

Andrews Bridge: A Boon for Cleft Lip Palate Patients: A Case Report

Prabal Sharma^{1*} Bhumika Sharma² Roma Goswami³ Sandeep Kalra⁴ Priyanka Vats⁵

¹Senior Lecturer, Department of Prosthodontics Including Crown & Bridge, MM College of Dental Sciences & Research, Mullana, Ambala, India.

²Senior Lecturer, Department of Prosthodontics Including Crown & Bridge, MM College of Dental Sciences & Research, Mullana, Ambala, India.

³Professor and Head, Department of Prosthodontics Including Crown & Bridge, Subharti Dental College, Swami Vivekanand University, Meerut, India.

⁴Reader, Department of Prosthodontics Including Crown & Bridge, MM College of Dental Sciences & Research, Mullana, Ambala, India.

⁵Senior Lecturer, Department of Prosthodontics Including Crown & Bridge, MM College of Dental Sciences & Research, Mullana, Ambala, India.

ABSTRACT

Background: Cleft Lip & Palate (CLP) is a congenital anomaly caused by abnormal facial development during pregnancy. The exact etiology of CLP is still unknown but some of the reasons could be malnutrition, irradiation, psychological stress, teratogenic agents, viral infections and inheritance. The treatment of a CLP patient is a multidisciplinary approach including complex treatment strategies and long treatment duration. These patients require various treatments provided by a multidisciplinary team which includes a maxillofacial surgeon, an orthodontist, prosthodontist, an ear nose and throat specialist (ENT), speech therapist and all those professionals who can help provide functional and aesthetic improvement. Prosthetic rehabilitation of anterior maxilla in such patients is most important and complex as well. As most of the cleft lip & palate patients demand fixed prosthesis because of better aesthetics, better function and has an obvious psychological impact on these patients. But, the success of a prosthodontic rehabilitation of these patients lies in the retention of a prosthesis. Therefore, a Fixed-removable partial denture are particularly indicated for the patients with such extensive supportive tissue loss and when the alignment of the opposing arches or esthetic arch position create difficulties for placement of a conventional fixed partial denture. This case report highlights the fabrication of a fixed-removable partial denture using the Andrews Bridge philosophy wherein a removable prosthesis is retained by a bar and sleeve attachment to fixed retainers on the either side of an edentulous space.

Keywords: Cleft Lip and Palate, Prosthetic Rehabilitation, Andrew's Bridge, Edentulous.

INTRODUCTION

Cleft of lip and palate (CLP) is a type of craniofacial malformation that occurs due to non-fusion of two sides of maxillary processes during the embryonic stage.¹ In India, the incidence of cleft lip and palate is 1 in 500 live births making CLP one of the most frequent occurring congenital anomaly.^{2,3} Clinically, it is presented as an irregular and incomplete maxillary growth and oro-nasal communication, accompanied with agenesis or malformation of the teeth which affect the function of swallowing and speaking.

Among the various classifications of cleft lip & palate, Veau's Classification is most commonly used which classifies cleft lip & palate in four main groups.⁴

- I. Clefts of the soft palate.
- II. Clefts of the soft and hard palate, up to the incisive foramen.
- III. Clefts of the soft and hard palate extending unilaterally through alveolus.
- IV. Clefts of the soft and hard palate extending bilaterally through alveolus.

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*Correspondence Dr. Prabal Sharma.

Department of Prosthodontics Including Crown & Bridge, MM College of Dental Sciences & Research, Mullana, Ambala, India.

Email: prabalsharma.3@gmail.com



Fig 1a: Preoperative intraoral view.



Fig 1b: Occlusal view.



Fig 2: Final Impression of Tooth Preparation for 13 & 23.



Fig 3: Components for Andrew's bridge.



Fig 4: Attachment of the plastic bar to wax patterns.



Fig 5: Metal trial of the casted framework.



Fig 6: Wax trail of the prosthesis.



Fig 7: Retentive clips attached on the bar.

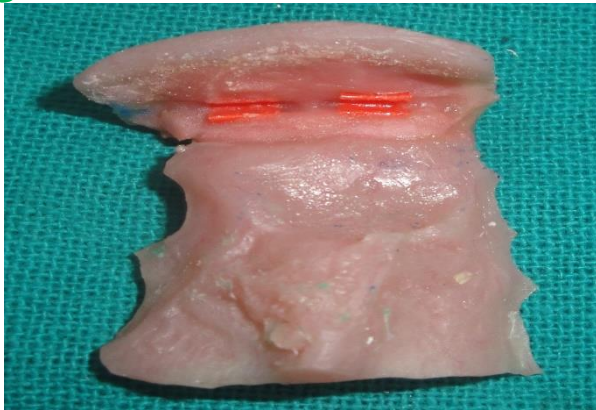


Fig 8: Retentive clips picked-up on RPD.



Fig 9: Prosthesis in situ.

Rehabilitation of a cleft lip palate is a very challenging task and require a multidisciplinary approach since the neonatal period. The aim of rehabilitation besides reestablishing esthetic is to improve the functional speech of the patient and to achieve adequate nutrition. Due to a long and stressful treatment duration, the patient should also be supported psychologically. Therefore, the multidisciplinary approach including plastic surgeons, dentists and psychologists will be beneficial.⁵

The ideal treatment of a cleft lip palate is surgical, bone grafting and orthodontic positioning of the teeth. Surgical treatment most often considers shifting of retruded premaxilla in protruding position or complete closure of oro-nasal communication with bone grafting. With orthodontic treatment the discrepancy in the size of

maxillae and mandible should be corrected, adjustment of the teeth should be performed in mixed as well as permanent dentition.⁶ Now, if this ideal treatment does not provide satisfactory results then, prosthetic restorations are required. This treatment demand can be fulfilled with removable, fixed or removable-fixed prosthetic restorations depending on multiple factors.⁷

During prosthetic rehabilitation, numerous factors influence the prosthetic choice, starting from the number of teeth in the mouth and their position, size of the defect, bone deficiency, the presence of keratinized tissue.⁸ Removable dentures are the treatment of choice to restore maxillary defects and replace missing teeth. But, Soft tissue irritation and lack of retention and stability remains to be most common disadvantages of removable prosthesis.⁹

The fixed partial denture system named Andrew's bridge was introduced by Dr James Andrews of Amite Louisiana, USA in 1965.¹⁰ This system involves a fixed retainer on abutment teeth and removable pontics. The fixed component is made of porcelain fused to metal crowns that are joined together by a castable bar cemented on to the prepared abutments. The removable component consists of acrylic teeth on acrylic base to which metal or plastic retentive clips are embedded. This system has an advantage of flexibility in the arrangement of artificial teeth with minimum RPD extension along with better retention and stability. The indications for fixed-removable Andrews's bridge system includes;

- Several missing teeth along with defect in the edentulous ridge.
- Failure of removable partial denture because of discomfort related to its palatal extension.
- Long edentulous space where fixed partial denture has failed.
- Cleft palate patients.

However, this system is contraindicated in cases with deep bite and inadequate interocclusal distance.¹¹ This case report presents a patient with cleft lip rehabilitated with the Andrews Bridge System restoring patient's esthetic, functional and phonetics demands.

CASE REPORT

An 18-year-old male patient was referred to the Department of Prosthodontics for prosthetic rehabilitation of missing upper front teeth. Relevant dental history revealed that the patient had a congenital cleft lip and palate which was surgically corrected at an early age. He recently underwent an orthodontic correction by rapid maxillary expansion (RME) as the maxillary arch was too narrow which was completed one month back. Intraoral examination revealed maxilla with a Veau's class III defect (unilateral cleft lip, alveolus, hard and soft palate) and missing central & lateral incisors of both sides (Figure 1a & b). Extra oral examination revealed a surgical scar on the upper lip due to previous surgical correction of cleft lip.

Considering patient's age and oral conditions it was planned to rehabilitate with a prosthesis which would be simple in design, light weight, fixed and also easily maintainable. Therefore, an Andrews's bridge (fixed removable) was planned.

Procedure

Maxillary and mandibular diagnostic impressions were made with irreversible hydrocolloid impression material (Septodont, DPI) and poured with Type-III gypsum product (Kaladent, Kalabhai). Mock tooth preparation and wax-up were done on the study model to analyze final treatment outcome. The selected abutment teeth were then prepared for receiving metal ceramic crowns. Final impression was made using the Polyvinyl Siloxane impression material medium body consistency (Aquasil Dentsply, Germany) (Figure 2). The master cast was retrieved using Type IV gypsum product (Kalabhai Ultrarock Die Stone). Now, the wax patterns for copings of prepared abutments were fabricated. A plastic bar pattern (Alphadent Ceka Preciline, NV, Belgium) (Figure 3) was placed in the pontic section joining the mesial aspects of wax patterns of 13 and 23 following the labiopalatal center of residual ridge with sufficient occlusal and tissue clearance (Figure 4). The entire assembly (wax patterns and bar) were sprued, invested, casted, and finished. The metal framework was checked intraorally for proximal contacts and occlusal relationships (Figure 5). Ceramic layering was done followed by shade selection in adequate light. After bisque trial of the prosthesis, it was

cemented using glass ionomer luting cement. Impression was again made using irreversible hydrocolloid after blocking out the undersurface of the bar and casts were poured with type IV gypsum product for fabrication of RPD. Casts were mounted on articulator, teeth arrangement was carried out and wax try-in was done (Figure 6) followed by acrylisation. Now, undersurface of the bar was again blocked and clips were attached to the bar and picked up with autopolymerising PMMA resin into the removable superstructure (Figure 7, 8 & 9).

Patient was given instructions regarding insertion and removal of the prosthesis. Patient was motivated for cleaning and maintenance of the prosthesis. Patient was periodically recalled and no prosthetic, periodontal failure or soft tissue injury was noticed. Therefore, patient's satisfaction and challenging treatment demands were fulfilled.

DISCUSSION

The incidence of congenitally missing teeth, especially lateral incisors adjacent to the alveolar cleft is high.¹² Quality and quantity of existing contiguous hard and soft tissues, systemic conditions and economic status of the patient also plays a significant role in treatment planning, clinical outcome and prognosis in the CLP patients. Large vertical and horizontal bone defects pose a prosthodontic challenge as it is difficult to restore aesthetics and function. Such clinical conditions are not successfully treated by conventional fixed or removable prosthesis. This case is the classic example of Siebert class III ridge defect with inadequate height and width.¹³ When there is a limitation of bone grafting/surgical augmentation, alternative treatment modalities should be considered. Conventional fixed partial denture treatment was not a treatment of choice for the patient due to the exaggerated movement of the labial mucous membrane fold during function. This may cause immense pressure on the FPD and deleterious effects on the abutments. Moreover, a removable partial denture could not be planned as placement of clasps in the aesthetic zone is not desirable for a young patient. Hence, Andrew's bridge is an alternative choice of treatment.

The Andrew's bridge system is composed of two components: Fixed component (retainers on abutments joined by bar) and a removable

component. Due to fixed extra-coronal bar system, vertical movement of dentures base during masticatory function is minimized and irritation of soft tissue and function becomes improved thus, overcoming the disadvantages of a removable prosthesis. Hygiene can be efficiently maintained for this kind of prosthesis and the abutment teeth with satisfactory lip support, especially needed in cleft lip patients also make this kind of prosthesis favorable. The Andrew's system is usually of two types based on the area of bar attachment:¹⁴

- Pontic supported Andrew's bar system.
- Bone anchored or implant supported Andrew's bar system.

Such an assembly provides maximum aesthetics and phonetics. Since the abutments are strong enough to receive load, Pontic supported Andrew's bar system used in this situation offers both function and aesthetics. Since the prosthesis is retained by a bar retainer, the taste perception is unaltered as the flanges need not be extended palatally for support. The acrylic prosthesis can be removed by the patient when desired for hygienic access. A gauze piece can be used to clean the areas below the bar. The system allows a precision fit between fixed and removable components without compromising the retention. In this case, the support mechanism is shared by the tooth, and the tissues to some extent and the bar serves as a retentive and stabilizing tool for the removable segment. Immeleus JE and Aramany M¹⁵ advocated the use of fixed-removable partial denture for cleft palate patients when conventional methods are contraindicated.

Advantages of Andrews bridge^{16,17}

1. Has both fixed and removable properties.
2. Can be removed by the patient thereby maintaining oral hygiene.
3. More stable as it is totally tooth borne and the occlusal forces are directed more along the long axis of the abutment teeth.
4. Normal perception of taste is maintained.
5. Economical treatment option.
6. The system acts as stress breaker while transmitting unwanted leverage forces.

Disadvantages of Andrews bridge

1. Wearing away of the plastic clip needs to be replaced.
2. Additional lab steps and needs meticulous planning to prevent tissue impingement of metal bar.
3. Can't be used for long spans as it will increase flexure of the metal bar and lead to failure of the prosthesis.
4. Minimum 3 – 4 mm occlusogingival height is necessary.

CONCLUSION

This case report describes prosthodontic rehabilitation of a young patient with cleft lip and palate with Andrews bridge system replacing missing teeth with marked improvement in patients appearance, speech and confidence. Andrews Bridge system is a fixed-removable prosthesis that is indicated in patients with few missing teeth and large localized ridge defects.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

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