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Prosthodontic Rehabilitation Alternative of Maxillary Dentoalveolar Defect in a Patient with Cleft Lip and Palate (CLP): Case Report

[1]Dr. Balkis Khadhraoui
Department of Fixed Prosthodontics,
Dental Faculty of Monastir,
University of Monastir, Tunisia

[2]Dr. Raouf Turki
Department of Fixed Prosthodontics,
Dental Faculty of Monastir,
University of Monastir, Tunisia

[3]Dr. Yosra Gassara (Assistant Professor)
Department of Fixed Prosthodontics,
Dental Faculty of Monastir,
University of Monastir, Tunisia

[4]Dr. Zohra Nouira (Professor)
Department of Fixed Prosthodontics,
Dental Faculty of Monastir,
University of Monastir, Tunisia

[5]Dr. Belhassen Harzallah (Professor)
Department of Fixed Prosthodontics,
Dental Faculty of Monastir,
University of Monastir, Tunisia

[6]Dr. Mounir Cherif (Professor)
Department of Fixed Prosthodontics,
Dental Faculty of Monastir,
University of Monastir, Tunisia

Abstract:- Cleft lip and palate are common birth defects, occurring in approximately 1 in 800 births. Most clefts are believed to be caused by a combination of genetic and non-genetic factors. It may be attributed to factors such as malnutrition, irradiation during pregnancy, psychological stress, teratogenic agents, infectious agents (viruses), and heredity. There are various options available to treat the missing soft and hard tissues, including removable dental prostheses, fixed dental prostheses, and implant prostheses. However, different authors have different opinions on the standard of care for prosthetic treatment of cleft lip and palate. Some prefer removable prostheses, while others recommend conventional tooth-supported fixed dental prostheses. This case report describes prosthetic treatment of a congenital cleft lip and palate, where a direct zirconia-ceramic fixed dental prosthese was chosen based on the patient's preference and agreement.

Keywords: *Cleft Lip and Palate; Prosthodontics; Ceramic; Zirconia; Orthodontics; Fixed Protheses;.*

I. INTRODUCTION

When offering maxillofacial prosthetic treatment to patients with craniofacial and congenital defects, it is crucial not only to address their physical and functional shortcomings but also to take into account the potential psychological impact of these deformities (1).

Even though cleft palate patients may not be a common occurrence in general dental practice, it is a prevalent congenital anomaly with roughly one in every 800 live births resulting in a cleft lip and palate (1)

Thanks to advanced knowledge of craniofacial growth and development, along with enhanced surgical and orthodontic treatments, patients with cleft palate now receive improved care and in a more efficient manner (2) . As a result, they require fewer prosthetic interventions. However, prosthetic treatment still plays a crucial role in cleft palate care. (3)

Cleft palate patients often have missing anterior teeth since birth. The lateral incisors are the most commonly missing teeth in unilateral or bilateral clefts, although the canines and central incisors may also be affected (4) . In cases where the teeth are present, they may be malformed or malpositioned. Moreover, the bone support for teeth near the cleft is typically compromised (5)

Various authors have presented different standards for prosthetic treatment of cleft palate/lip in literature. While some suggest removable prosthesis as the ideal choice, others consider conventional tooth-supported Fixed Dental Protheses to be the standard of care (6) (7) (8)

A carefully planned combination of prosthetic, periodontal, and surgical therapies can lead to satisfactory function and improved appearance, reducing the impact of deformities. With proper education and regular check-ups, patients should be able to maintain good oral health.

The purpose of this clinical case report is to detail the interdisciplinary approach to treating a young adult patient with Cleft Palate and Lip and Maxillary Dentoalveolar Defect, as well as their prosthodontic rehabilitation.

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II. CASE DESCRIPTION

A 22-year-old woman was referred to the department of fixed prosthodontics at the faculty of dental medicine of Monastir. The patient's history revealed that she had a congenital unilateral complete lip and palate cleft, which had previously been ortho-surgically reconstructed.

An intraoral examination revealed the absence of maxillary anterior residual ridge on the left side. The maxillary left lateral incisor tooth was outside the bone in the center of the cleft (Figures 1 and 2).

Fig 1 (a) Extraoral View

Fig 2 (b) Profile View

Fig 2 (a) Intraoral View

Fig 2 (b) Lateral Intram Ural View

The extraction of this tooth was indicated.

After comprehensive evaluation of the case, it was determined that the prosthodontic treatment plan would include a zirconia-based fixed dental prosthesis to mask the bony defect and restore both the facial and dental aesthetics with tooth-colored layered porcelain on the labial surface of the teeth, and pink- colored porcelain on the soft tissue area of the prosthesis. Abutment teeth included #11, #12, #23.

To create a diagnostic wax-up, tooth proportions, gingival contours, and facial ratios commonly employed for restoring non-cleft patients were used as a reference.

The abutment teeth were prepared for zirconia-ceramic fixed dental protheses. (Figure 3)

Final impression of the maxillary abutments was made using a combination of heavy and light-body PVS impression material, after conventional gingival retraction using a double cord technique.

Fig 3 Teeth Preparation

Fig 4 The Zirconia Coping

After obtaining the working cast, the zirconia coping was designed digitally, fabricated with a milling machine and checked intraorally to verify insertion and marginal adaptation (Figure 4).

Then the veneering ceramic was layered according to the selected shade.

The ridge was finalized before the try-in. Occlusal interference was checked with articulating paper. Finally, the ridge was cemented with self-adhesive resin cement (RelyX U200; 3M ESPE, Cuxhaven, Germany) (Figure 5).

Fig 5 Final Result

Fig 6 Intra-Oral View Two-Year Follow-Up

Fig 7 Frontal View of Smile Two-Year Follow-Up

A two-year follow-up confirmed the patient's complete satisfaction with her smile (Figures 6 and 7)

III. DISCUSSION

Providing treatment to patients with CLP is a highly complex process and requires an interdisciplinary team to achieve successful outcomes. The difficulty level can be further increased in cases where there are additional complicating factors, such as maxillary hypoplasia or the absence of a premaxilla. In these cases, prosthodontists face challenges such as multiple missing teeth, teeth with abnormal shapes or sizes, and insufficient soft tissue.

Various treatment options are available for patients with cleft lip and palate. Removable partial dentures can be used with telescopic crowns cemented to natural teeth, and overdentures can be utilized to camouflage large defects with major bone and soft tissue deficiencies (9). Another recently published technique is interdental alveolar distraction, which reduces the cleft area and eliminates the

need for bone grafting large alveolar deformities (10) (11). Implant-supported fixed prostheses and conventional fixed dental prostheses are also viable options depending on the severity of the case (12).

Removable partial denture can be used temporarily as a form of tooth replacement, as noted by Saito et al. (2002)(13) . However, despite their good appearance, these removable dental prostheses may cause discomfort for patients due to irritation caused by the soft tissues supporting them (14). Therefore, they should only be used as a permanent solution for tooth replacement when multiple teeth are missing and the gap is too large to be filled by a fixed partial denture.

After careful evaluation, it was determined that a fixed dental prosthesis would be the optimal treatment option for this particular patient. However, there were concerns about the ceramic structure's ability to adequately address the soft tissue and bone deficiencies present in the edentulous area.

The framework made with Zirconia was planned with adequate volume and vertical dimension to compensate for the absent hard and soft tissues, and two abutments were employed (#11 and #12) to improve stability, retention, and support of the prosthesis.

To achieve aesthetic results, the length of the teeth was regulated by incorporating pink porcelain into the cervical area of the structure, which covered the alveolar ridge to offset the bone deformity.

Currently, all-ceramic crowns are becoming increasingly popular, and for good reason. The Y-TZP zirconia-based framework, which is coated with a feldspathic ceramic, satisfies patients' reasonable expectations for aesthetics, biocompatibility, and functionality.

A favorable aesthetic result was achieved in this case, thanks to the thorough treatment planning and the collaborative efforts of the interdisciplinary team. The final restoration took into account various factors, including the ideal tooth proportions, gingival height, shape, and contours, as well as the position of the upper and lower lips, restoration of facial support, and configuration of the zirconia-Ceramic dental protheses.

Although, the use of a fixed partial denture may create a number of problems such as the removal of sound tooth structure and difficulty in oral hygiene with reduced gingival and periodontal health. (15) (16)

It is noteworthy to acknowledge the patient's high motivation and unwavering dedication to attaining the optimal outcome, which included maintaining sufficient oral hygiene and care at home. The ultimate restoration successfully resolved the patient's main concern of obtaining a fixed prosthesis, revitalized a visually appealing smile, and established a satisfactory occlusion.

IV. CONCLUSION

This clinical report describes an innovative approach to the prosthodontic rehabilitation of a patient with Cleft Palatal and Lip, involving the use of a zirconia-based fixed partial denture with pink porcelain to restore facial and dental aesthetics. The complex case required lengthy treatment time and interdisciplinary collaboration. Despite these challenges, the final restoration achieved the patient's desired outcome, providing an aesthetically pleasing smile and satisfactory occlusion.

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- *Conflicts of Interest*

The authors declare no conflicts of interest.

- *Authors's Contributions*

All the authors to the production of this article. They read and approved the final version of this manuscript.

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