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Interdisciplinary Orthodontic and Prosthodontic Rehabilitation of a Patient with Bilateral Cleft Lip and Palate: A Case Report

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Abstract: Bilateral cleft lip and palate (BCLP) is frequently associated with dental anomalies, altered maxillary development, and malocclusion, which complicate dental rehabilitation. This report describes the interdisciplinary orthodontic–prosthodontic management of a 22-year-old patient with BCLP who was referred to the Faculty of Dental Medicine, International Balkan University, because of dissatisfaction with dental appearance and function. The clinical findings included absent teeth in cleft-related areas, altered tooth morphology, irregular alignment, compromised anterior aesthetics, and occlusal discrepancies. Treatment was planned jointly by orthodontic and prosthodontic specialists, with orthodontic preparation preceding prosthodontic rehabilitation so that tooth positions and available space would suit the planned restoration, and a porcelain-fused-to-metal fixed partial denture from tooth 15 to tooth 25 was fabricated. After treatment, improved smile aesthetics and dental harmony were observed clinically, and the patient reported satisfactory adaptation. This case illustrates the value of planning orthodontic and prosthodontic treatment together in patients with BCLP. As a single case with qualitative outcomes, it does not allow conclusions about long-term stability.

Keywords: *Bilateral Cleft Lip and Palate; Orthodontics; Prosthodontics; Interdisciplinary Treatment; Case Report.*

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I. INTRODUCTION

Cleft lip and palate are congenital conditions that can affect the upper lip, the alveolar process, and the palate. Their clinical presentation varies, and patients may require coordinated care from several specialties throughout growth and adulthood. Individuals with bilateral cleft lip and palate (BCLP) may present with dental anomalies, missing or supernumerary teeth, altered tooth morphology, malocclusion, and differences in maxillary development. These features can complicate restorative treatment and may affect dental appearance and oral function. (1,3). The management of individuals with cleft lip and palate requires a lifelong multidisciplinary approach that begins during infancy and continues into adulthood. Surgical procedures, including lip repair, palatal closure, and alveolar reconstruction, establish the anatomical basis for rehabilitation; however, the outcome depends significantly on the integration of orthodontic and prosthodontic treatment strategies. (4) Modern cleft care has evolved from isolated specialty-based interventions toward comprehensive interdisciplinary protocols. The orthodontist and prosthodontist have complementary responsibilities within this framework.

Orthodontic treatment can help align the remaining teeth, manage available space, and establish tooth positions that are compatible with a planned restoration. Prosthodontic treatment may then address missing or compromised dental structures and the restorative needs of the patient. The sequence and scope of treatment must be individualized according to the anatomy of the patient, previous treatment, periodontal condition, occlusion, and restorative options. (4,5,6)

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In the modern era of technology, digital records and imaging, such as digital impressions and cone-beam computed tomography (CBCT), can support diagnosis and communication between the clinicians involved when they are integrated into the clinical workflow. In complex cleft patients, prosthetic rehabilitation cannot be considered separately from orthodontic preparation. The final restorative outcome depends greatly on the position, angulation, and distribution of the remaining teeth. Therefore, treatment objectives should be established collaboratively before initiating active therapy. A restorative-driven orthodontic approach enables clinicians to create conditions that support predictable prosthetic reconstruction while minimizing biological compromise. The development of digital dentistry has further improved interdisciplinary treatment planning. Digital impressions, cone-beam computed tomography (CBCT), three-dimensional visualization, computer-aided design and manufacturing (CAD/CAM), and digital smile design (DSD) have enhanced diagnostic accuracy and communication among specialists. These technologies allow clinicians to visualize the desired outcome, evaluate treatment limitations, and improve patient understanding before definitive procedures are done. (7,8) Prosthodontic rehabilitation of cleft patients presents unique challenges because the clinician must consider not only tooth replacement but also facial proportions, lip support, phonetics, gingival aesthetics, and long-term functional stability. The prosthetic restoration should harmonize with the patient's facial characteristics while respecting the biological limitations associated with previous surgical interventions. (9,10) Although technological advances have improved the predictability of treatment, successful rehabilitation remains dependent on clinical expertise and interdisciplinary collaboration. The integration of different specialties allows clinicians to move beyond correction of individual defects and focus on restoration of the patient's overall facial harmony and quality of life.(11,13) The purpose of this case report is to present the interdisciplinary orthodontic–prosthodontic rehabilitation of a patient with bilateral cleft lip and palate, emphasizing the importance of coordinated treatment planning, sequential therapy, and the role of modern restorative concepts in achieving functional and aesthetic improvement.

The aim of this case report is to describe the interdisciplinary orthodontic–prosthodontic rehabilitation of a 22-year-old patient with BCLP.

II. CASE REPORT

➢ *Patient Presentation*

A 22-year-old patient with bilateral cleft lip and palate was referred to the Faculty of Dental Medicine, International Balkan University, for comprehensive dental rehabilitation. The main concerns were compromised dental aesthetics, functional limitations, and dissatisfaction with the appearance of the smile. The medical and dental history was recorded, including previous cleft-related surgery (the cleft lip surgery was done when the patient was 3 months old and palatoplasty was performed at the age of 2), no bone grafting was done, previous orthodontic treatment was not reported, and other dental procedures, as well as the expectations of the patient.

➢ *Clinical Findings and Diagnostic Assessment*

Extraoral evaluation included facial symmetry, profile, nasolabial relationship, smile, lip support, and lower facial proportions. Intraoral examination revealed absent teeth in cleft-related areas, altered tooth morphology, irregular dental alignment, compromised anterior aesthetics, and occlusal discrepancies. Tooth proportions, gingival architecture, midline relationship, available restorative space, periodontal condition, and occlusal contacts were also assessed. The premaxilla, together with 12,11,21,22 (FDI notation), was present but deformed and not for use; the other teeth were present in the mouth, with a relatively normal overjet. The patient refused CBCT, cephalometry, and any photos at that moment.

The proposed protocol should be:

- Clinical examination;
- Intraoral and extraoral photography;
- Digital impressions and diagnostic models;
- Panoramic radiography;
- CBCT evaluation;
- Occlusal analysis.

From this, we had only the first clinical evaluation and dental models made in plaster. (Fig.1)



Fig 1 Dental Models Made in Plaster

➢ *Interdisciplinary Treatment Planning*

Following completion of diagnostic procedures, an interdisciplinary consultation was performed between the orthodontic and prosthodontic specialists. The main principle of treatment planning was that the final prosthodontic objective should determine the orthodontic requirements. Unlike conventional orthodontic treatment, where alignment and occlusal correction are often the primary objectives, cleft rehabilitation requires a restorative-oriented approach.

The treatment objectives were defined as follows:

- Improvement of dental alignment and arch coordination.
- Establishment of appropriate space for prosthetic reconstruction.

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- Optimization of tooth position according to the planned restoration.
- Improvement of occlusal stability.
- Restoration of smile aesthetics.
- Enhancement of functional efficiency and patient confidence.

The treatment sequence was carefully planned to minimize biological compromise and maximize long-term stability.

➢ *Orthodontic Treatment*

The orthodontic phase preceded prosthodontic rehabilitation. It aimed to align the remaining teeth, correct rotations and positional discrepancies, improve arch relationships, redistribute the available space, and support favourable occlusal relationships. Continuous communication between the orthodontist and the prosthodontist was maintained so that tooth movements were directed toward the planned final result. A rapid palatal expander was used. It stayed in the mouth for nine months. Tooth positioning, periodontal response, space adequacy, and readiness for prosthetic rehabilitation were evaluated at regular intervals. After that, orthodontic treatment was performed with a fixed appliance using a straight wire appliance with Roth 22 brackets; the treatment lasted 24 months, with a retention period of 6 months in the upper due to the prosthodontic treatment afterward and long-term retention in the lower arch. (Fig.2,3)



Fig 2 Orthodontic Treatment Progression. (During Ortho Treatment)



Fig 3 Orthodontic Treatment Progression. (After Ortho Treatment)

➢ *Prosthodontic Rehabilitation*

After orthodontic preparation, the patient was reassessed for definitive prosthodontic rehabilitation. After completion of orthodontic preparation and approval of the final treatment plan, definitive prosthodontic rehabilitation was performed.



Fig 4 After Preparation

The restoration was designed to achieve:

- Natural appearance;
- Appropriate tooth morphology;
- Improved smile aesthetics;
- Stable occlusal function;
- Patient comfort.

The selection of restorative materials was based on aesthetic requirements, mechanical properties, biological considerations, and long-term prognosis. A porcelain-fused-to-metal fixed partial denture extending from tooth 15 to tooth 25 (FDI notation) was fabricated, which was made possible by the improved posterior arch width achieved after orthodontic treatment. Materila used for this was a nickel-chromium bonding alloy for metal-ceramic by Realloy[@]. The ceramic material used was Initial MC by *GC*[@]. Special attention was given to the anterior region because it represents a critical component of facial aesthetics and patient self-confidence. (Fig.4,5,6). To prevent relapse and contraction of the palatal tissues at the surgical site, the prosthesis must be completed promptly after orthodontic treatment.



Fig 5 Prosthetic Fabrication

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Fig 6 Prosthetic Fabrication (Anterior View)

➢ *Occlusal Management and Functional Evaluation*

Occlusal adjustment was performed to achieve functional stability and protection of the restored structures.

The final occlusal scheme was evaluated considering:

- Static contacts;
- Dynamic movements;
- Anterior guidance;
- Patient adaptation.

The objective was to establish a comfortable and stable functional relationship while minimizing excessive loading of restored teeth.

Occlusal adjustment was performed to achieve functional stability, and the final occlusal scheme was evaluated in static and dynamic contacts, with attention to anterior guidance and adaptation of the patient.

➢ *Outcome and Follow-Up*

After completion of treatment, improvement in smile aesthetics and dental harmony was observed clinically. The patient reported improved masticatory comfort, occlusal stability, and confidence, and showed satisfactory adaptation to and acceptance of the rehabilitation. (Fig 7&8) During follow-up examinations (after one month, then 3 months, and now every 6 months), we kept the condition under monitoring and maintenance of oral hygiene. The result remained clinically stable.


Fig 7 Final Prosthodontic Rehabilitation.


Fig 8 Follow-Up Photograph Demonstrating Aesthetic and Functional Improvement.

III. DISCUSSION

This case concerns the coordination of orthodontic and prosthodontic care in a young patient with BCLP. The central principle was that the restorative objective should be considered during orthodontic planning, because tooth position and available space influence the feasibility and design of a subsequent restoration. Joint planning allowed these requirements to be identified before definitive prosthetic treatment. (1,4) In patients with clefts, treatment extends beyond replacement of missing teeth. The prosthetic restoration should harmonize with the facial characteristics of the patient and with lip support, phonetics, and gingival aesthetics, while respecting the biological limitations related to previous surgical interventions (4,5)

Digital records, including digital impressions and CBCT, are part of the diagnostic protocol and support communication between the specialists. Such tools can help clinicians to visualize limitations before irreversible procedures, but they do not replace clinical judgement and interdisciplinary decision-making. (7,8,11) However, although digital technologies enhance diagnostic accuracy, they cannot replace clinical judgement and interdisciplinary decision-making. The biological characteristics of cleft patients remain unique, and treatment must always be individualized according to the patient's anatomy, previous interventions, functional requirements, and expectations. Another important aspect of cleft rehabilitation is the psychological impact of treatment. Facial appearance and smile aesthetics have a strong influence on social interaction, self-esteem, and quality of life. Improvements achieved through multidisciplinary dental care may therefore extend beyond oral health and contribute significantly to patient wellbeing. (12,13) The present case supports the concept that cleft rehabilitation should be considered a continuous

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reconstructive process rather than a sequence of independent procedures. Orthodontics provides the foundation by optimizing the dental environment, while prosthodontics completes the reconstruction by restoring function, aesthetics, and confidence. The strength of this case lies in demonstrating a coordinated treatment philosophy where both specialties contributed from the initial planning stage until completion of rehabilitation. Such collaboration represents an essential component of modern patient-centred dentistry.

The improvements in appearance, function, and patient adaptation reported here are clinically relevant. They were evaluated clinically and are not based on standardized measures; in a single case, they should be interpreted cautiously and should not be generalized as evidence that this approach is superior to other treatment options.

IV. LIMITATIONS

This report describes a single patient, and the outcome was assessed qualitatively, without a standardized patient-reported or clinical outcome measure. The follow-up period is limited, so conclusions about long-term stability and prosthetic longevity cannot be drawn. Larger studies with longer follow-up are needed to evaluate treatment protocols and patient-reported outcomes in patients with BCLP.

➢ *Clinical Significance*

The present case emphasizes the importance of interdisciplinary orthodontic–prosthodontic collaboration in the rehabilitation of patients with bilateral cleft lip and palate. A restorative-driven orthodontic approach combined with carefully planned prosthodontic reconstruction may improve functional stability, aesthetic outcomes, and patient satisfaction.

V. CONCLUSION

In patients with bilateral cleft lip and palate, orthodontic preparation and prosthodontic rehabilitation benefit from being planned together. In this 22-year-old patient, a coordinated sequence of orthodontic and prosthodontic treatment led to improved smile aesthetics and dental harmony and to satisfactory adaptation. These findings illustrate the value of interdisciplinary collaboration, but, as a single case with qualitative assessment, they do not support claims about long-term outcomes.

➢ *Conflict of Interest*

The authors declare that they have no conflicts of interest.

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➢ *Author Contributions*

- R.D.: conceptualization, patient management, interdisciplinary treatment planning, supervision and manuscript preparation.
- M.A.T.: clinical data collection, literature review, and critical revision of the manuscript.
- J.S.: patient management
- S.S.: prosthetic work in dental laboratory

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