

Laser dentistry in general practice

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Introduction

Improvements in technology and materials have given the general, as well as cosmetic, dentist many more options for treatment. This has improved the efficiency and predictability of aesthetic restorative dentistry for clinicians. One technology that has become increasingly utilised in clinical dentistry is the use of lasers.

The laser offers many advantages over other modalities of treatment; procedures can now be completed in a more comfortable manner and in a more timely fashion. However, we believe the greatest impact the laser has made is its ability to be used for both hard and soft tissue, often without the need for anaesthesia, offering a reduced healing time for the patient.

Good laser technique is easy to learn, although there are some tips on settings and technique that need to be mastered. The erbium-YAG laser is an invaluable asset for the cosmetic practice. By utilising the soft tissue and osseous applications of the erbium-YAG, ideal golden proportions and width/height ratios can be created that lead to better cosmetic outcomes. This article will discuss the variety of applications of lasers in dentistry and the cosmetic practice.

Gingival recontouring

The application of the laser in gingival recontouring has become the treatment of choice for the aesthetic clinician as a means to optimise the smile design process since the mid 1990s. Prior to the use of the laser, tissue recontouring often resulted in times of discomfort for the patient and lack of predictability for the clinician.

The use of the laser – more specifically the diode laser (Sirolase, Sirona or DioDent II [Hoya ConBio]) – has provided a means to predictably reshape and recontour



Figure 1: VersaWave, an all-tissue erbium-YAG laser.

the gingival tissue to optimise symmetry and maximise aesthetics (if tissue changes of up to 1mm are required).

The haemostatic nature of the laser eliminates the need for a retraction cord during restorative procedures, and the minimal necrosis zone of the actual laser 'cut' provides a very stable final contour that will not change after the definitive restoration is placed. The 'recontouring' is useful during smile design to improve the following:

- An ideal width to height ratio of anterior teeth
- The golden proportion
- The gingival outline and symmetry.

Using a laser, as opposed to other methods such as electrosurgery or scalpel surgery, also allows for immediate impression taking for definitive restorations.

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Figure 2: Pre-operative view – patient has short clinical crown heights.



Figure 3: One week after crown lengthening using VersaWave erbium-YAG laser.



Figure 4: Post-operative view of full mouth rehabilitation.



Figure 5: Vestibuloplasty incision.

Crown lengthening

With soft tissue removal only, the extent of gingival tissue removal is limited by the biological width, which requires a minimum of 2.5-3.0mm between the free gingival margin and the osseous crest. If the requirement to optimise aesthetics violates this measurement, then the only option is to remove osseous tissue to establish a healthy biological width.

The treatment of choice in the past has been to refer the patient to the periodontist for full flap osseous surgery, involving three to four months of healing time and an additional appointment for final impressions to ensure osseous and soft tissue stability.

However, the use of the erbium laser in crown lengthening has created an entirely new dimension in smile design dentistry. Using a procedure called 'closed

flap osseous recontouring' it is possible to remove soft tissue and bone with fast and predictable healing.

Closed flap osseous recontouring uses a 2940nm wavelength of invisible light to react with soft tissue and hard tissue structures like gingivae, bone, dentine and enamel. With this laser, the gingival tissue is removed to the desired level, regardless of the biological width. Using a 400-micron tip, with a setting specific to osseous tissue, the laser is then placed parallel to the tooth surface and placed under the gingivae. The osseous tissue is then recontoured to the ideal level to establish a healthy biological width.

The erbium-YAG has the ability to recontour osseous tissue without the discomfort and healing time commonly associated with traditional methods.

Although long-term clinical studies are certainly



Figure 6: Pre-operative view of fraenum.



Figure 7: Post-operative view after fraenectomy.



Figure 8: Ovate pontic site after use of laser.

indicated, anecdotal and short-term clinical experience indicates that the osseous levels remain at the newly contoured level. This allows us to proceed with final impressions within several days of the procedure, although many clinicians actually take definitive impressions for the restorations at the time of osseous recontouring.

Reverse vestibuloplasty

It is possible for a smile with a high amount of gingival exposure to be satisfactory in other regards; the teeth are the correct height, the width length ratio is good, and the amount of tooth visible with the lips at rest is fine as well. In this scenario, crown-lengthening procedures can make the anterior teeth look large.

Here, a reverse vestibuloplasty procedure with the erbium laser will bring the upper lip down, thus reducing the quantity of gingival exposure and enhancing the smile.

The use of the erbium laser allows for efficient healing and greatly reduced post-operative discomfort. Compared to the use of Botox to treat a gummy smile, this is a more definitive solution.

Fraenectomies

Whether as the result of a recommendation from an orthodontist or for aesthetic concerns, the use of a laser is ideal for both maxillary and lingual fraenectomies. Since the laser seals both nerve endings and capillaries, post-operative discomfort and bleeding are almost non-existent, and the need for post-operative suturing is eliminated as well.

Periodontal treatment

The use of lasers in periodontal treatment has been well documented over the past 10 years. When used in deep periodontal pockets with associated bony defects, the laser not only removes the diseased granulation tissue and associated bacteria, it also promotes osteoclast and osteoblast activity, often resulting in bone regrowth. Laser energy is also bactericidal, thus helping improvement in gum health.

The laser can become a very important part of an overall treatment plan and regime that may be offered to patients as part of the periodontal phase of any treatment, whether restorative or aesthetic.

Ovate pontics

The ovate pontic has become the choice of pontic design for both aesthetic and cleansibility reasons. Success with the ovate pontic comes as a result of developing an ideal site into the gingival tissue. Since the ovate pontic actually replaces part of the natural tooth root form, it is imperative to establish a recess in the gingival tissue on the alveolar ridge to accept the pontic form.

Again, using a laser as opposed to other methods such as electro surgery or the use of a scalpel, allows for immediate impression of the site for the definitive restoration.

Restorative dentistry

Recent advancements in laser technology have also allowed for their use in hard tissue applications. The laser can be used in not only making soft tissue changes, but also cavity preparation (decay removal, and preparation of enamel and dentine), as well as making changes to bone.

Although the laser has not replaced the high-speed handpiece in most tooth preparations, it has certainly become a very useful modality to remove defective enamel and dentine.

Ideal applications of lasers in restorative dentistry include class I, II, III, and V preparations. More often than not, these types of preparation can be performed without the need for anaesthesia, so the marketing benefits of laser dentistry has more than established its value, especially in a paedodontic practice. There are clear benefits in now being able to genuinely claim that you can do fillings 'needle and drill free'!

Summary

Lasers have been scientifically and clinically proven to offer many benefits in a variety of treatment approaches. They offer fast healing of soft tissues, minimum or no postoperative discomfort, precision in tissue alteration and great patient acceptance. If you market your practice correctly, and charge correct fees for all the different procedures, the investment in the laser(s) should be repaid in no time! Thereafter, patients benefit and the practice can enjoy an increase in profits.