ORIGINAL RESEARCH PAPER

Periodontology

GINGIVAL FINISH LINE AND ITS IMPORTANCE IN PERIODONTICS.

KEY WORDS:

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ABSTRACT

The relationship between periodontal health and restoration of teeth is intimate and inseparable. For restoration to survive long term, the periodontium must be healthy so that the teeth are maintained. The establishment of periodontal health is therefore a prerequisite for successful prosthodontic and restorative procedures. Finish line of any restoration should be made in harmony with the biological tissue of gingiva and its attachment. Extent and location of the gingival finish line related to the health of periodontium. Subgingival finish lines damage and traumatize the gingival tissues due to the contact with rotary or dental nstruments used during preparation. Crown tooth junction enhances plaque accumulation and its harmful effect on the periodontium. Subgingival crown margins are difficult to clean, and the relation between gingival tissue and restoration can never be the same as with natural tooth. Whereas supragingival finish line shows better gingival health compared to others.

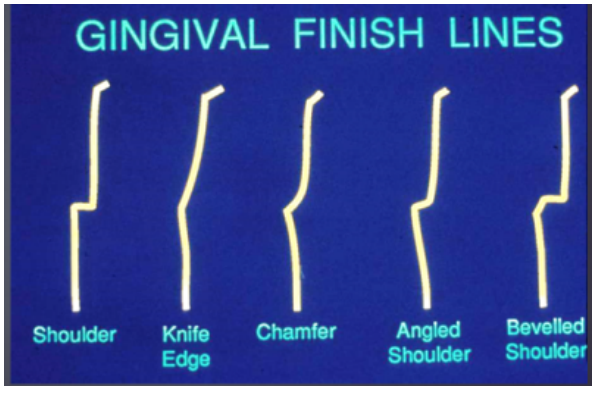
INTRODUCTION:

The ultimate goal in fixed and removable prosthodontics is the maintenance and preservation of the remaining dentition. The execution of this goal can be achieved initially by tooth preparations that are clinically sound and will increase the longevity of the abutments. Likewise, proper tooth preparation and contoured restorations that are periodontically acceptable are of major importance in maintaining optimal periodontal health, restoration of occlusal harmony, and stability of the restored dentition [1]. Restoration of teeth is possible only if sufficient space is created for the application of the appropriate thickness of material required[2].

Types of finish line:

There are four types of finishing lines for full coverage restorations [3]:

1. Knife edge.
2. Chamfer.
3. Shoulder.
4. Beveled shoulder.



1. Knife-Edged Preparations :

A knife-edge or a feather-edge preparation that is basically designed so that as the tooth is prepared zero cutting results at the gingival termination. The dentist employs the rotary instrument and leans the cutting stone or bur inward by rotating on that gingival termination and cutting mostly at the occlusal end. It is a process of tipping the rotary instrument occlusally. When planning the taper of this type of preparations, a number of problems are observed, especially with a short crowned tooth or on a tooth with a normal anatomic crown where the preparation ends at the cementoenamel junction.

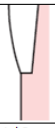
A. Since there is zero cutting at the gingival termination the resultant crown becomes over contoured gingivally [4].
B. The retention and resistance form of the preparation is compromised due to over tapered preparation. This over tapered preparations has compromised long-term retention.
C. As force is applied into the ceramometal crown with a conically shaped preparation, it will act like a wedge. The crown exerts a force on the preparation, even if cement is in between. All materials have flow, even though they are solid. That flow is enough to cause wedging of the metal. The veneering material is strong under compression but is weak under tension. The internal stress wedging tends to expand the metal substructure, causing the porcelain veneer to craze and fracture over a period of time.
D. This is the type of preparation that the clinician should utilize with long clinical crowns found with post periodontal surgery cases.
E. If the preparation extends to the tissue because of old restorations, root caries, root sensitivity, and aesthetics, very long preparations will be developed.
F. Another problem with knife-edged preparations is the resistance form.
a. The longer preparation the more resistant to dislodgment.
b. The more parallel a preparation, the more resistant to rotation forces.
c. The smaller diameter the crown, the more resistant to rotation forces.
G: Features of knife edge preparation [5]
a. Little resistance to marginal distortion during firing of porcelain.
b. Margin not always distinct.
c. Poor control over placement of subgingival margin.
d. Insufficient preparation in cervical area.
e. No control over reduction of cervical tooth structure, and
f. Employed with long clinical crown lengths following periodontal surgery.

2. Chamfer Preparation:

A chamfer, according to Boucher is "a marginal finish either curved or formed by a plane at an obtuse angle to the external surface of a prepared tooth." One advantage of a chamfer preparation is that any round-ended instrument employed produces the same type of a cut, no matter at what angle or height the diamond stone is held [6].

There are three different chamfer types of prepartions:

1. Hybrid. Insert the chamfered stone about one third of the depth of the stone and obtain a hybrid between a chamfer preparation and an exaggerated knife-edge type of preparation.
2. Ski-sloped. Insert the chamfered stone into the radius of the instrument or half the depth of the stone; then a more ideal type of chamfer preparation is developed.
3. Rounded shoulder. Insert the chamfered stone into its full diameter, the resulting type of chamfer preparation appears to approximate a rounded shoulder.

Shoulder	Bevelled Shoulder	Heavy Chamfer	Chamfer
			
Metal Ceramic Crown, All Ceramic/ Porcelain Jacket Crown	Buccal of Metal Ceramic Crown	High Strength Porcelain Crowns, Buccal of Metal Ceramic Crowns	Full Metal Crowns, Palatal/Lingual of MCC's, Resin Bonded Crowns

1. Shoulder Finish line:

This design has, over time, replaced the beveled shoulder as the resulting butt joint permits the use of a bulk of porcelain at the margin, thus removing the need for a metal collar. A shoulder width of 1 mm to 1.5 mm at a 90° to 100° angle to the root surface is ideal. The axial line angle should be rounded to reduce stress concentration in that area. This design is sometimes referred to as the radial shoulder [7]

2. Shoulder with bevel:

The slant shoulder can be used with a metal collar or with the so-called disappearing margin. In this case the shoulder is slanted coronally at an angle of approximately 40°. However, the disappearing margin is inherently rough due to the presence of three different materials at the terminus of the margin. This design is seldom used in modern practice.

Functions of the bevel are as follows:

1. To seal restoration against cement leakage and subsequent bacterial invasion.
2. To permit finishing and burnishing on die or tooth.
3. To Provide circumferential rigidity.
4. To initiate reproduction of the contour removed in preparation and provide control of the emergence profile during framework trie-in.

Terminating a crown margin at tissue height has the disadvantage of poor aesthetics in an area of maximal plaque accumulation. The other extreme is margin placement 2 to 3 mm subgingival.

Sub-gingival margins are employed in the following situations [8]:

1. Aesthetics.
2. Presence of subgingival caries.
3. Presence of existing restorations with subgingival margins.
4. Short clinical crowns with greatly reduced retentive capacity.
5. High susceptibility to root caries.

A preferable compromise is to prepare a shoulder at tissue height and prepare the bevel 0.5 to 1mm below the tissue, thus burying the metal collar while minimizing the insult to the tissue. If the margin is placed too far subgingivally, gingival inflammation results, and the restoration's aesthetics will be compromised. Thus, if the margin is carefully placed and finished ideally, good long-term results are possible.

The biologic width is the amount of space that is necessary to house the periodontal complex, consisting of the trans-septal fibres and circular fibers 2 to 3mm between the crest of bone and any restoration. If this width is not present, inflammation will result, and the inflammation will persist until alveolar resorption occurs to re-establish the 2 to 3mm biologic width [9].

When the restoration margin is placed too far below the gingival tissue crest, it will impinge on the gingival attachment apparatus and a constant inflammation is created and made worse by the patient's inability to clean this area. Body attempts to recreate room between the alveolar bone and the margin to allow space for tissue reattachment. This is more likely to occur in areas where the alveolar bone surrounding the tooth is very thin in width. Highly scalloped, thin gingiva is more prone to recession than a flat periodontium with thick fibrous tissue. The more common finding with deep margin placement is that bone level appears to remain unchanged; however, gingival inflammation develops and persists on the tooth restored [10]. Investigators have correlated that sub gingival restorations demonstrated more quantitative and qualitative changes in the micro flora, increased plaque index, gingival index, recession, pocket depth and gingival fluid [11,12]

Conclusion:

The health of the periodontal tissues is dependent on properly designed restorations. Undoubtedly it is preferable if margins can remain coronal to the free gingival margin. Obviously, subgingival margin placement is often unavoidable. If restorative margins need to be placed near the alveolar crest, crown-lengthening surgery or orthodontic extrusion should be considered to provide adequate tooth structure while simultaneously assuring the integrity of the biologic width. Although individual variations exist in the soft tissue attachment around teeth, a minimum of 3 mm should exist from the restorative margin to the alveolar bone, allowing for 2 mm of biologic width space and 1 mm for sulcus depth.

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