

## Case Report

# A MULTIDISCIPLINARY APPROACH FOR FUNCTIONAL REHABILITATION OF A PATIENT WITH SKELETAL CLASS III MALOCCLUSION AND AMELOGENESIS IMPERFECTA

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## Abstract :

Amelogenesis Imperfecta has been defined as a group of hereditary enamel defects not associated with evidence of systemic disease. Restoration for patients with this condition should be oriented toward the functional and esthetic rehabilitation and the protection of these teeth. The specific objectives of the treatment were to enhance esthetics, eliminate tooth sensitivity and restore masticatory function. Management of a patient with skeletal class III malocclusion and Amelogenesis Imperfecta is a challenge for the clinician. Surgical correction of the skeletal class III malocclusion, orthodontic therapy followed by full mouth rehabilitation as a multidisciplinary approach is vital for the functional rehabilitation of the patient.

Keywords: Amelogenesis imperfecta, orthognathic surgery, orthodontic therapy, full mouth rehabilitation.

## Introduction:

A biologic and functional approach to restorative dentistry is essential for the satisfactory performance and fulfillment of those requisites basic to Prosthodontics. Accordingly, the masticatory organ must be considered as a functional, consolidated unit, with proper attention being directed to all the elements that comprise this unit. All functional factors are interrelated, and proper regard for each aspect is essential, if the restoration and maintenance of the health of the entire functioning mechanism is to be a realization.

Amelogenesis imperfecta (AI) has been defined as a complex group of hereditary enamel defects not associated with evidence of systemic disease affecting both primary and permanent dentitions.<sup>1,2</sup> It is a rare enamel mineralization defect

described by Spokes in 1890 as "*hereditary brown teeth*" with a reported incidence of 1:14,000.<sup>3,4</sup> Other associated findings in patients with AI include delayed eruption of teeth, taurodontism, congenitally missing teeth, crown and root resorption, and pulp calcification.<sup>5</sup>

## Clinical report:

An 18 year old male patient presented with poor esthetics, gap between upper and lower teeth; and poor masticatory efficiency. Patient exhibited a concave facial profile with a skeletal class III malocclusion, mandibular prognathism with increased anterior facial height. On intra oral examination, dark yellowish discoloration of all teeth, open proximal contacts and esthetic disharmonies with open bite from first molar to first molar with occlusal contacts only at second molar was revealed (Figure 1). A panoramic radiographic examination of the teeth revealed generalized defective enamel on all the teeth. A lateral cephalogram revealed a class III skeletal malocclusion with skeletal open bite with prognathic mandible, increased mandibular plane and increased lower anterior face height

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(Figure 2). A methodical multidisciplinary approach was planned for the oral rehabilitation of the patient starting with orthodontic alignment, surgical correction of jaw relationship and finally prosthodontic rehabilitation to restore both function and esthetics. The detailed treatment plan and the possible outcome were explained to the patient and informed consent was obtained before the treatment procedures.

Orthognathic surgery was performed as bilateral sagittal split osteotomy [BSSO] with mandibular set back and upward rotation for correction of open bite as well as prognathic mandible. Presurgical orthodontics with 0.022" preadjusted edgewise appliance [Roth system] for pre surgical alignment and space closure were carried out. A month after the orthognathic surgery, post-surgical orthodontics was begun for minor occlusal corrections (Figure 3,4). Perfect occlusal relationship was not established as the case was required to undergo full mouth rehabilitation.

The patient was now ready for prosthodontic rehabilitation. Maxillary and mandibular complete-arch impressions were made using irreversible hydrocolloid (Zelgan, Dentsply, Gurgaon, India) impression material. Diagnostic casts were fabricated from Type-III dental stone (Kalstone, Kalabhai private limited, Mumbai, India). The opening axis of the mandible was determined by face bow transfer and mounted on a Whipmix semiadjustable articulator [Whip Mix Articulator; Whip MixCorp; Louisville, Ky]. Bite registration using Type II modeling wax (Hyderabad Dental Products, Hyderabad, India) was made at the orthodontically established maximum intercuspation.

One of the most common method for establishing an acceptable plane of occlusion is indirect analysis using the Pankey-Mann-Schuyler (PMS) method with the Broderick occlusal plane analyzer (BOPA).<sup>6</sup> When it has been determined that restoration of all or most of the posterior teeth is necessary, the PMS technique using BOPA provides a simple and practical method to determining the preliminary occlusal plane on diagnostic casts. Hence BOPA

was used as a guide for determining an acceptable plane of occlusion and the reduction required for each tooth preparation.<sup>6,7,8</sup> Diagnostic preparations were made on the stone casts, and a diagnostic waxup was completed with a canine guided concept of occlusion design (Figure 5). Tooth reduction guides and heat processed acrylic resin provisional restorations were fabricated from the diagnostic wax-up.

Tooth preparation and restoration with porcelain fused to metal crowns was done in a sequential manner, starting with the mandibular anteriors, followed by the maxillary anteriors, mandibular posteriors and finally the maxillary posteriors following the PMS philosophy of occlusal rehabilitation. The anterior guidance was established based on esthetics, phonetics and development of a canine guided occlusion. Soft tissue was retracted using knitted cord [UltraPak, Ultradent products, south Jordan, Utah] with aluminium sulfate hemostatic agent [Gelcord, Pascal Co Inc, Bellevue, Wa], and complete arch impressions were made with the addition polymerization silicone impression material [Express<sup>TM</sup> 3M ESPE]. Wax patterns were completed to the contour of the final restorations, and the wax patterns for the teeth receiving porcelain-fused-to-metal restorations were cut back approximately 1 mm to allow for the porcelain addition. All occlusal surfaces were planned to be fabricated in metal. The wax patterns were invested in a phosphate bonded investment, and cast. Porcelain shade Vita B2 was applied to the metal-ceramic castings. All the restorations were characterized, glazed, and polished, and luted with glass ionomer cement (Figure 6). The esthetics and functional efficiency has improved drastically after the rehabilitation (Figure 7,8).

Complete mouth rehabilitation is a dynamic functional problem, and embodies the correlation and integration of all component parts into one functioning unit. The aim and endeavor, therefore, must be reconstruction and rehabilitation of the whole, satisfying all the related factors. The science of complete mouth rehabilitation rests upon three proved and accepted fundamentals: namely, the existence of a physiologic rest position of the mandible,



Fig 1 : Pre Treatment intra oral view



Fig 2 : Pre treatment Lateral cephalogram



Fig 3 : Intra oral view- One month after the orthognathic surgery



Fig 4 : Lateral cephalogram - One month after the orthognathic surgery



Fig 5 : Diagnostic wax up in the semi adjustable articulator



Fig 6 : Post treatment intra oral view



Fig 7 : Pre treatment facial view Fig 8 : Post treatment facial view

which is a constant; the recognition of a vertical dimension; and, finally, the acceptance of a dynamic, functional centric occlusion

The clinical features of amelogenesis imperfecta compounded with a skeletal class III malocclusion presented special challenges to the treatment team. Though the treatment planning was complicated, the diagnostic wax-up demonstrated that full-arch restorative

treatment could be accomplished, and without unfavorable stresses caused by the arch malrelations. Careful technique and very close follow-up are required to maintain occlusal stability when restoring arch discrepancies. The planned occlusal relations were tested in the mouth with the acrylic resin provisional restorations, and were found satisfactory by the patient as to esthetics, phonetics, and function.

#### Discussion:

Complete mouth rehabilitation is a dynamic functional problem, and embodies the correlation and integration of all component parts into one functioning unit. The aim and endeavor, therefore, must be reconstruction and rehabilitation of the whole, satisfying all the related factors. The science of complete mouth rehabilitation rests upon three proved and accepted fundamentals: namely, the existence of a physiologic rest position of the mandible, which is a constant; the recognition of a vertical dimension; and, finally, the acceptance of a dynamic, functional centric occlusion

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#### Conclusion :

The procedure explained in this clinical report is an organized way to rehabilitate the lost occlusion. An advanced restorative treatment plan involving the re-

organization of the patient's occlusion is a major challenge for the restorative team. Successful completion will depend upon:

1. An accurate record of the patient's pre-treatment occlusion.
2. A clear idea of the occlusion of the definitive restoration, including the jaw relationship at which it is to occur.
3. A detailed sequential plan and the execution of treatment from the pre-treatment phase until the final rehabilitation.

A multidisciplinary sequential approach with pre surgical orthodontic alignment followed by planned orthognathic surgery and subsequent post surgical orthodontic alignment and occlusal corrections and further Prosthodontic treatment approach ensured a successful esthetic and functional rehabilitation.

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