Use of Intracanal tip as an Intrasulcular tip for Gingival Retraction and Impression : A Novel Technique.

Original Article

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Abstract:
A novel Gingival retraction technique that uses intracanal tip as an intrasulcular tip for chemical free gingival retraction and impression

Keywords not available

INTRODUCTION:

A proper physiological gingival contour, well-adapted margins, and harmonious occlusal relationships in symbiotic relationship with the supporting peridontium and bone are all necessary for a successful functioning of a restoration. The stability and long-term health of the surrounding periodontal structures are crucial for the success of fixed prosthodontic restorations.[1] Marginal integrity is one of the important factors, which contributes to the success of full coverage restorations. The restoration can survive in the biological environment of the oral cavity, only if the margins are closely adapted to the finish line of the preparation.[2]

The correct emergence profile and contouring of the restoration depend on this record of unprepared abutment tooth structure. In order to get precise dies for the fabrication of restorations, the practitioner should accurately record the cervical margins using the appropriate impression technique.

Entry of the impression material into the narrow sulcus is achieved by placing the marginal gingiva away from the tooth structure. This is achieved by the procedure of gingival retraction.[3] The goal of gingival displacement therefore is to reversibly displace the gingival tissues such that adequate bulk of material flows into the sulcus to accurately record margin details and the area apical to the margin. This method produces a good prosthesis with intact margins and a sound emergence profile due to easy access and a precise impression.

Maintaining a healthy periodontium is crucial for the longevity of fixed restorations, atraumatic displacement of the gingival tissue is required when taking impressions to create fixed dental prostheses.[4,5] The procedure to expose the equi-gingival and sub-gingival finish lines of preparation by deflection of the marginal gingiva

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away from the tooth is termed as gingival displacement, also referred as gingival retraction or gingival deflection. The goal of gingival displacement therefore is to reversibly displace the gingival tissues such that adequate bulk of material flows into the sulcus to accurately record margin details. A minimum lateral displacement of 0.2 mm(200 microns) is desirable for the displacement to be effective.[6]

Various methods of tissue management such as mechanical methods, chemo-mechanical methods, electro surgery, rotary gingival curettage, or gingitage have been described6. Numerous studies reported mechanical methods that involved the use of strings or fibres of different types and diameters along with astringent chemicals to be the most effective, safe and easy methods for tissue displacement. However chemicals like epinephrine, ferric sulphate, aluminium chloride, aluminium sulphate, and zinc chloride which causes side effects that may vary from mild inflammatory response to tachycardia, increased respiratory rate, nervousness and increase in pulse rate and blood pressure.[7,8]

The pH of most gingival retraction agents is in acidic range in order to exert its activity. It is proved that these acidic solutions are not safe for the tooth structure. Prolonged exposure to these agents cause alteration and instability in smear layer and produces etching upto several degrees.[9,10]

Even cordless agents like aluminium chloride can produce etching and irritation to the surrounding soft tissues. Medicated cords are effective, however various studies in the past have shown local and systemic side effects induced by medicaments used for gingival retraction

Based on review of literature there hasn't been a study which establishes the efficacy of one gingival retraction technique over the other with respect to the thin and thick gingival biotypes, as most of the studies have been exclusively conducted on thick gingival biotypes.

To overcome the drawbacks of the chemical agents used in the chemomechanical or chemical retraction methods A novel chemical free mechanical retraction method was developed using the endodontic intracanal tip to inject the impression material into the retracted sulcus on both thick and thin gingival biotypes for its effectiveness as gingival retraction techniques

TECHNIQUE

The gingival biotype was assessed and categorized on the basis of Probe transparency (TRAN) method as either thin or thick (Figure 1 & 2) according to the visibility of underlying periodontal probe through the gingival tissue.[11]

Figure 1

Figure 2

Diagnostic impressions were made using irreversible hydrocolloid (Alginate) and diagnostic casts were poured to fabricate a custom tray for both thick gingival biotype and thing gingival biotype. The custom trays-were fabricated by adapting layer of softened baseplate wax on to the diagnostic cast model to act as a spacer.

A plain braided cord was placed using a cord packer. The instrument was angled towards the tooth so the cord is placed directly into the healthy labial sulcus. Retraction cord was removed after keeping for 8-10 minutes in the gingival sulcus for both the gingival biotypes as shown in Figure 3 & 4.

Figure 3

Figure 4

An intracanal endodontic tip was modified by bevelling it at an angle as to permit easy insertion into the sulcus and to enhance amount of impression material that flows into the sulcus using it as an intrasulcular tip. (Figure 5)

Figure 5

Monophase addition silicon impression material dispensed via the Penta-mix system and loaded in a disposable syringe with a modified (bevelled at an angle) intracanal endodontic tip is used to fill the retracted sulcus with impression material immediately as the cord is removed from the sulcus (Figure 6 & 7).

Figure 6

Figure 7

Impressions were made for both the gingival biotypes in the Custom trays already fabricated with monophase impression material. (Figure 8 & 9)

Figure 8

Figure 9

After impression disinfection, Casts were poured using Die Stone. Mesio-distal width of each maxillary incisor were measured on the cast with help of vernier calliper and centre point of the tooth was marked on the cast. The second marking was done 3mm distal to the centre point, i.e. 3-4mm slices in the labio-palatal direction were made using die cutter.

Figure 10

The sectioned samples were viewed under the Stereomicroscope. (Figure 11)

Figure 11

Images were captured and transferred to the Image analyser. In the Image Analyzer perpendicular line was drawn from the most prominent point of crest of the marginal gingiva to the tooth surface to obtain the intrasulcular width as the amount of gingival retraction in both the gingival biotypes. The amount of sulcular width obtained was 647microns and 575 microns for the thick and thin gingival biotypes respectively which was more than minimum desired amount of gingival retraction.

DISCUSSION

Gingival retraction as for decades been a very technique sensitive procedure though mandatory prior to making analog as well as digital impressions. The procedure aims at placing a retracting material which has a mechanical effect of displacing gingiva temporarily to aid in the entry of impression material or to make the margin visible to the intraoral scanner tip. In chemo mechanical means Various chemicals were compounded into the mechanical methods that produce transient ischemia leading to temporary gingival shrinkage and reduced production of sulcular fluids. However, ill effects of mechanical retraction materials like the cord and pH of

chemicals were identified in clinical and invitro researches. Clinical researches have proved that use of the retraction cord negatively affects gingival health leading to gingival recession. The reasons for producing gingival recession can be attributed to the mechanical equivalent to the pressure applied during cord packing.

Gingival biotype plays an important in selecting the type of retraction material. A thin biotype is difficult to retract primarily because it restricts the entry of a cord or the paste delivery tip into the sulcus. As the major difficulty in retracting thin gingival biotypes remains, the it was felt that the modified method of making impressions especially with introduction of impression material directly inside the sulcus. For this a primary gingival retraction with a 000 cord was done in the gingiva. For delivery of impression material intraorally, a modified intracanal tip routinely used in Endodontics was used. This concept aimed at controlling gingival secretion using the cord and introducing impression material directly inside the sulcus as the cord was being removed. This dual procedure once done in continuity hypothesised that space created by the cord will be immediately occupied by the impression material. Intracanal Tips used in endodontic practice are extremely thin with a bore diameter of 0.014 inch (0.36 mm). This diameter is nearly half the diameter of a periodontal probe which is around 0.6 mm therefore it was clear that the intracanal tip can more easily enter the gingival sulcus. In addition to this the intracanal delivery tip for bevelled for further ease insertion of the end of the tip easily into the sulcus and also to slightly increase the volume of impression material that enters the sulcus. The last part of the concept of ingenious retraction was to match the timing of entry of impression material into the sulcus with that of removal of the retraction cord from the sulcus. Past researches have reported that the gingival margin starts to collapse and fall back into position post retraction within 60-120 seconds.[12] The ingenious techniques used only a mechanical cord with no chemical astringents. This means that there always exists a probability of the gingiva to fall back much sooner than the reported time of 60 seconds. Therefore in the present method it was decided to introduce the material into the sulcus at the same time as the cord was being removed. For this purpose, as one operator removed the cord another operator started injecting the material intrasulcularly.

SUMMARY

The results of the retraction width obtained by the ingenious method for both thick and thin biotypes was well within the acceptable range of 0.2 mm which is advisable as adequate retraction. In spite of the limited evidence, the ingenious retraction technique could provide an acceptable amount of gingival retraction for both the gingival biotypes. This technique has the advantage of mechanical retraction with impression material being injected directly into the sulcus for an accurate reproduction of the intrasulcular details.

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