

The Chao Brushing Stent™: A Novel Appliance for Protecting Gingival Surgical Sites During Oral Hygiene

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Abstract

Poor patient non-adherence following periodontal and oral surgeries is a well-documented challenge that often results in poor surgical outcomes and postoperative complications. Soft tissue wound protection in the oral cavity has traditionally been limited to palliative stents and dressing materials intended for passive coverage. However, no known technology shields the healing mucogingival site while actively allowing toothbrushing—a critical distinction for ensuring compliance without sacrificing wound integrity. An innovative oral appliance designed specifically to protect healing gingival tissues during postoperative hygiene has been developed. This article describes the clinical need for such a device, the limitations of prior approaches, and a protocol for stent fabrication and delivery.

Keywords: Chao Brushing Stent, Gingival Surgery, Periodontal Surgery, Oral Hygiene, Postoperative Care, Gingival Wound Protection.

Introduction

Patient compliance of oral hygiene after oral and periodontal surgery is a known problem and poses unique challenges to both patients and providers [1]. Patients are often told to avoid conventional brushing and flossing in the area to avoid traumatic injury and damage to the healing surgical site and fragile tissues, yet this contraindicates all the clinical information and media that continuously extol patients on the virtues of proper oral hygiene and plaque control [2, 3].

A large number of traditional periodontal or oral surgeries have limited amounts of pain, and providers are encouraged to limit pain management to OTC medications, such as acetaminophen and ibuprofen combinations [4-7]. Patient understanding of medical instructions has been studied throughout medical disciplines [8-10]. While patients might experience less pain, many do not have the literacy or knowledge to fully understand that pain propagation and wound healing are two distinct physiological processes [11]. Patients may be led to believe, from their own experiences, that if it does not hurt after a few days, then they

are able to distort and reflect their facial tissues to visualize the surgical site, brush the site, or otherwise engage in oral behavior against expert advice, such as sucking and spitting [12]. These activities may damage the surgical site and can cause a litany of procedural and medical consequences. It is estimated that up to 70% of complications in periodontal wound healing are attributed to patient noncompliance. Moreover, clinical evidence indicates that although the healing process after periodontal surgery is favored by mechanical and/or chemical plaque control, early introduction of dental brushing or flossing may have detrimental effects on the immature tissues due to physical trauma disrupting the attachment apparatus.

Patients are pressured to resort to a variety of hygiene measures due to their social and work obligations. Plaque accumulation on anterior teeth is unsightly, and after several weeks of not brushing, can even change colors, are malodorous and reduce the overall quality of life [13, 14]. Patients report not working, missing social events, and limiting their exposure due to the negative social consequences of their unclean smiles [15]. While some

clinicians advise using soft appliances, others do not, and many patients ignore instructions or resort to alternative methods, such as using a finger, cotton swab or tissue; these methods ultimately damage the healing and friable periodontal tissues [16].

Many patients are unfamiliar with oral microbiology and normative biology. The recommended healing time after gingival surgery is around six weeks [17, 18]; within this time span, accumulated plaque does not have the opportunity to cause any dental caries or progress into periodontal disease [19-21]. These are usually nonpathogenic bacteria within the microbial complexes described by Socransky and others [22, 23]. Any active lesions or pathology that result during this period did not commence due to the plaque accumulation following periodontal procedures. Patients who are unfamiliar with clinical microbiology or who do not routinely manage infections are inclined to pursue unrecommended hygiene routines uncondusive to tissue healing.

To combat these dilemmas, a large number of solutions have been proposed and implanted into clinical practice, such as periodontal dressings, collagen barriers, and cyanoacrylate adhesives [24, 25]. While these provide temporary coverage, they are not designed for continued use during oral hygiene routines. In addition, palliative stents, often used after palatal graft harvesting, serve primarily to protect against mechanical trauma and promote hemostasis, but are not intended to allow tooth-brushing. Many of these solutions focus on donor site protection or general wound stabilization, rather than protection of buccal or facial gingival surgical sites from the mechanical forces of brushing. To date, no published stent or dressing has been explicitly developed to cover and shield healing gingival wound sites and simultaneously afford patients the feasibility of maintaining normative hygiene standards and practices.

A novel protective stent (The Chao Brushing Stent™) was developed to address this critical gap. It is a custom-fit oral appliance fabricated postoperatively to conform closely to the gingival architecture, protect the surgical site from direct bristle trauma and allow brushing of exposed tooth surfaces. It is designed to maintain periodontal hygiene and patient comfort, thus enhancing patient compliance. Unlike palliative stents used for palatal donor sites—which remain passive—the Chao Brushing Stent functions as an active hygiene aid. Its design allow brushing around or through designated windows, keeping exposed crowns clean while protecting the healing gingiva.

Fabrication Protocol

Impression/Scan: A full-arch impression is taken using a fast-setting PVS (polyvinyl siloxane) or other elastomeric material. Alternatively, a digital intraoral scan may be performed. Any resultant displacement or wound irregularity is corrected before patient is dismissed.

Model Preparation: The impression is poured in fast-set dental stone or processed digitally to fabricate a working model.

Stent Fabrication: A thermoplastic or light-cured acrylic material is adapted to cover the surgical area. Windows are cut to expose the crown portions of the teeth, allowing effective brushing while shielding the gingiva. (Figure 1).

Try-In and Adjustment: The stent is tried in and adjusted for comfort and fit. Patients are shown how to insert, remove, and clean the stent and are instructed to wear it only during brushing for the first 4–6 weeks postoperatively.



Figure 1: Shows teeth #6-11 one week after mucogingival surgery

Clinical Case

Medical History: 38-year-old patient with a history of thyroid disease, chicken pox and history of breast augmentation, lipoma resection and c-section. Patient endorsed vaping, and denied all forms of recreation drug usage. Patient complained of “receding gums and cold sensitivity near her gum line”.

Dental Exam: FMX and CBCT were taken and interpreted by an oral and maxillofacial radiologist. A rarifying osteitis is noted on #4, as well as resorption on the cervical aspect of #3, 7, 8, 9, 10 and 27 secondaries to parafunctional habits. Mild flattening of the condylar head was noted bilaterally, and the joint space was narrowed at the lateral aspect. Bone loss was consistent with early periodontal disease, and bacteriological DNA test re-

veals red, orange, orange-associated and green complex bacterial profiles well beyond the averages noted in chronic periodontal diseases.

Procedures: Intraoral scans, full-mouth root planning with adjunctive laser therapy, and re-evaluation was completed prior to the day of surgery. Systemic antibiotic was also recommended prior to surgery. On the day of surgery, root coverage was obtained via the Chao Pinhole Surgical Technique®. Limited hemostasis was controlled locally and patient return for follow up three days, one week and six weeks after surgery. The patient was instructed to avoid any activities that could complicated the surgical site, including hygiene [26-28].



Figure 2: Stent should cut out and removable from the cast. Excess material should be removed



Figure 3: Shows stent placement after one week

After one week, the Chao Brushing Stent™ was fabricated and delivered to the patient. (Figure 2-4) Oral hygiene instructions

and post-operative surgical recommendations were reiterated.



Figure 4: Shows teeth #6-11 six weeks after surgery

Discussion

This novel protective brushing stent represents a paradigm shift in postoperative wound protection for gingival surgery. Patients with who must undergo mucogingival or periodontal surgery procedures must allow the tissue to heal and adapt to its new contours, but normative daily habits impede these processes. In this case study, we showed how the Chao Brushing Stent™ could be used to offer a window of clearance that could be cleaned in a normative, albeit careful, manner.

It must be emphasized that the patient was instructed to not engage in oral hygiene activities until the stent was delivered. The reader can appreciate the notable plaque accretions on the facial and interproximal aspects of the maxillary anterior teeth. (After

the stent was delivered, with modified oral hygiene activity, the maxillary anterior teeth look remarkably more cosmetic, hygienic and socially appropriate.

The protective brushing stent, has remarkable ramifications for clinical practice. Any periodontal or mucogingival surgery requires healing time to prevent post-operative complications, unwanted patient dissatisfaction and poor clinical outcomes. All providers have experienced patients who are noncompliant with post-operative instructions. Offering patients the opportunity to engage in their normative behaviors and hygienic activities while wearing the appliance allowing them to participate in the healing process without damaging the healing structures.

Conclusion

The Chao Brushing Stent represents a paradigm shift in post-operative wound protection for periodontal or mucogingival surgery. Unlike existing dressings or palliative stents, it is designed to meet the clinical need for functional protection during brushing. This allows patients to engage in the healing process without damaging any structures. With minimal fabrication time and maximum patient benefit, it is a valuable adjunct to modern surgical therapy.

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