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From Skeletal Discrepancy To Functional Harmony- Case Report

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Abstract:
Background*: Class III malocclusion is best described by discrepancies of dental or skeletal components in antero-posterior or vertical directions. Retrognathic and narrow maxilla, prognathic and wider mandible, and / or a combination of both are the common clinical presentations of skeletal class III malocclusion. The magnitude of discrepancy may compromise facial esthetics variably and motivate individuals to seek orthodontic correction. The aim is to show a case that benefits from the multidisciplinary treatment approach between surgery, orthodontics and proshtodontics in adult patients with jaw deformities and partially edentulous jaws. A patient with skeletal Class III with partially edentulous jaws was treated through a combination of surgical-orthodontic and prosthetic procedures. An accent was given on the precision of the steps in planning a multidisciplinary case and importance of achieving occlusal and functional harmony. The course of the treatment is long, and it requires patience and good cooperation between the orthodontist, the surgeon, the prosthodontist and most importantly the patient.*
Materials and Methods: *After the patient finished her orthodontic treatment and orthognathic surgery of the mandible, the oral surgeon extracted the hypermobile teeth in the mandibular front, and an immediate partial denture was made of acrylic with metal clasps. The patient had an old PFM(porcelain fused to metal) extension bridge on the maxillary front which was replaced for achieving a proper over-jet. This was possible with the definite partial denture, which was made together with the new PFM bridge in the maxillary front.*
Results*: The whole treatment resulted in aesthetic and functional harmony, which enabled the patient to chew properly and to be pleased with the look.*
Conclusion: *The patient with partially edentulous jaws and a mandibular protrusion was successfully treated aesthetically and functionally via a collaboration among the departments of maxillofacial surgery, orthodontics and prosthodontics. Improving the position of the mandible itself is of great importance for establishing stable occlusion in patients with mandibular protrusion and large dental defects.*
Keywords: *Class III, occlusal rehabilitation, prosthodontics management, multidisciplinary treatment, partial dentures, esthetics in maxillary front.*

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I. Introduction

Progenia (skeletal Class III malocclusion) represents one of the most complex dentofacial discrepancies to manage, often affecting facial aesthetics, occlusal function, and patient quality of life. Successful treatment frequently requires a coordinated multidisciplinary approach involving orthodontics, maxillofacial surgery, and prosthodontics[1]. While orthognathic surgery plays a decisive role in correcting the underlying skeletal discrepancy, prosthodontic treatment is essential for establishing stable occlusion, functional harmony, and long-term aesthetic outcomes[2]. This case report presents the comprehensive management of a patient with progenia treated through orthognathic surgery followed by prosthodontic rehabilitation, highlighting the critical role of prosthodontic planning in achieving predictable and sustainable results.

Adult patients with dento-skeletal deformities usually require treatments where most cases need interdisciplinary intervention, an example of this being the surgical-orthodontic treatment[3]; however, these complex cases require a precise diagnosis, a careful treatment plan, and patient cooperation. A poor aesthetically pleasing facial appearance is usually the main cause of consultation but it is often accompanied with functional problems, temporomandibular joint disorders and psychosocial aspects.

When a patient with mandibular protrusion becomes edentulous or partially edentulous, it is very difficult to stabilize the prosthesis via prosthetic treatment alone such that the patient has appropriate over-jet and over-bite. However, if the maxillary anterior teeth of a patient with mandibular protrusion are positioned labially against the mandibular anterior teeth, over-loading of the mandibular anterior teeth can result in overturning of the denture and bone loss. As a result, the denture must be placed with a reversed occlusion. To achieve an aesthetically and functionally acceptable occlusion, orthognathic surgery is required to balance the maxilla and mandible[4].

II. Material And Method

A.A, 45-year-old female patient with Angle Class III malocclusion, came to the Department of prosthodontics at the University Clinic "St. Pantelejmon" in Skopje, North Macedonia regarding her concerns about her facial aesthetics, her lifelong struggle with the ability to chew correctly and small speech obstacles. After a clinical exam, an X-ray was done, and we noted that, she has old porcelain fused to metal extension bridge on the central and lateral incisor, 12 and #11 and nano-composite filling on #21 and #22 in the maxilla. The mandible partially edentulous with missing teeth #48,46, 36,38. The planned treatment plan was to achieve better function and aesthetic, first by orthodontic treatment, then orthognathic surgery of the mandible and in the final stage the adequate prosthetic work. In between treatment, immediately after the surgery and extraction of the teeth that had severe bone loss, a partial denture was made in order to keep the remaining space of the extracted teeth intact and to prevent the resorption of the alveolar ridge.

Treatment plan

The treatment began with orthodontics in the lower jaw in order to achieve better occlusion, then orthognathic surgery of the mandibular prognathism, correcting the position of the jaw posteriorly. Bilateral Sagittal Split Osteotomy (BSSO) technique was applied (Fig.1). After almost a year on 11.02.2025 extraction of the front was performed, (41, 42, 31, 32 and #35), because of their mobility from severe bone loss. An immediate impression was taken after the extraction of the teeth, and an acrylic partial denture was done with metal clasp on teeth #33 and #43. After waiting for the appropriate post-extraction time and the jawbone had finished reshaping the definite prosthodontic treatment had to begin (Fig.2). The next step in the treatment plan was to remove the extension bridge, which didn't meet the prosthodontic protocols and rules, tooth #12 was the abutment tooth and the pontic was tooth #11, which also didn't have the proper width to height proportions, and it was esthetically unpleasing. At the same time a new impression had to be taken from the lower jaw to make the definite partial denture. For better static, functional distribution of force and physiological load bearing of the abutment teeth, we decided to include the central incisor and lateral incisor, (21 and #22) as abutment teeth to the new bridge. The new bridge was from porcelain fused to metal material, because of the patients' financial status.

Fig.1 Panoramic X-ray after the orthognatic surgery, the bone loss of the mandibular front teeth is clearly visible and the patient is scheduled for extraction of teeth #42,41,31,32,35.

Fig.2 Pre-prosthodontic treatment, with the immediate partial denture and the old maxillary bridge

III. Result

Following the completion of orthodontic treatment, mandibular surgery and definitive prosthodontic rehabilitation, satisfactory functional and esthetic outcomes were achieved. Post-treatment evaluation revealed a stable skeletal and dental occlusal harmony and an over-jet of approximately 2 mm. The definitive partial denture in the mandible and the newly fabricated maxillary porcelain-fused-to-metal bridge demonstrated proper fit, adequate retention, and harmonious occlusal contacts (Fig.3).

Fig.3 Post-proshtodontic treatment, with the achieved over-jet of approximately 2 mm

The patient reported significant improvement in masticatory efficiency, speech clarity, and overall comfort during function. Facial profile and smile esthetics were notably improved following the correction of mandibular protrusion and anterior dental rehabilitation. No postoperative complications related to the prosthetic restorations were observed during the follow-up period of 6 months. The achieved occlusion remained stable, and the patient expressed satisfaction with both functional performance and esthetic appearance (Fig.4).

Fig.4 Our patients 6 months follow up

IV. Discussion

Skeletal Class III malocclusion in adults represents a complex clinical condition, particularly when accompanied by partial edentulism and compromised dental support. Since growth modification is no longer possible in adult patients, combined surgical–orthodontic treatment remains the most effective and predictable approach for correcting severe skeletal discrepancies and restoring facial esthetics, function, and occlusal stability[5,6,7]. The present case emphasizes the importance of a well-coordinated multidisciplinary strategy in managing such challenging clinical situations.

In patients with mandibular prognathism, prosthodontic rehabilitation alone cannot provide long-term functional stability if the underlying skeletal disharmony is not addressed. Orthognathic surgery plays a crucial role in repositioning the mandible and establishing a favorable maxillomandibular relationship, which is essential for achieving stable occlusion and facilitating subsequent prosthetic rehabilitation[8,9]. Several authors have highlighted that correction of the skeletal base is a prerequisite for predictable outcomes in adult Class III patients with significant anteroposterior discrepancies[10]. In the present case, mandibular setback surgery was fundamental in achieving a proper sagittal relationship and enabling correction of the anterior over-jet.

Partial edentulism further complicates treatment planning by reducing occlusal support and altering functional load distribution, which may adversely affect remaining teeth and prosthetic restorations[11]. Following orthodontic and surgical treatment, the mandibular anterior teeth exhibited severe mobility and were therefore extracted. Immediate replacement with an acrylic partial denture preserved esthetics, phonetics, and masticatory function, while also providing psychological comfort during the healing phase. Interim prosthetic solutions are widely recommended in prolonged multidisciplinary treatments to maintain patient satisfaction and compliance [12].

The maxillary anterior region plays a key role in facial esthetics, smile harmony, and speech. Replacement of the existing PFM (porcelain fused to metal) extension bridge was necessary to accommodate the corrected jaw relationship and to establish an appropriate over-jet and anterior guidance. Simultaneous fabrication of the definitive partial denture and the maxillary fixed prosthesis ensured harmonious occlusal contacts and functional efficiency. Close collaboration between the orthodontist, maxillofacial surgeon, and prosthodontist is essential to achieve optimal outcomes in such complex rehabilitative cases[13,14].

The success of the present treatment can be attributed to meticulous interdisciplinary planning, precise execution of each treatment phase, and strong patient cooperation. Adult patients with skeletal deformities and extensive dental defects often require long treatment durations, making patient motivation and understanding critical factors for successful outcomes[15].

This case demonstrates that adult patients with skeletal Class III malocclusion and partially edentulous jaws can be treated successfully through a combined surgical–orthodontic–prosthodontic approach. Correction of mandibular position is of paramount importance for establishing stable occlusion, while prosthodontic rehabilitation restores function and esthetics. A multidisciplinary treatment strategy remains the gold standard for achieving predictable, stable, and satisfactory results in such demanding clinical scenarios.

V. Conclusion

The patient with partially edentulous jaws and a mandibular protrusion was successfully treated aesthetically and functionally via a collaboration among the departments of orthodontics, maxillofacial surgery, and prosthodontics. Improving the position of the mandible itself is of great importance for establishing stable occlusion in patients with mandibular protrusion and large dental defects.

The successful management of Class III mandibular prognathism in this case highlights the critical value of a coordinated, multidisciplinary approach involving orthodontics, maxillofacial surgery, and prosthodontics. Careful diagnosis and joint treatment planning allowed each specialty to contribute effectively at the appropriate stage, ensuring both functional correction and esthetic harmony. Orthodontic preparation established proper dental alignment and decompensation, maxillofacial surgery addressed the underlying skeletal discrepancy, and prosthodontic rehabilitation finalized occlusion and smile aesthetics. Continuous communication among the three specialties optimized decision-making, minimized complications, and enhanced treatment efficiency. The favorable functional, skeletal, and esthetic outcomes achieved demonstrate that integrated team management is essential for predictable and stable results in complex Class III mandibular prognathism cases, ultimately improving patient satisfaction and long-term quality of life.

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