

Prosthetic Rehabilitation of an Individual Papillary Unit: A Clinical Report

Farooq Ahmed*, Ian K MacLeod† and Anthony Roberts‡

Abstract - This article is a clinical and technical report to illustrate the prosthetic correction of an individual interdental papilla, which had been lost due to periodontal disease. The patient presented with localised aggressive periodontitis and was successfully treated non-surgically. As a result of the periodontal disease and its management, the interdental papilla between the 11 and 21 were lost and prosthetically replaced. The clinical details of the case and the technical procedures are fully illustrated within this article.

KEY WORDS: Interdental papilla, Prosthetic replacement, Technique

INTRODUCTION

Periodontal diseases may lead to irreversible changes in the soft tissue architecture of the tissues supporting the dentition. Furthermore, the treatment of these diseases may result in similar soft tissue contour changes as part of the healing process. A variety of periodontal diseases have been described¹ and a common presentation of localised aggressive periodontitis is to observe significant attachment loss affecting the permanent first molars and central incisors in younger patients¹. Of course, the loss of soft tissue between the 11 and 21 provides a significant challenge to clinicians in an aesthetically important zone especially in patients with high lip/smile lines. This article details the management of a patient who had lost an individual interdental papilla, which was replaced with a localised removable prosthesis or 'papillary prosthesis'.

Clinical report

A 33-year old female patient first attended the Periodontal Department at the University Dental Hospital of Manchester in January 2008. The patient had been referred in by her General Dental Practitioner who had noticed a significant deterioration in her periodontal condition over the previous 12-months. The patient presented with adequate oral hygiene but with deep pocketing (5-8mm) associated with the first permanent molars and central incisors. The patient was diagnosed with localised aggressive periodontitis¹ and treated non-surgically with root surface debridement and adjunctive systemic antibiotics (Amoxicillin and Metronidazole). At the 3- and 6-month review appointments, no significant periodontal pocketing was present although there had been a significant loss of the interdental papilla between the 11 and 21 teeth (Figure 1). The appearance, particularly on smiling, caused the patient significant

concern as they were employed as a model and required photographs to be taken periodically.

There were a number of treatment options available for the correction of such a defect. These included periodontal surgery to surgically reconstruct the papilla and obtain further root coverage (discounted due to poor predictability), a removable gingival veneer (discounted due to the lack of interproximal soft tissue loss around adjacent teeth), provision of veneers with or without gingivally-coloured porcelain / composite (discounted due to the potential for poor emergence profile and subsequent plaque accumulation) and an interproximal papillary prosthesis. The provision of a gingival prosthesis was predictable and a non-invasive approach, ideal for this patient's requirements.

A number of discussion points were raised with the patient ahead of the provision of the prosthesis and also at the time of delivery. The most important discussion point was the potential risk of inhalation or ingestion due to the small size of prosthesis and mechanism of retention. For this reason, the prosthesis was provided on the understanding that it was to be used for short-term use only i.e. for photographic work. Sufficient undercut engagement was intentionally included in the design specification to ensure sufficient retention preventing inadvertent loss. Continual emphasis was placed upon the usage for short-term aesthetics. Previous reports utilising similar gingival prostheses highlighted that these prostheses may reduce the trapping of food² although the patient was discouraged from eating to further reduce the likelihood of dislodging the prosthesis.

Of course, the prosthesis had the potential for plaque retention, which could result in further periodontal destruction and exacerbation of the defect. In turn, the prosthesis could be deemed a failure if there were further loss of soft tissue due to lack of adaptation. The importance of a high standard of oral hygiene was continually emphasised to the patient.

A variety of materials were considered for the papillary prosthesis produced for this patient. Indeed, other materials used for removable gingival prosthesis have been

* BDS

† MBE

‡ BSc, BDS, FDS RCPS, FDS (Rest Dent) RCPS, PhD, FHEA



Figure 1. Post-treatment clinical picture illustrating the loss of interdental papilla between tooth 11 and 12 due to localised aggressive periodontitis. No pocketing was present post-treatment.

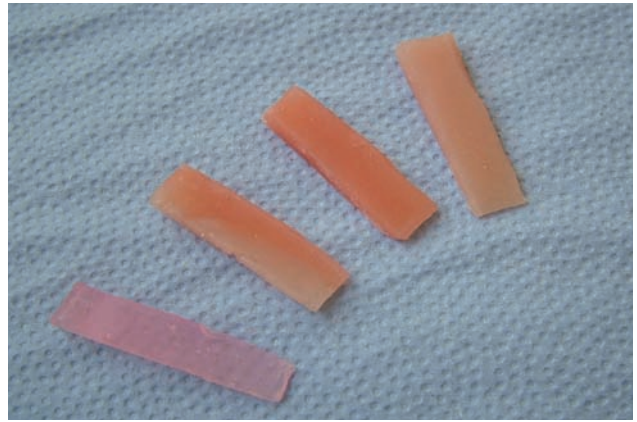


Figure 4. Bespoke colour charts constructed from a variety of silicones at different thicknesses to produce a spectrum of colours similar to the patients gingival.



Figure 2. Preliminary cast from impression taken in a irreversible hydrocolloid and cast up in dental stone demonstrating the post-treatment appearance.

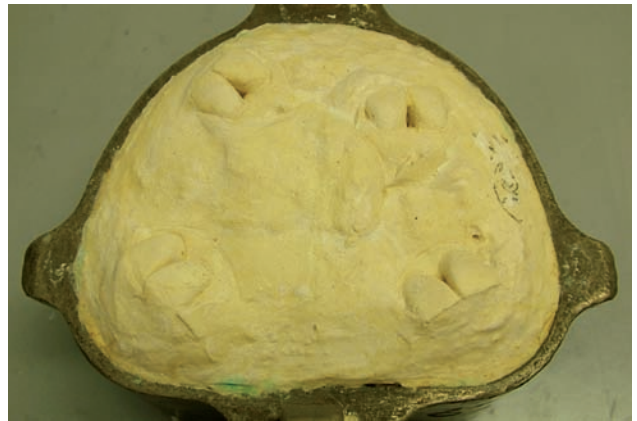


Figure 5. Definitive cast of impression taken in Impregum of the soft tissue defect and cast up in dental stone.

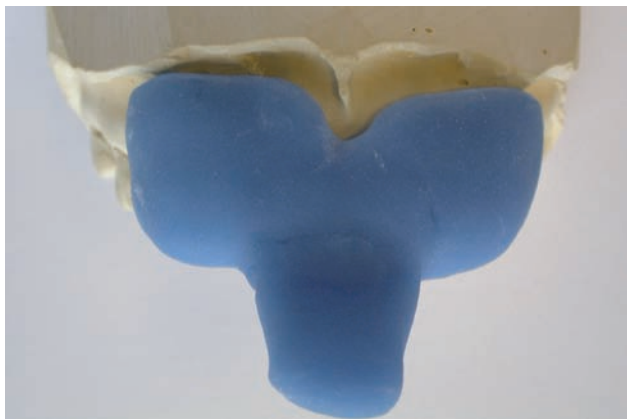


Figure 3. Custom anterior tray with an anterior stub handle utilised for master impression. The impression technique was anterior-posterior to reduce interdental impression tearing.



Figure 6. Wax dummy prosthesis produced from the definitive cast and processed using the lost wax technique.



Figure 7 a.



Figure 7 b.



Figure 7 c1.



Figure 7 c2.



Figure 7 d1



Figure 7 d2.

Figure 7. Final prosthesis produced demonstrating:
a. Prosthesis ex vivo, showing an irregular finish line to aid camouflage of the device.
b. Palatal extension of the prosthesis
c. Clinical appearance with and without prosthesis.
d. Clinical appearance of patient smiling with and without prosthesis.

reported^{4,5}. These materials include resin composite, ceramic, auto-cure acrylic, heat cure acrylic, thermoplastic acrylic and silicones. Composite resins can be used directly in pink shades however their rate of discolouration is quicker than other materials also composite suffers from marginal fracturing and poor wear qualities³. Porcelain veneers have been indicated with fixed prosthesis however extensive preparations are required⁴. Acrylic gingival veneers offer colour better stability however they tend to be less flexible, provide less aesthetic results and have an increased probability of fracturing in comparison to silicone based prosthesis⁵. Certainly the patient reported that this silicone prosthesis was extremely comfortable, which anecdotally is not the author's experience of acrylic based prostheses. Conversely, silicone materials do provide a significant challenge in colour matching and significant issues can arise matching the silicones to the tissues due to their variability of silicone translucency.

A preliminary impression of the Maxillary arch was taken in an irreversible hydrocolloid impression material (Xantalgin) using a perforated Maxillary medium dentate stock tray (Polytrays) with a tray adhesive (Fix). A preliminary cast was poured in dental stone to highlight to the technician the area of concern. (Figure 2; Kaffir D British Gypsum). A close fitting non-perforated custom made tray of the anterior region with a stub handle over the 11 and 21 teeth were constructed from light cured hybrid composite (Figure 3; Plaque photo®).

In an attempt to ensure that the prosthesis matched the colour of the gingival tissues, a custom-made colour chart was produced to match a shade of silicone to the patient's tissues (Figure 4). Whilst the gingival tissues showed no signs of clinical inflammation, healthy gingivae provide a large spectrum of colours, which necessitated a custom chart which other authors have also described⁶. The colour chart was constructed from a combination of silicone materials, (Permaflex®, Monoplast B® a soft lining material, Detax and Ufi Gel SC a soft reline material, Voco) each used to produce different thickness of silicones. In this manner a bespoke chart was produced providing a variety of healthy gingival shades with a degree of translucency. The final colour was a hybrid of all three silicones as no one silicone produced a precise match.

Secondary impressions were taken using the polyether (Impregum Penta™). Previous attempts at using addition cured silicones (Doric and Dimension™ Penta™) proved unsuccessful. Care was taken to ensure the path of insertion was anterior-posterior and not inferior-superior, thus minimizing the tearing of the interdental impression. On occasion, the authors have also used palatally placed silicone impression material to prevent tearing of the master impression material. In addition to the clinically assessed quality of the impression, a polyether was chosen due to its hydrophilic nature and ease of flowability over moist surfaces. The impression was cast up to produce the master impressions in dental stone (Figure 5) (Kaffir D British Gypsum).

A dummy prosthesis was constructed from the master impressions casts in modelling wax (Anutex) (Figure 6). The wax dummy was flaked and processed using the traditional lost wax technique. The mixtures of silicones, chosen for their aesthetic characteristics from the bespoke

chart, were heat cured to manufacturers instructions. After curing the edges were torn to produce a feathered edge finish. This produced an irregular finish line concealing the prosthesis further and aided the camouflage of the prosthesis into the patient's tissues (Figure 7a).

Retention of the prosthesis was achieved by utilizing labial and palatal undercuts (Figure 7b); the prosthesis is easily removable and maintainable using warm water or standard denture cleansers suitable for soft linings.

SUMMARY

The aesthetic result of the papillary prosthesis was excellent (Figure 7c and 7d). The patient was highly satisfied with the result and it was made clear that the prosthesis was provided for short-term aesthetic use only. Furthermore, the prosthesis fitted well, was comfortable and it was functioning well.

The cornerstone for long-term stability of periodontal diseases is the patients' own plaque control which had always been of a high standard. The concern for any prosthesis is that it may also act as a plaque-accumulating factor and the patient will be closely monitored in the future, initially on a 3-monthly basis. In addition to a periodontal reassessment at future appointments, the aesthetics and integrity of the silicone will be checked as it may be subject to extrinsic staining. Extended periods of wear could result in discolouration and require replacement. The master casts and details relating to the silicone combinations have been retained so that replacement prostheses can be produced in the future if desired.

CONCLUSION

This report highlights the highly aesthetic outcome that can be achieved replacing a single papillary unit in a highly aesthetic area using a papillary prosthesis. The clinical and technical details provide highlight to the reader the individual stages in construction of the papillary prosthesis that should be used only for short-term aesthetic use.

MANUFACTURER'S DETAILS

- Irreversible hydrocolloid impression material, Xantalgin, Heraeus Kulzer GmbH, South Bend, Netherlands
- Dentate stock tray, Polytrays, Dentsply Ash instruments, Surry, UK
- Tray adhesive, Fix, Dentsply Detrey GmbH, Konstanz, Germany
- Kaffir D British Gypsum, Newark, Nottinghamshire, UK
- Plaque photo®, W+P dental, Hamburg, Germany
- Permaflex®, Kohler Neuhausen, Germany
- Monoplast B® and Detax, GmbH & Co, Errdingen, Germany
- Ufi Gel SC a soft reline material, Voco, Cuxhaven, Germany
- Impregum Penta™ 3M ESPE, Seefeld, Germany
- Doric, Davis Schottlander & Davis Ltd, Herts, UK
- Dimension™ Penta™ H, 3M ESPE AG, Seefeld, Germany
- Anutex, Kemdent, Purton, Swindon, Wiltshire, UK

ADDRESS FOR CORRESPONDENCE

Dr Anthony Roberts, Senior Lecturer and Honorary Consultant in Restorative Dentistry, School of Dentistry, University of Manchester, Higher Cambridge Street, Manchester, M15 6FH. UK. Email: anthony.roberts@manchester.ac.uk

We note with sadness the death of Ian MacLeod since this paper was accepted for publication

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