Amelogenesis Imperfecta (AI) is a complex of hereditary defects constricted to the dental enamel hard tissue. This entity of enamel alteration targets the mineralization process and therefore affects both the deciduous and permanent dentitions. This condition was known since 1890 when Spoke described it as "Hereditary Brown Teeth". The prevalence of AI is 1:14,000.

AI is caused by mutations of several genes responsible for enamel formation. These genes are isolated and recognized as five enamel formation genes: AMELX, ENAM, KLK4, MMP20 and DLX2.

Mutation of the AMELX gene causes x-linked AI, whereas mutation of the AMEL gene causes autosomal inherited AI.

The clinical appearance is varied and divided into four group categories:

Type I: tiny perforations scattered across the enamel surface. The distribution of those lesions can be localized as well as generalized. The damage lies within alteration of enamel matrix deposition.

Type II: characterized by hypomaturation of enamel formation. As a result the enamel appears opaque and of chalk-white coloration. The enamel layer’s thickness is normal but the hardness is impaired and separates easily from underlying dentin.

Type III: the enamel is increasingly thin and has a worn brownish appearance. Its mineralization is insufficient.

It separates easily from the dentin soon after the tooth erupts. The teeth are extremely sensitive to thermal stimuli.

Type IV: characterized by hypomaturation as well as hypoplastic enamel. This is the most common type of AI and it is associated with taurodontism phenomenon.

CASE REPORT

A 26 year old female patient arrived at the clinic presenting severe dental and consequent psychological and behavioral problems. She was diagnosed with Amelogenesis Imperfecta Type IV. This condition resulted both in massive and extensive dental damage and many problems associated with AI - poor esthetics, loss of function, deterioration of the gingival tissues, impaired speech, self-consciousness due to difficulties to appear and speak in public and deep dental phobia. A comprehensive treatment plan was prepared, with the challenge of completing it within a single session under general anesthesia.

The treatment plan objectives were to restore esthetics, function and soft tissue health. Among the procedures performed were periodontal treatments with an Er:YAG laser, gingival recontouring, crown lengthening, root canal treatments and non-metal esthetic crowns.

This case presented many clinical challenges and requires creative solutions. In order to obtain a favorable outcome of long-term success resulting in caries free teeth and healthy soft tissues, many variables had to be taken in consideration. All of those will be elaborated in this case report.
Figure 1 exhibits the intraoral pre-operative status, demonstrating open bite, gummy smile, poor bridgework and severely inflamed gingival.

The patient was diagnosed as suffering from deep dental phobia, and was not willing to undergo a conservative dental treatment. Therefore general anesthesia was indicated in order to complete the treatment in a short time while the patient is unconscious.

A comprehensive treatment plan was prepared consisting of total oral rehabilitation, of both the dentition and the gingival tissue.

Crown lengthening and gingival recontouring were indicated as well due to the carious lesions and the high lip line, revealing considerable gingival tissue length.

The premolars and molars were designated for metal ceramic crowns, and the front teeth - canines and incisors - were designated for metal free ProCera crowns.

**METHODS AND MATERIALS**

The following examinations were made:

2. EKG examination was taken and found normal.
3. Blood differential was taken and found normal.
4. Anesthesiologist test - mouth breather.
5. Impressions of the upper and lower arches were taken prior to GE. The impressions were cast in order to determine the following:
   * Location of the finishing lines.
   * Inter-maxillary relationships.
   * The gingival line of the upper incisors in order to achieve a pleasing and esthetic contour as a part of the smile design of the all ceramic crowns.
   * Diagnostic wax-up was prepared by the technician according to the impressions and following the clinician’s requests.

6. The pockets that were recorded before treatment amounted to 8 mm depth in the region of teeth 23-24, 13-14, 31-41.

During the treatment sequence, the following procedures were performed:

1. A thorough scaling was done pre-treatment.
2. Radicular cyst enucleation in the region of the middle lower incisors.
3. Extractions of teeth no. 17, 31 & 41 were performed.
4. Root canal treatments in teeth no. 16, 26, 28, 47, 46, 36 & 37.
5. Root canal retreatments were performed in teeth no. 15, 12, 21, 22, 23, 25 & 35.
6. During the canal treatments, canal sterilization was performed using the laser.
7. Core buildups in teeth 12, 15, 16, 21, 22, 23, 25, 26, 28, 35, 36, 37, 46 & 47.
8. Gingivoplasty of the gums in the upper and lower jaws due to severe gingivitis coupled with soft tissue hyperplasia.
9. Periodontal treatment was performed using a LiteTouch Er:YAG laser (Syneron Medical Ltd.) with work parameters of 400 mJ and a frequency of 12 Hz for gingivectomy and gingivoplasty procedures performed later on.
11. Provisional crowns were prepared following tooth preparations and placed on teeth 16 to 28 and 37 to 47.
12. The anterior open bite condition was closed in the antero-posterior dimension with no anterior contacts between the incisors. The first occlusion was made starting the canines and posterior 13-17, 23-27.
13. The patient was released to her home following a 2-hour recuperation period, during which she was under the anesthesiologist’s supervision.
14. There was an uneventful awakening following general anesthesia.
15. Post-treatment: four soft laser treatments were done, consisting of 10-minutes sessions with 2-day intervals.
16. A hygiene refreshing course was given by a hygienist concerning correct brushing technique and the utilization of accessory dental products, such as dental floss and dental woodsticks.
17. The healing sequence was observed without any unusual events.
TREATMENT

Under general anesthesia a gingival crown lengthening and recontouring was performed using an Er:YAG laser (LiteTouch by Syneron Medical Ltd.).

Endodontic treatment was performed in all teeth due to severe wear and the desire to avoid pulp involvement postoperatively as the patient cannot be treated without GA.

Upon completion of root canal treatment, post- and core build up were made using prefabricated "Dentatus" (Dentatus, Stockholm, Sweden) titanium posts and "Build-it" (Pentron Clinical Tech. Wellington, CT, USA) dual cure core build up composite material. Tooth preparations were made and full arch mandibular and maxillary impressions were taken using PVS “Express” (3M-ESPE, St. Paul, MN, USA) impression material using the putty-wash technique.

Gingival displacement was done using retraction cords and a hemostatic agent.

Full arch heat cured provisional restorations were fabricated by the technician working chairside, based on a pre-operative, and temporarily cemented with Freegenol temporary cement (GC, Tokyo, Japan). Impressions were taken after GA was administered.

POST-TREATMENT

- During the first two weeks following treatment, the provisional restorations were adapted to the gingival contour in order to achieve esthetics and determination of the best form for the definitive restorations, in order to create a natural emergence profile and a balanced crown length relationship.

- The tooth/crown shade was selected using the VITA shade guide (Vita Zahnfabrik, Badsackingen, Germany). Porcelain firing was performed, and Procera substructure was fabricated.

- Permanent 13 to 23 and 33 to 43 TeCera crowns were prepared with PFM 14 to 17, 24 to 28, 34 to 37 and 44 to 47 bridges.

- Ten days after the operation, the permanent all-ceramic crowns were placed to the satisfaction of the patient and cemented with FUJI II GIC cement (GC, Tokyo, Japan).

- Upon crowns delivery, pocket depth decreased to a maximum of 5 mm in depth in the region of teeth 23-24, 13.

- One month post-operative a further decrease in pocket depth was recorded. A maximum of 3 mm pocket depth was observed.

- Upper anterior gingival tissue showed healthy, pink, orange-peel appearance with no evident swelling.

Figure 3 exhibits a post-operative photo with permanent crowns - note the decreased gummy smile, open bite closure and healthy pink appearance of the gingival tissue.
TREATMENT OUTCOME

Figures 4a & 4b exhibit 10 days post-operative photos with the permanent crowns - note the decreased gummy smile, open bite closure and healthy pink appearance of the gingival tissue.

DISCUSSION

The dental Er:YAG laser is the only available tool today capable of performing procedures such as gingivectomy and gingivoplasty within a single session, achieving a new gingival contour without risking a significant recession (due to inhibition of fibroblast migration) and without any post-operative edema.

People suffering from dental phobia (20% of the adult population) refrain from dental treatment and therefore accumulate dental tissues damage. The result is an extensive deterioration of the gingival and tooth attachment apparatus tissues. Furthermore, the phobic patient refuses conventional dental treatment. The only treatment option is with GA. While the patient is unconscious, all of the required procedures can be performed. Due to the experience accumulated in our clinic most of the treatments can be performed as part of a complex oral rehabilitation in one day within a single appointment session.

This kind of complicated treatment requires special preparations:

• Logistic
• Armament
• Knowledge - surgical and prosthodontic.

With this treatment nature, the Er:YAG laser is an indispensable instrument enabling us to offer our patients high quality and predictable treatment in a short time to the full satisfaction of the patient.

In this case many different variables existed simultaneously. AI as well as gingival problems, open bite and dental phobia presented a considerable challenge to the clinician.

The literature describes these clinical problems.

As the only treatment option was to perform GA, the time in which the treatment was confined to was restricted. The use of Er:YAG laser decreased the healing time dramatically and enabled treatment of the soft tissue in an almost sterile environment, enhancing rapid and complete healing.
REFERENCES


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Lecture topic: A revolution in Hard Tissue Laser Dentistry.

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