EAS Journal of Dentistry and Oral Medicine
Abbreviated Key Title: EAS J Dent Oral Med
ISSN: 2663-1849 (Print) & ISSN: 2663-7324 (Online)
Published By East African Scholars Publisher, Kenya

OPEN ACCESS

Volume-7 | Issue-1 | Jan-Feb-2025 | DOI: https://doi.org/10.36349/easjdom.2025.v07i01.008

Case Report

Cantilevered Anterior Fixed Partial Dentures in Medically Compromised Patients: A Case Report

Hanen Boukhris[1*], Sabrine Jlassi[1], Ameni Thabet[1], Hajer Zidani[1], Hayet Hajjami[1], Souha Ben Youssef[2]

[1]Department of Fixed Prosthodontics, University Hospital Farhat Hached Sousse, LR12SP10, University of Monastir, Tunisia
[2]Department of Oral Surgery, University Hospital Farhat Hached Sousse, LR12SP10, University of Monastir, Tunisia

Article History
Received: 11.01.2025
Accepted: 15.02.2025
Published: 20.02.2025

Journal homepage:
https://www.easpublisher.com

Quick Response Code

Abstract: ***Introduction*:** Cantilevered anterior fixed partial dentures (FPDs) are a viable treatment option for patients with esthetic concerns, particularly when implants are not suitable due to medical conditions or financial constraints. These prostheses provide a conservative, minimally invasive solution to restore both function and appearance. ***Objective*:** This case report aims to demonstrate the use of a cantilevered anterior FPD for esthetic rehabilitation in a medically compromised patient undergoing radiotherapy for breast cancer, with a focus on achieving an optimal esthetic result while considering the patient's medical and financial limitations. ***Patient and Methods*:** A 42-year-old female patient presented with severe mobility of tooth 12 and a 1mm midline diastema. After initial periodontal therapy (scaling and root planing), the treatment plan was established. The adjacent teeth (11 and 21) were prepared for full coverage crowns, and tooth 12 was extracted atraumatically. An immediate provisional cantilever bridge was placed, followed by final impressions for the fabrication of a ceramo-ceramic cantilever bridge with tooth 22 in extension. ***Results*:** The final prosthesis successfully restored the patient's smile, providing immediate esthetic improvement and functional stability. The cantilevered bridge with tooth 22 in extension closed the midline diastema, with no complications observed during the healing phase. The patient expressed high satisfaction with the esthetic outcomes and functional restoration. ***Conclusion*:** This case highlights the effectiveness of cantilevered anterior FPDs as an esthetic and functional solution for patients with medical conditions that preclude implant therapy. The treatment was minimally invasive, cost-effective, and met the patient's needs for a rapid, non-surgical approach. Cantilevered bridges offer a viable alternative for esthetic rehabilitation in medically compromised patients, though further research is needed to assess long-term durability and performance.

Keywords: Cantilevered Anterior Fixed Partial Dentures, Esthetic Rehabilitation, Medically Compromised Patients, Breast Cancer, Radiotherapy, Tooth Mobility, Midline Diastema, Ceramo-Ceramic Bridge.

INTRODUCTION

Tooth loss poses a significant challenge in restorative dentistry, necessitating prosthetic solutions that restore both function and aesthetics. Among the various options available, cantilevered anterior fixed partial dentures (FPDs) offer a unique and minimally invasive alternative, particularly in medically compromised patients who cannot undergo implant therapy due to financial or health constraints. These cantilever bridges differ from traditional fixed prostheses by relying on a single-sided pontic extension, supported by one or more abutment teeth, creating a cantilever effect that distributes forces asymmetrically [1].

Cantilevered bridges can be classified into two main types: the single-abutment cantilever bridge, supported by only one abutment tooth, and the multiple-abutment cantilever bridge, where at least two contiguous abutments provide support. While the former offers minimal tooth preparation, it places greater stress on the abutment, whereas the latter offers improved force distribution, reducing the risk of overloading a single abutment [2].

***Corresponding Author:** Hanen Boukhris
Department of Fixed Prosthodontics, University Hospital Farhat Hached Sousse, LR12SP10, University of Monastir, Tunisia

In cases involving medically compromised patients, such as those undergoing cancer treatment or with limited financial resources, cantilevered FPDs provide a viable, cost-effective solution to address tooth mobility and esthetic concerns, while minimizing invasive procedures. However, this treatment modality carries inherent risks, such as abutment overload and mechanical stress. Therefore, the selection of the appropriate cantilever bridge type and careful planning are crucial to ensuring success [1-3].

This case report aims to present the clinical application of a cantilevered anterior FPD in a 42-year-old female patient undergoing radiotherapy for breast cancer. The goal is to demonstrate the potential benefits of cantilevered bridges in terms of esthetic restoration and functional stability, while also considering the challenges associated with such treatment in medically compromised patients.

CASE PRESENTATION

- **Patient Background and Chief Complaint**

A 42-year-old female patient presented to the University Hospital of Farhat Hached, Sousse, Department of Prosthodontics, with the chief complaint of improving her smile and addressing tooth mobility. The patient was undergoing radiotherapy for breast cancer and requested a quick and minimally invasive treatment. She explicitly refused implant therapy due to both medical and financial constraints (Fig.1)

Figure 1: Initial extratraoral view

- **Clinical Examination**

The initial extraoral examination revealed a normal facial profile with no significant asymmetry. The intraoral findings were as follows: (Fig.2)

- ✓ Severe mobility (Grade III) of tooth 12, stabilized with a composite resin splint.
- ✓ A 1 mm midline diastema between the maxillary central incisors (11 and 21).
- ✓ Healthy periodontal conditions for teeth 11 and 21, with adequate bone support.
- ✓ Proper occlusion, with mild anterior wear but no major interferences.

Figure 2: Initial intraoral view

- **Radiographic and Diagnostic Assessment**

A periapical radiograph and cone-beam computed tomography (CBCT) scan revealed:

- ✓ Advanced periodontal attachment loss of tooth 12, indicating a poor prognosis.
- ✓ Sufficient bone support around 11 and 21, allowing for prosthetic rehabilitation.
- ✓ No periapical pathology or signs of systemic bone loss.

- **Initial Periodontal Therapy**

Before starting the prosthetic treatment, a comprehensive periodontal phase was completed to ensure a healthy and stable oral environment:

- ✓ Scaling and root planing (SRP) was performed to remove subgingival calculus and bacterial biofilm.
  The patient was motivated and instructed on proper oral hygiene measures, including the use of interdental brushes and chlorhexidine rinses.
- ✓ A follow-up periodontal evaluation confirmed gingival health improvement, allowing safe progression to prosthetic rehabilitation.

- **Treatment Considerations and Planning**

Given the patient's medical history, financial limitations, and desire for a rapid, minimally invasive solution, the following treatment plan was proposed:

- ✓ Digital Smile Design (DSD) to visualize the expected esthetic outcome and confirm the feasibility of a cantilever bridge.
- ✓ Tooth preparation of 11 and 21 before extraction to maintain occlusal reference points.
- ✓ Atraumatic extraction of tooth 12, preserving soft tissue integrity.
- ✓ Immediate provisionalization with a temporary cantilever bridge.
- ✓ Final impressions and CAD/CAM fabrication of a monolithic zirconia cantilever bridge after healing.
- ✓ Definitive cementation and follow-up.

The patient agreed to this plan, appreciating the shorter treatment time and non-invasive nature compared to implant therapy.

- **Treatment Protocol**

Step 1: Digital Smile Design (DSD) and Pre-Treatment Planning

Before initiating treatment, a Digital Smile Design (DSD) was performed to: (Fig 3, 4).

- ✓ Assess esthetic modifications and ensure proper pontic positioning.
- ✓ Simulate the final outcome, allowing the patient to visualize the expected smile transformation.
- ✓ Optimize diastema closure, ensuring a natural and harmonious appearance.

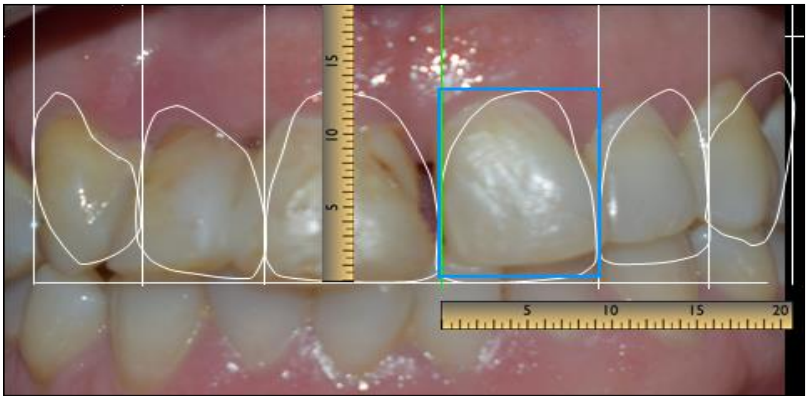

Figure 3: DSD

Figure 4: the aesthetic project of the patient

Step 2: Tooth Preparation of 11 and 21

To ensure occlusal stability and a smooth transition to the provisional phase, the abutment teeth (11 and 21) were prepared before extracting tooth 12. The preparation protocol followed minimally invasive guidelines.

Step 3: Atraumatic Extraction of Tooth 12 and Immediate Provisionalization

Following tooth preparation, tooth 12 was extracted atraumatically, ensuring minimal trauma to surrounding tissues. Immediately after extraction, a provisional acrylic cantilever bridge was fabricated and cemented, allowing: (Fig 5, 6).

- ✓ **Immediate esthetic restoration**, preventing psychological distress for the patient.
- ✓ **Soft tissue preservation**, ensuring better pontic adaptation in the final prosthesis.
- ✓ **Patient adaptation to the cantilever design**, before transitioning to the definitive prosthesis.

Figure 5: Atraumatic Extraction of Tooth 12

Figure 6: After two weeks

Step 4: Final Impressions and CAD/CAM Fabrication

Once soft tissue healing was complete, a digital impression was taken using an intraoral scanner. The definitive full-coverage ceramo-ceramic or multilayer cantilever bridge was designed and milled using CAD/CAM technology, ensuring: (Fig 7,8)

- ✓ **Superior strength and fracture resistance**, crucial for cantilevered restorations.
- ✓ **Precise marginal adaptation**, minimizing the risk of secondary caries.
- ✓ **Natural esthetic integration**, matching adjacent dentition in shade and translucency.

Figure 7, 8: Final restoration (framework/after ceramic cosmetic layering)

Step 5: Final Cementation and Follow-Up

The final **zirconia cantilever bridge** was tried in, with occlusal adjustments made to ensure: (Fig .9)

- ✓ **Proper force distribution**, preventing excessive load on the cantilever.
- ✓ **A natural emergence profile**, ensuring harmonious gingival contour.
- ✓ **Seamless diastema closure**, achieving the patient's esthetic goals.

Figure 9: Final result: Smile view with the bridge in place

The bridge was permanently cemented using adhesive luting techniques, optimizing retention and longevity.

DISCUSSION

The final prosthetic solution for the patient, a cantilever ceramo-ceramic bridge with 22 in extension,

successfully met both her clinical and esthetic expectations. Several key factors contributed to the success of this treatment, emphasizing the importance of personalized, minimally invasive, and cost-effective treatment planning in medically compromised patients.

1. Immediate and Minimally Invasive Esthetic Restoration

The patient's primary concern was the restoration of her smile, including the mobility of tooth 12 and closure of the midline diastema. The immediate cantilever provisional bridge addressed these esthetic concerns while minimizing the need for invasive interventions. This provisional bridge not only offered an immediate esthetic solution but also allowed the patient to adapt to the final restoration, ensuring a smooth transition. Additionally, the minimally invasive approach preserved the gingival architecture, which is vital for long-term esthetic outcomes [4].

2. A Cost-Effective Alternative to Implant Therapy

The patient’s financial constraints, combined with her refusal of implant therapy, significantly influenced the decision to opt for a cantilever bridge. While implants offer high success rates, they can be prohibitively expensive, particularly for patients with medical issues that limit their surgical options. The cantilever bridge provided an affordable, non-invasive solution that addressed both functional and esthetic concerns, while avoiding the need for costly bone grafting or implant placement. The use of ceramo-ceramic materials ensured high-quality esthetics, making this approach not only cost-effective but also visually appealing [4, 5].

3. Functional Stability and Long-Term Durability

The cantilever bridge, made from multilayer ceramics, provided the necessary strength and durability for long-term use. Despite the inherent biomechanical challenges of the cantilever design, including the risk of increased stress on the abutment teeth, meticulous planning of tooth preparations (teeth 11 and 21) helped optimize the distribution of occlusal forces. The zirconia framework, known for its fracture resistance, further enhanced the bridge's stability, ensuring that it remained functional for years. Additionally, careful occlusal adjustments and emergence profile management helped avoid undue stress on the abutments and ensured optimal functional performance [6].

Clinical Considerations and Challenges

While the cantilever design was well-suited to this patient’s needs, several clinical challenges were carefully considered. The primary concern was ensuring precise preparation of the abutment teeth and optimal force distribution. Cantilever bridges are often subjected to significant forces, particularly when the pontic is in extension, which can lead to failure if not adequately addressed. The decision to preserve tooth 22, which remained intact, allowed for the best esthetic outcome by focusing preparation on the central incisors (11 and 21). This decision ensured that the final restoration achieved symmetry and harmony within the dental arch while preserving natural tooth integrity [7, 8].

The use of multilayer ceramics played a critical role in ensuring both the strength and esthetics of the restoration. These ceramics provided the necessary flexibility and fracture resistance, allowing for a seamless integration of the restoration into the patient's smile. The careful selection of ceramic materials, closely matching the translucency and color of adjacent teeth, contributed to the esthetic success of the final bridge [9, 10].

Future Considerations

Although the patient is currently satisfied with the outcome, regular follow-up visits will be essential to monitor the long-term stability and health of the abutment teeth, as well as the integrity of the cantilever bridge. Periodic check-ups will help detect any potential complications, such as wear, fracture, or loosening of the restoration. Additionally, maintaining good oral hygiene and consistent follow-up care will be crucial in ensuring the longevity of the restoration and preventing issues such as plaque accumulation, which could lead to periodontal problems or secondary caries.

This case highlights the importance of a personalized and holistic approach to treatment planning, especially in medically compromised patients. By carefully considering the patient's specific needs and constraints, a cantilevered anterior fixed partial denture was successfully utilized to provide a functional, esthetic, and cost-effective solution.

CONCLUSION

In conclusion, this case demonstrates the effectiveness of cantilevered anterior fixed partial dentures (FPDs) as a minimally invasive, cost-effective solution for esthetic rehabilitation in a medically compromised patient. The cantilever ceramo-ceramic bridge, supported by meticulous planning and advanced materials, successfully met both functional and esthetic expectations. This approach highlights the potential of cantilevered anterior FPDs to provide a durable and predictable alternative to more invasive treatments, such as implants, particularly when medical conditions, financial constraints, and treatment preferences influence the therapeutic approach. Customizing treatment based on individual patient needs is crucial, and with careful design and material selection, cantilevered anterior FPDs offer a reliable solution to address esthetic concerns and maintain long-term functional stability in patients facing significant medical and financial challenges.

REFERENCES

1. Ewing, J. E. (1957). Re-evaluation of the cantilever principle. *The Journal of Prosthetic Dentistry*, *7*(1), 78-92.
2. Henderson, D., Blevins, W. R., Wesley, R. C., & Seward, T. (1970). The cantilever type of posterior fixed partial dentures: a laboratory study. *The Journal of prosthetic dentistry*, *24*(1), 47-67.
3. Wright, K. W., & Yettram, A. L. (1979). Reactive force distributions for teeth when loaded singly and when used as fixed partial denture abutments. *The Journal of Prosthetic Dentistry*, *42*(4), 411-416.
4. Wright, W. E. (1987). Success with the cantilever fixed partial denture. *J Prosthet Dent*.
5. Lundgren, D., & Laurell, L. (1986). Occlusal force pattern during chewing and biting in dentitions restored with fixed bridges of cross-arch extension: I. Bilateral end abutments. *Journal of oral rehabilitation*, *13*(1), 57-71.
6. Lundgren, D., Laurell, L., Falk, H., & Bergendal, T. (1987). Occlusal force pattern during mastication in dentitions with mandibular fixed partial dentures supported on osseointegrated implants. *The Journal of prosthetic dentistry*, *58*(2), 197-203.
7. Budtz-Jørgensen, E., Isidor, F., & Karring, T. (1985). Cantilevered fixed partial dentures in a geriatric population: preliminary report. *The Journal of Prosthetic Dentistry*, *54*(4), 467-473.
8. Kelly, E. (1972). Changes caused by a mandibular removable partial denture opposing a maxillary complete denture. *The Journal of Prosthetic Dentistry*, *27*(2), 140-150.
9. Glantz, P. O., Nyman, S., Strandman, E., & Randow, K. (1984). On functional strain in fixed mandibular reconstructions II. An in vivo study. *Acta Odontologica Scandinavica*, *42*(5), 269-276.
10. Glantz, P. O., Strandman, E., Svensson, S. A., & Randow, K. (1984). On functional strain in fixed mandibular reconstructions I. An in vitro study. *Acta Odontologica Scandinavica*, *42*(4), 241-249.

Cite This Article: Hanen Boukhris, Sabrine Jlassi, Ameni Thabet, Hajer Zidani, Hayet Hajjami, Souha Ben Youssef (2025). Cantilevered Anterior Fixed Partial Dentures in Medically Compromised Patients: A Case Report. *EAS J Dent Oral Med*, *7*(1), 55-60.