Pre-Prosthetic Planning for Periodontal Surgery: A Technique Report

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This manuscript is a technical report to illustrate the pre-prosthetic surgical planning of a case of gingival angioedema, where substantial soft tissue removal was anticipated at the time of surgery and the periodontal-restorative team wished to provide predictable and good quality denture-bearing tissues to facilitate the insertion of an immediate maxillary prosthesis. A surgical model was created and a mock surgical procedure performed, providing the laboratory technician with a close representation of the planned outcome, on which to fabricate the immediate prosthesis. The clinical planning and technical procedures are illustrated and the definitive surgery documented in a step-wise manner, to allow visualisation of the overall case management from pre-surgical planning up to completion of surgery.

Key words: periodontal surgery, pre-prosthetic planning, technique

INTRODUCTION

Pre-prosthetic surgery requires adequate planning and execution in an attempt to improve the denture-bearing area for prosthodontic rehabilitation. Indeed, the creation of pre-prosthetic teams has been advocated to ensure that appropriate cases are selected in an attempt to ensure that the outcome of surgery is predictable and useful to the prosthodontist (Engelmeier, 1991).

BACKGROUND TO THE CASE

We have previously published a clinical report of a patient with a C1-esterase inhibitor dysfunction that resulted in a stress-associated angioedema localised to the free gingival tissues (Roberts et al, 2003). Despite repeated attempts at non-surgical and surgical management and the employment of several medical management strategies, rapid episodes of bone loss continued with each exaggerated inflammatory episode, necessitating the abandonment of medical management (as all avenues of clinical immunology/biochemistry had been exhausted) and the continued need for surgical reduction of the progressively expanding gingival tissues. The periodontal disease occurred in the absence of traditional risk factors for periodontal bone loss and resulted in terminal tooth mobility. As a consequence of the continued attachment loss, further tooth extractions (of both maxillary left premolars) were required; however, the gross expansion of the gingival tissues and the maxillary ridge mucosa would have created obvious difficulties with prosthetic management. The principal problem was that the denture-bearing tissues were grossly enlarged, oedematous and mobile, thereby provid-

Fig 1 Pre-surgical appearance. Note the gross expansion of the gingival tissues bucco-palatally and vertically (demonstrated by the indentations on the palatal gingivae from the incisal edges of the lower anterior teeth), and the poor quality of the denture-bearing tissues of the left maxillary ridge.

Fig 2 Pre-surgical appearance and maxillary prosthesis, which has been relined with a tissue conditioner due to the continual expansion of the gingivae and maxillary mucosa.

Fig 3 Buccal gingival expansion and oedema.

ing an inadequate quality of mucosa covering the left maxillary alveolus. This report documents pictorially the pre-prosthetic planning, surgical management and successful initial prosthetic rehabilitation of the case. Specifically, it demonstrates a method that can be used to surgically plan gross tissue removal, in a manner that reduces the uncertainty of the post-surgical alveolar ridge morphology and mucosal tissue quality and allows construction of a prosthesis that may be fitted immediately following periodontal surgery, with a reasonable degree of retention and stability.

MATERIALS AND METHODS

Pre-prosthetic planning

The pre-surgical situation is illustrated in Figs 1–3. A maxillary impression was taken using alginate and a stone model was poured (Fig 4). The primary model was duplicated using Dubliplast® thermoreversible duplicating gel (Dentaurum, Ispringen, Germany). A Coltène® Lab-Putty impression (Coltène Whaledent AG, Altstätten, Switzerland) was taken of the relevant areas (teeth to be removed, adjacent teeth and surrounding gingivae) and once set, the duplicate stone model was trimmed to create space for the silicone. Holes (3 mm diameter) were made in the Lab-Putty impression to allow the injection of the silicone-based gingival mask (Coltène® Gi-Mask, Coltène Whaledent AG, West Sussex, UK) into the void between the stone model and the Lab-Putty. Once the Coltène® Gi-Mask has set, the Lab-Putty matrix is carefully removed from the model. The resulting model therefore contained the proposed surgical area in silicone (Fig 5), amenable to a 'mock' surgical procedure and the remainder of the maxillary model was in dental stone. Figs 6 and 7 illustrate the union between the silicone putty and the stone base. The surgical incisions were planned on the hybrid model (Fig 8) and then executed (Figs 9–13), prior to duplication of the predictive model (Figs 14 and 15). The mock surgery performed on the model was conservative relative to the anticipated tissue reduction in vivo, thereby ensuring that a small space would exist between the immediate maxillary prosthesis to prevent pressure from the prosthesis on the surgical site. Any resulting space immediately post-surgery would be filled by application of a tissue conditioner (e.g. Viscogel, Dentsply, Surrey,

Fig 4 Preliminary cast demonstrating gross soft tissue expansion.

Fig 5 Duplicated cast using silicone material (Coltène® Gi-Mask, Coltène Whaledent AG, West Sussex, UK) at surgical site to allow pre-surgical planning.

Fig 6 Duplicated cast with silicone removed to demonstrated retention of silicone onto the stone model.

Fig 7 Silicone removed from dental stone cast and demonstrating 'bung' for retention onto the dental stone model.

Fig 8 Surgical outline drawn onto surgical model.

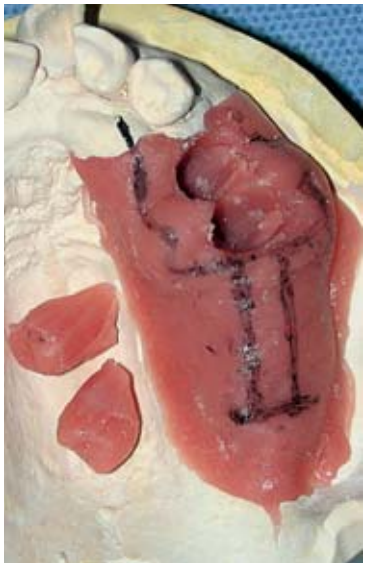

Fig 9 Proposed extraction of teeth 24 and 25.

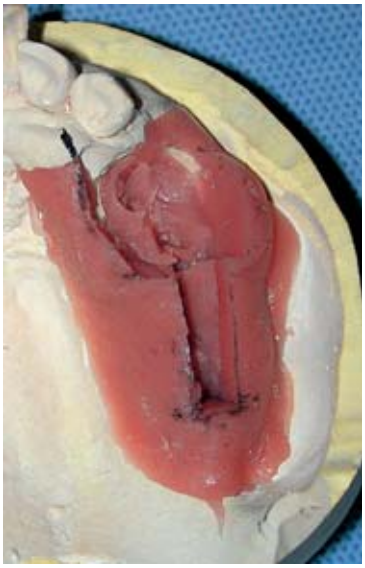

Fig 10 Inverse bevel incisions and 'distal wedge' resection performed.

Fig 11 Primary closure of the 'mock' surgical site with single interrupted 4/0 braided black silk sutures.

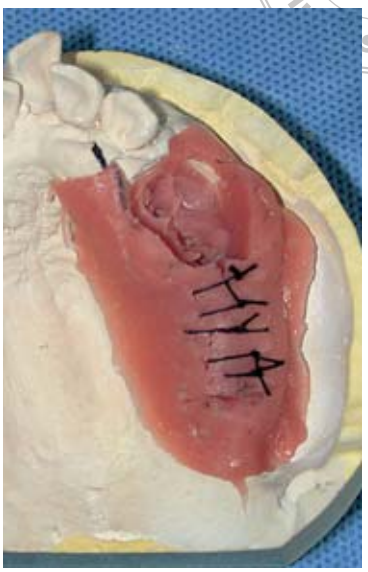

Fig 12 Continued closure of distal wedge surgical site.

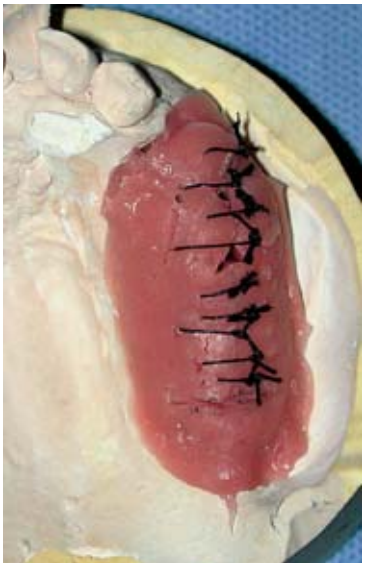

Fig 13 Completed primary closure of surgical site.

Fig 14 Suture material covered in a thin coating of wax (Kemdent Modelling Wax, Wiltshire, UK) and undercuts blocked out in preparation for duplication.

Fig 15 Working cast following duplication to construct prosthesis to fit immediately following surgery.

UK) to the fitting surface of the maxillary prosthesis and seating of the prosthesis onto the maxillary denture-bearing tissues.

The maxillary prosthesis was a Kennedy class I design and fabricated on the working model as an immediate replacement denture for 24 and 25. Figs 15–28 illustrate the buccal and palatal inverse bevel incisions and the distal wedge procedure across the maxillary ridge, post local analgesia. After raising buccal and palatal mucoperiosteal

Fig 16 Operative site immediately following extraction of 24 and 25.

Fig 17 Commencement of first palatal incision with a scalpel (Swan Morton, Sheffield, UK) and number 15 blade. Note the inverse bevel incision and the importance of starting the incision posteriorly to ensure visualisation of the surgical site when the incision continues further forward.

Fig 18 Completion of first incision down to alveolar bone.

Fig 19 Completion of buccal and palatal incisions down to alveolar bone.

Fig 20 Buccal mucoperiosteal flap raised.

flaps, the tissues were de-bulked by sharp dissection of connective tissue layers from the underside of both flaps. Provisional closure (Fig 26) allowed the planning of further sub-mucosal trimming to allow approximation of flap margins without creating any tissue tension. The resulting operative site is illustrated 2 weeks post-surgery, where an appropriate thickness of mucosa is covering the alveolar ridge to facilitate adaptation, retention and stability of the immediate prosthesis. The maxillary pros-

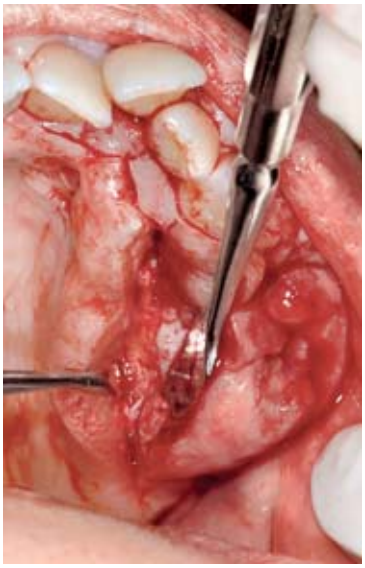

Fig 21 Palatal mucoperiosteal flap raised.

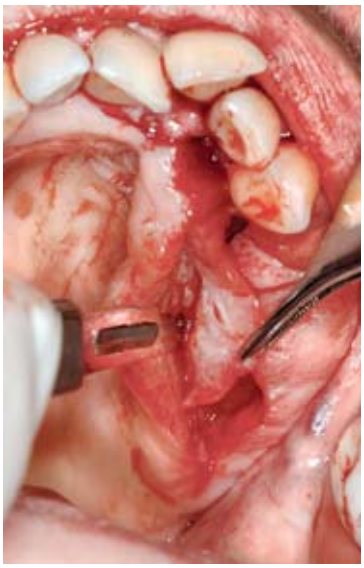

Fig 22 Filleting/undermining of the palatal flap to de-bulk the tissues and facilitate a thinner mucosal alveolar covering to support the prosthesis.

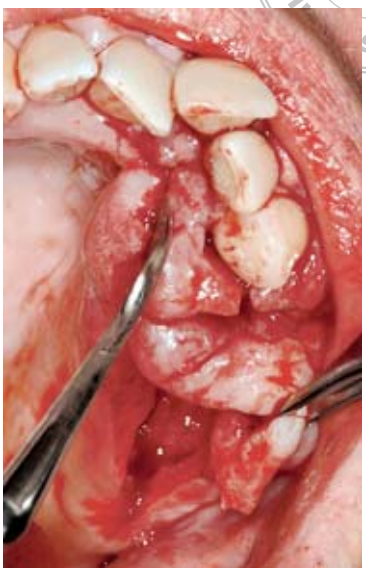

Fig 23 Distal wedge incisions performed and removal of excessive tissue.

Fig 24 Wedge of resected tissue intact.

thesis was re-lined with a tissue conditioner at the time of surgery (Viscogel) to allow close adaptation of the prosthesis and to reduce post-operative discomfort. At the time of this report being submitted the patient was 3-months post-surgery and still wearing the immediate prosthesis and functioning well.

SUMMARY AND CONCLUSIONS

This report has provided a step-by-step illustration of a technique that allows the periodontist to provide important clinical information to the laboratory technician and prosthodontist prior to pre-prosthetic surgery. Specifically, the surgery was carefully planned using a duplicated cast with silicone used at the surgical site and the resultant gingival and alveolar ridge contour used to provide a working model for the construction of an immediate prosthesis fitted at the surgical appointment. A traditional open-face gingivectomy was deemed inappropriate in this case because of the large area of connective tissue that would be exposed to the oral environment and subsequent secondary intention healing. This technique has the advantage of allowing both clinical and laboratory input into the management of the case as well as demonstrating the likely outcome of proposed surgery to the prosthetic's technician. The immediate prosthodontic outcome of the planned surgery was deemed acceptable in this case, and remained so for 2 months. A definitive permanent reline of the maxillary prosthesis was performed at 3-months post-surgery and the patient remains very satisfied with the

Fig 25 Tissue excised.

Fig 26 Initial approximation of tissues to ensure primary closure of defect.

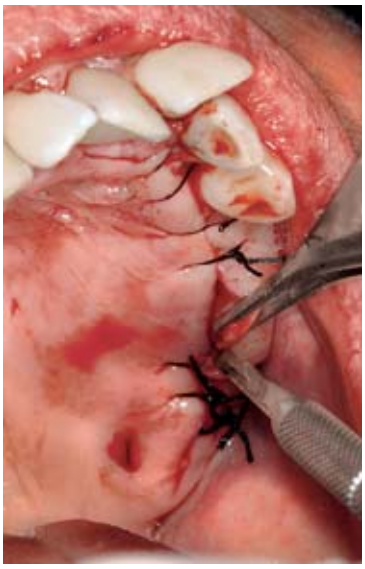

Fig 27 Primary closure of defect following further undermining of the buccal flap.

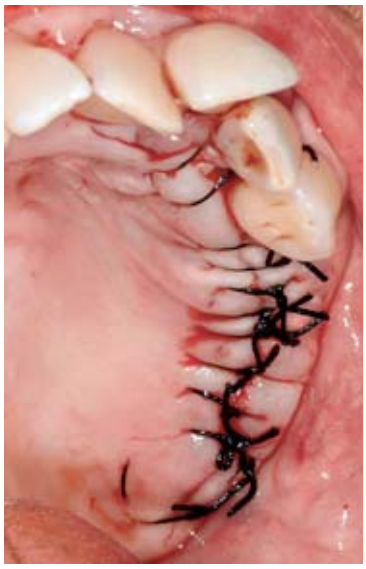

Fig 28 Final closure of defect.

Fig 29 Two-week post-operative appearance.

outcome, having experienced minimal inconvenience or functional problems in the immediate postoperative period.

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