesis imperfecta (AI) is a group of inherited disorders characterized by abnormal enamel formation. These enamel defects are a result of gene mutations associated with amelogenin protein and enamelin protein, which are secreted during the amelogenesis process. However, most forms of AI do not have a defined molecular basis at this time. AI follows an autosomal dominant, autosomal recessive or X-linked pattern of inheritance. The reported prevalence of AI is highly variable, it is reported to be 1:14,000 in the USAand 1:700 in Europe**.**

The enamel defects associated with AI are highly variable, and the main clinical problems are extensive loss of tooth tissue, poor esthetics and tooth sensitivity. Enamel in both the primary and the permanent dentition will be affected. Pulp and dentin are usually normal and the teeth are usually caries resistant. Apart from enamel defects, AI has been also associated with inclusions, abnormalities in dental eruption, congenitally missing teeth, anterior open bite, pulpal calcifications, root and crown resorption, hypercementosis, root malformations and taurodontism.[1]

AI has been classified on the basis of clinical, radiographic and histologic appearance of the enamel defect and the mode of inheritance of the trait. AI has been categorized as hypoplastic (autosomal dominant /autosomal recessive /X-linked dominant), hypocalcified (autosomal dominant/autosomal recessive), hypomaturation types (autosomal recessive/x-linked recessive/autosomal dominant) and hypoplastic-hypomaturation type. Hypoplastic AI represents 60 to 73% of all cases, hypomaturation AI represents 20 to 40%, and hypocalcification AI represents 7%.

Hypoplastic form of AI is characterized by thin enamel with yellowish-brown color, rough or smooth and glossy, square-shaped crown, lack of contact between adjacent teeth, flat occlusal surfaces of the posterior teeth due to attrition, and with/without grooves and/pitting. Radiographically, in hypoplastic type, there is a presence of thin radiopaque layer of enamel with normal radiodensity. Histologically, in hypoplastic type, defect is in enamel matrix formation.

Hypocalcified form of AI is the most common type and is characterized by normal size and shape of crown, softer enamel which wears down rapidly and can be removed by a prophylaxis instrument, and become pigmented-dark brown colored. Radiographically, in hypocalcified form, thickness of enamel is normal but radiodensity of enamel is less than that of dentin. Histologically, in hypocalcification type, defects of matrix structure and mineralization is seen.

Hypomaturation form of AI is characterized by normal thickness of enamel but softer than normal but harder than hypocalcified type and may crack away from the crown, mottled- colored cloudy white/yellow/brown/snow capped. Radiographically, radiodensity of enamel is similar to that of dentin. Histologically, in hypomaturation type, alterations in enamel rod and rod sheath structures had been noted in various studies.

In hypoplastic-hypomaturation with taurodontism, the enamel is thin, mottled yellow to brown, and pitted. Molar teeth exhibit taurodontism and other teeth have enlarged pulp chambers.[2]

Case Report

A 19 year old female patient reported to the Department of Prosthodontics, Bharati Vidyapeeth Deemed University Dental College and Hospital, Pune with the chief complaint of replacement of missing teeth. She was unhappy with her unesthetic smile and had difficulty in mastication. She gave a medical history of

nephrocalcinosis and had undergone treatment for the same. Her dental history included extractions, root canal treatment and paediatric metal crowns.

On oral examination, it was seen that 51,52,53,61,62,63,64,65,73,74,36,83,46 were the teeth present (fig 1).The teeth had very thin enamel present and had smooth, shiny appreance without pitting. On viewing the orthopentogram(OPG) it was revealed that patient had multiple unerupted teeth which had no possibility of eruption in the future (fig 2). Thus the diagnosis was that patient had hypoplastic type of AI.

Thus the treatment options given to the patient were:

1.) Crown lengthening for 51, 52, 53, 61, 62, 63, 64, 65 followed by crowns and maxillary, mandibular removable partial denture.
2.) Crown lengthening for 51, 52, 53, 61, 62, 63, 64, 65 followed by crowns and maxillary cast partial denture. Removal of pediatric metal crowns for 36, 46 followed by telescopic overdenture for the mandibular arch.

The second option was accepted by the patient and treatment was started.

1.) Crown lengthening procedure was performed for 51, 52, 53, 61, 62, 63, 64, and 65 using electrocautery(monopolar unit 0.9 amp,230 volts at 1.5 to 1.7MHz) so as to increase the crown height and to restore the teeth with crowns. Previously cemented pediatric metal crowns were removed for 36 and 46.
2.) After 2 weeks, when the desired gingival levels were achieved, maxillary teeth were prepared (fig.4)and primary impressions were made using an irreversible hydrocolloid (Tropicalgin, Zhermack).Impression thus obtained was poured in type III dental stone(Kalabhai).
3.) Later maxillary cast was mounted on the Hanau Wide Vue articulator using facebow (Hanau springbow).For mounting the mandibular cast centric relation was recorded using Dawson's technique.
4.) Temporaries were then fabricated for the maxillary teeth on the mounted maxillary cast. Intra-oral adjustments were made for the temporaries and cementation was completed using non-eugenol temporary cement (Relyx X^{TM} Temp NE,3MESPE).
5.) After cementing the temporary crowns, mandibular teeth were prepared to receive the primary copings. Preparations were done such that the teeth had parallel walls with minimum taper.
6.) After the preparation was completed,final impression was made using addition silicone impression material (3M, ESPE) for the fabrication of primary copings.
7.) Impression was poured in type IV die stone and wax patterns were fabricated. Milling of the wax patterns was done to ensure that the axial walls are parallel with minimum taper and later these wax patterns were casted.
8.) Primary copings were cemented using Glass Ionomer Cement (GC Corporation Tokyo,Japan)(fig.5)
9.) After half an hour, impression was made using an irreversible hydrocolloid of the cemented copings to obtain a cast to fabricate a custom tray for the final impression for the denture with secondary copings.
10.) Border molding of the custom tray was completedusing low fusing impression compound (DPI Pinnacle) and final impression for the denture was made using monophase impression material.(Aquasil Monophase, Dentsply)
11.) The impressionwas then beaded and boxed(fig.6) and cast was poured using Type IV die stone.
12.) In the next appointment, primary impression was made with an irreversible hydrocolloid of the temporized maxillary crowns and the maxillary cast was mounted using face-bow.
13.) Record base was fabricated on the mandibular cast and wax rims were made to record the jaw relation.
14.) Centric relation was then recorded and the mandibular cast was mounted.
15.) After assessment of vertical dimension, protrusive contacts and esthetics, try-in was completed and thedentures were fabricated with the secondary copings as a part of the denture.
16.) Denture insertion was completed and final impression was made for the maxillary teeth (fig.7,8,9)
17.) The maxillary cast was then mounted using the face bow (Hanau spring bow) and the mandibular impression was made of the dentures in irreversible hydrocolloid.
18.) Mandibular cast thus obtained was mounted using the centric relation record.
19.) Copings were then fabricated and coping trial was done for the maxillary teeth.Since cast partial denture was planned for the maxillary arch, surveyed crowns were planned for 13,14,24,25.
20.) Later bisque trial of the maxillary crowns was completed and anterior guidance was adjusted intra-orally.
21.) In the next appointment ,the maxillary crowns were cemented using an adhesive cement (RelyX ,3MESPE) (fig.10,11)
22.) Final impression was made for the cast partial denture for the maxillary arch and the cast was poured. Split cast technique was used for the maxillary cast.
23.) Metal framework try-in was completed(fig.12), followed by facebow transfer.Later centric jaw relation was recorded and the mandibular cast was mounted. Protrusive record was also made and the articulator was programmed.
24.) Teeth were arranged so as to produce protrusive and eccentric balancing contacts.

25.) The final cast partial denture was then delivered(fig.13, 14, and 15.)

II. Discussion

Amelogenesis imperfecta has marked psychosocial effects.It's very important to have teeth and oral esthetics for a normal psychosocial development. However, the restoration of esthetics and function of teeth in patients suffering from amelogenesis imperfecta often represents to the dentist as a challenge.

Earlier some authors have stated that for treatment of patients with amelogenesis imperfecta,extraction of remaining teeth followed by complete denture construction is the most feasible treatment option.[1]But with advancement in prosthodontics it is now possible to use different treatment modalities to rehabilitate a patient with amelogenesis imperfecta.

In the case explained above, it was observed on intra-oral examination that the crown height of the maxillary teeth was insufficient to restore it with fixed prosthodontics. Hence crown lengthening procedure was performed. Patient was previously treated with pediatric crowns for 36 & 46. But, since the treatment plan involved, telescopic overdenture for the mandibular arch, the pediatric crowns had to be removed.

The maxillary teeth were then prepared to receive the temporaries after 2 weeks; when appropriate gingival levels were obtained. Tooth preparation was performed such that the crown height was not reduced and shoulder margin was prepared to receive porcelain fused to metal crowns.

Intially it was planned to provide 14& 25 with extra-coronal attachments for retaining the maxillary cast partial denture. But due to the reduced crown height; an attachment was contra-indicated. Thus a conventional cast partial denture with surveyed crowns were planned for 13, 14 and 24, 25.

Before finalizing the maxillary crowns, using the temporary crowns as a guide, mandibular arch was restored with a telescopic overdenture.

The abutment teeth for telescopic overdenture were prepared such that the walls of the preparation had minimum taper and overall chamfer margins. The wax pattern of the primary copings for the abutment teeth were milled so as to obtain parallel walls.

Teeth were arranged such that protrusive contacts were obtained with maxillary temporary crowns by setting condylar guidance at an average value of 30^0. After telescopic over-denture was delivered, final impressions for the maxillary teeth was made.

It was realized that to maintain golden proportion a single bridge had to be prepared from 14 to 25 and accordingly metal copings were prepared.

For aesthetic purpose gingival porcelain was used and rest of the porcelain build-up was completed using the putty index of the temporary crowns and protrusive contacts were developed in the bisque trial.

Since the crown height was not ideal, adhesive cement (Relyx, 3MESPE) was preferred over the conventional Glass Ionomer cement.[3]

In the next appointment metal framework try-in was completed for the maxillary cast partial denture. Wax rims were prepared on the framework and jaw relation was recorded. Protrusive and centric relation records were made. Split cast technique was used for mounting the maxillary cast since it helped to program the articulator. Once the posterior teeth were arranged, the balancing eccentric and protrusive contacts were reproduced and processing of the cast partial denture wascompleted.

While insertion of the maxillary cast partial denture it was observed that due to the bilateral buccal undercuts there was interference while inserting and removing the denture. Thus, the denture was relieved and the patient was easily able to insert and remove the cast partial denture.

Telescopic crowns have been used mainly in RPDs to connect dentures to the remaining dentition, but these can be used effectively to retain complete dentures which receive their support partly from the abutments and partly from the underlying residual tissues.

Careful assessment of the interarch space is very important for the successful fabrication of the telescopic dentures. Sufficient space must be present to accommodate the primary and secondary copings, to have a sufficient denture base thickness to avoid fracture, space for the arrangement of the teeth to fulfill the aesthetic requirements and to have an interocclusal gap. The space consideration usually requires the devitalization of the abutments. The selected abutments should be periodontally sound with adequate bone support and no/ minimal mobility. There should be at least one healthy abutment in each quadrant. An even distribution of the abutment in each quadrant of the arch is preferable for better stress distribution and for increased retention and stability of the prosthesis. The interocclusal gap/ interarch distance should be $\geq$ 10 mm, in order to have sufficient space for the copings, denture base, teeth placement and adequate closest speaking space.

The contours and the degree of taper of the outer aspect of the primary coping determine the path of insertion and the amount of retention of the prosthesis. The retention varies inversely with the taper of the coping. Even copings of minimal taper (approximately 5 degrees) require a height of about 4mm to achieve a significant retention. The height and size of the inner coping also influence the retention. The essential requirements for the long service of the telescopic prosthesis are, to provide adequate height of the vertical walls

(at least 4mm), sufficient thickness of the copings (never less than 0.7mm for each casting) and a taper of around 6º's. [4]

Over denture therapy constitutes essentially a preventive prosthodontics concept as it endeavors to preserve the few remaining teeth and the supporting structures.The teeth which are too weak to support a fixed partial denture and are considered unsuitable to support a removable partial denture can often at times be usefully conserved and suitably modified to act as abutments under over dentures for useful span of time. [5]
It has been observed by many authors that positive results are seen in patients with reduced dentition treated with telescopic overdentures.[6]

The advantages of telescopic overdentures are axial loading of the tooth thereby reducing tilting forces which can cause resorption of the bone.Advantages of telescopic overdenture over other types of overdentures are the additional frictional resistance to dislodging forces which are afforded by long copings gives greater stability thereby reducing destructive forces on the tissues during mastication and the proprioceptive feedback from the periodontal ligament prevents the occlusal overload and it consequently avoids the rapid ridge resorption.The retention and stability of the telescopic overdenture are affected if the number of abutments along the dental arch is not adequate. [7]

There are certain limitations of telescopic overdenture like denture hygiene of high standard is essential, but the advantages outway the disadvantages of this treatment modality.

III. Conclusion

Patients with Amelogenesis Imperfecta as in the case explained can be successfully treated with telescopic overdenture for the mandibular arch and Porcelain fused to metal crowns along with cast partial denture for the maxillary arch. The primary advantage of this overdenture treatment modality is preservation of teeth, good proprioception and reduced residual ridge resorption.

Rehabilitation of such patients is a challenge since a dentist has to communicate effectively with the laboratory to achieve the desired results to provide such patients with confidence to face the society and lead an ordinary life.

References

[1] Early oral rehabilitation of a child with amelogenesis imperfecta Natalino Lourenço Neto1, Marco A.B. Paschoal, Tatiana Y. Kobayashi, Daniela Rios, Salete M.B. Silva
[2] J Health Sci Inst. 2010;28(3):246-8
[3] Amelogenesis imperfecta :Four case reports Dhaval N.Mehta, Jigna Shah and Bhavik Thakkar. J Nat Sci Biol Med, 2013 Jul-Dec;4(2):462-465.
[4] Adapting crown preparation to adhesive Materials David Bartlett Dent Update 2000;27:460-463
[5] Telescopic Denture –A treatment modality for minimizing the conventional removable completed denture problems: A Case Report Kunwarjeet Singh ,Nidhi Gupta. Journal Of Clinical And Diagnostic Research .2012 August, Vol-6(6):1112-1116
[6] Telescopic overdenture – A case report Naveen YG* Patel Jayantilal R† Sethuraman Rajesh, Paranjay Prajapati. JIOH, February 2011, Volume 3 (Issue 1)
[7] Overdenture: A Way of Preventive Prosthodontics Gorakhnath B Shinde and Wadkar AP. Indian J Dent Adv 2012; 4(2) 863
[8] Telescopic overdenture Ragini Bibinagar ,Chandrashekhar Anam ,Praveen Mamidi,Arti saxena, Gautam,Jothi Rathinam. Journal of Orofacial Research January-march 2013;3(1):57-62

Legends:

Figure 1: Intra oral view of maxillary and mandibular arch before treatment
Figure 2: Frontal view of both the arches
Figure 3: O.P.G of the Patient
Figure 4: After crown lengthening followed by tooth preparation after two weeks
Figure 5: Cementation of Primary Copings
Figure 6: Final impression for telescopic overdenture
Figure7: Temporization of maxillary teeth and insertion of telescopic overdenture
Figure 8: Tissue surface of telescopic overdenture
Figure 9: Final impression for maxillary arch
Figure 10: Cementation of maxillary crowns
Figure 11: Occulusal view of cemented surveyed crowns
Figure 12: Try-in of maxillary cast partial denture framework
Figure 13: Maxillary cast partial denture insertion
Figure 14: Pre-Treatment view
Figure 15: Post Treatment view

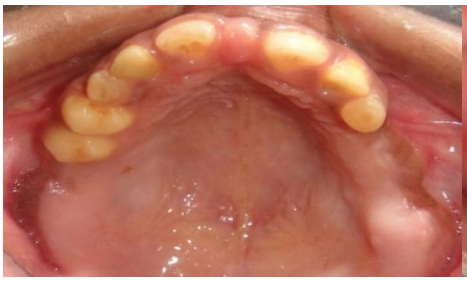


Figure 1Figure 2


Figure 3Figure 4


Figure 5Figure6

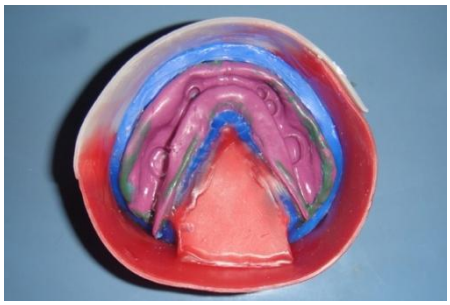


Figure 7 Figure 8


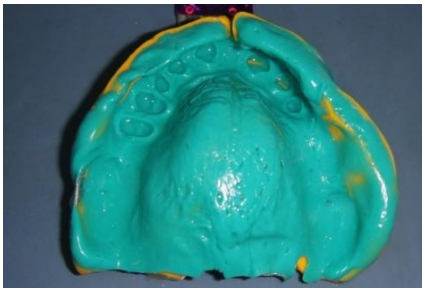

Figure 9 **Figure 10**


Figure 11 Figure 12


Figure 13 Figure 14


Figure 15 Figure 16