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Guided Technique for Crown Lengthening in an Amelogenesis Imperfecta Patient: A Fabrication Technique

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Introduction

Amelogenesis imperfecta is a rare congenital disorder that presents with abnormal enamel formation due to malfunction of the enamel proteins. It is very important to recognize the problem and to provide adequate treatment for the affected patients to improve esthetics, masticatory function and overall quality of life. Management of these patients requires a multidisciplinary approach including involvement of the prosthodontist, periodontist, endodontist and orthodontist. Effective communication between specialists is essential for a good result and long-term prognosis. Digital technologies help to improve communication among specialists resulting in more precise and accurate reproduction of the initial treatment plan.

Case Description

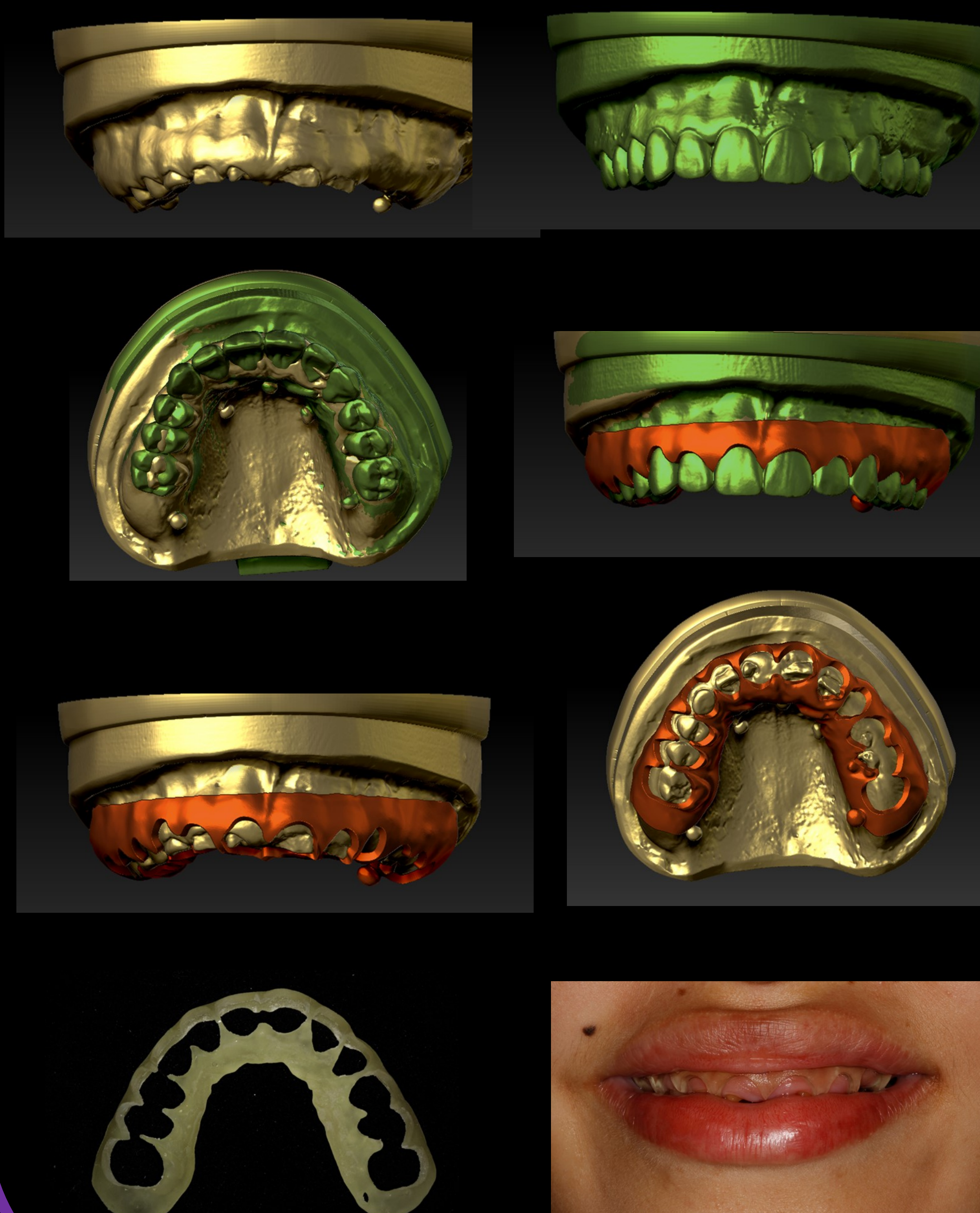
A 15-year-old female patient with amelogenesis imperfecta presented to NYU Jonathan and Maxine Ferencz Advanced Education Program in Prosthodontics. The treatment plan included crown lengthening and gingival recontouring, endodontic and orthodontic treatments. After completion of the diagnostic wax up, it was very important to accurately transfer that information to the periodontist. The existing dental softwares are not designed to create guides for more complex cases such as that of our patient. After unsuccessful attempts by the lab to make 3D printed guides, we decided to use an open software that is not designed for dentistry, but understanding the basis of the digital and conventional dentistry it can be adopted to make a surgical guide. The ZBrush digital sculpting and painting software was used to fabricate a 3D-printed surgical guide for the crown lengthening procedure. It is an open software that is widely used for CGI in movies, games and animations.

Photos

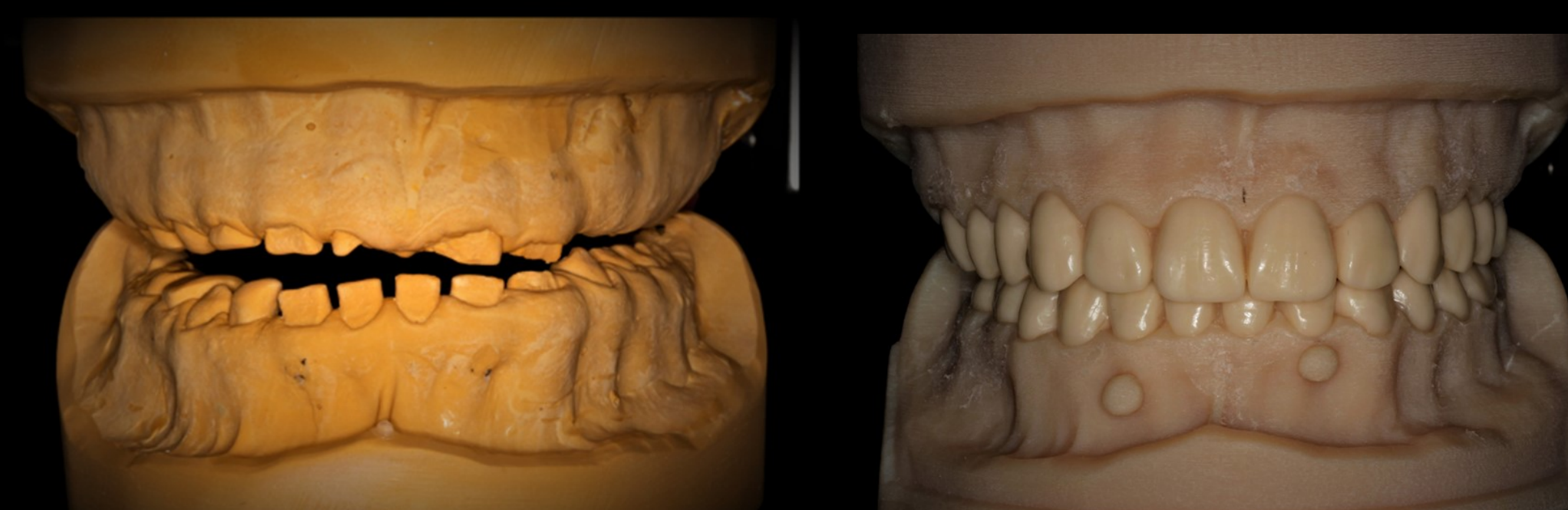
Initial presentation



Fabrication of crown lengthening guide for maxillary arch



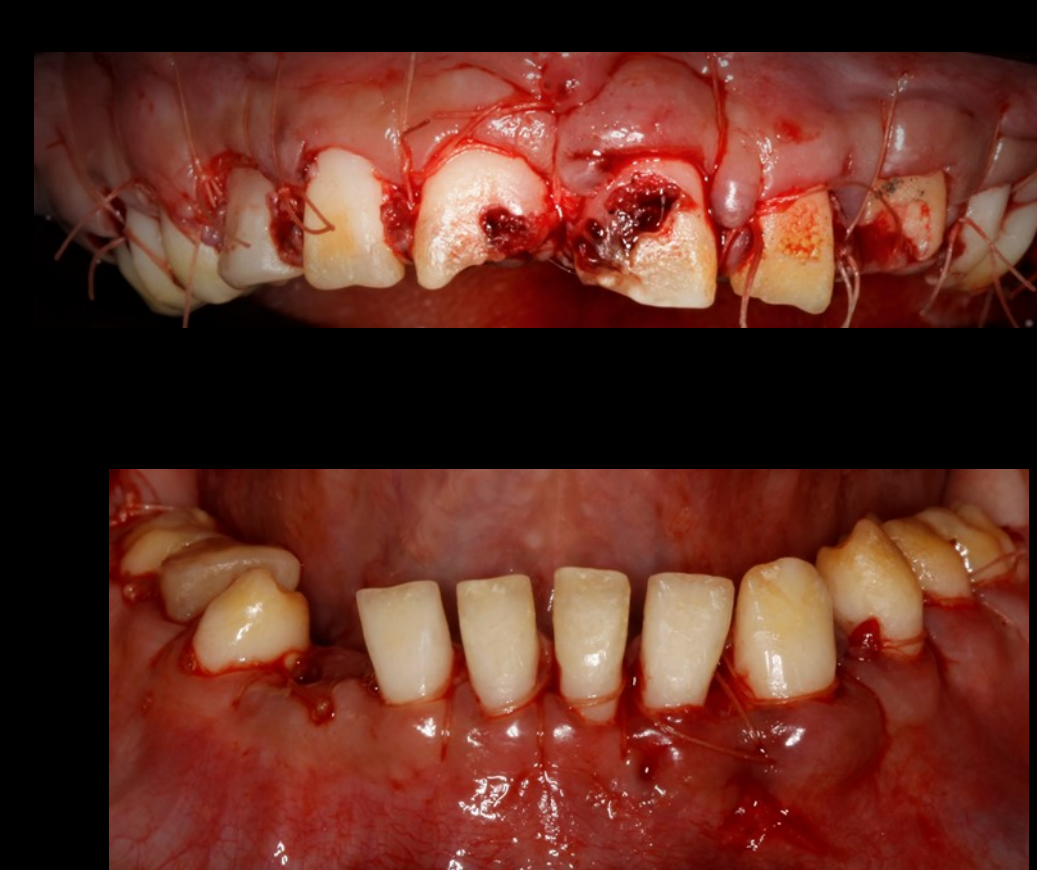
Diagnostic casts and wax up



Preoperative presentation



Immediately after surgery



2-3 weeks after surgery



Provisional restorations



Fabrication Technique

Diagnostic casts articulated at the desired vertical dimension of occlusion were scanned with the 3Shape E3 desktop scanner. Models were printed for a diagnostic wax-up. The diagnostic wax-up that included alteration of the soft tissue level was completed on the printed models according to presurgical clinical analysis. New models with the diagnostic wax-up were scanned and the obtained STL files were transferred to Pixologic's ZBrush Software. Files of the diagnostic casts and wax-up were superimposed on each other. The desired gingival margins, together with clinical crowns, were marked and subtracted from the diagnostic casts. The data was transferred to SprintRay's MoonRay S 3D printer to fabricate a surgical guide. The 3D printed surgical templates were tried in the patient's mouth and used to guide a more precise crown lengthening procedure. The 3D printed crown lengthening guide was shown to be rigid, stable, precise, time-efficient and cost-effective.

Conclusion

The ZBrush software was shown to be a viable option as a communication tool with the surgical team. Even though this program is not designed for dentistry, it can be adopted to create precise and cost-effective surgical guides for complicated cases.

References

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