



ORIGINAL RESEARCH PAPER

Dental Science

FINISH LINES IN FIXED PROSTHODONTICS

KEY WORDS: sliding joint effect, remargination, bevel.

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ABSTRACT

Background: Finish line design is very important in any tooth preparation as it affects not only sealing discrepancy but also seating discrepancy. Finish line location is decided by aesthetics, periodontal health, biological width and occlusocervical(OC)/faciolingual (FL)dimension ratio of tooth preparation.Finish line exposure is needed during impression procedures.

Definition: It may be well defined as

- I. Line of demarcation
- II. Peripheral extension of tooth preparation
- III. The planned junction of different materials

Features of finish lines: must be distinct, uniform, and smooth and should follow alveolar bone crest and free gingival margin.

Requirements of finish lines: it should be

Easy to prepare, easy to duplicate in impression, conservative and provide sufficient strength to restoring material.

Functions of finish lines:

- I. Finish line design provides an estimation of tooth reduction as feather edge is most conservative and shoulder is the least conservative.
- ii. Finish line design helps in measuring surface detail recording ability of an impression material.
- iii. Distinct finish line helps in ditching
- iv. Distinct finish line aids in remargination for proper marginal adaptation of wax pattern.

Criteria for successful finish line design: these are as under

- I. Acceptable marginal adaptation: According to David F Pascoe, seating discrepancy equals seating discrepancy times sine of marginal metal angle. Shoulder finish line produces marginal metal angle of 90°. That is why, seating discrepancy equals seating discrepancy. Beveling reduces marginal metal angle, thus minimizes seating discrepancy.
- ii. Tissue tolerant surface
- iii. Adequate contour: conservative finish lines like feather edge and knife edge produce overcontoured restoration leading to periodontal problems gingival recession, unaesthetic black triangular spaces, alveolar bone loss.
- iv. Adequate strength: finish line design should provide adequate strength to restoring material.

Criteria for finish line design selection:

The selected finish line design should

- I. provide predictable level of marginal integrity.
- ii. present smooth materials to the sulcus, to minimize plaque accumulation.
- iii. provide acceptable esthetics.

Classification of finish line design configuration:

- I. Based on configuration of finish line
 - a. Feather edge
 - b. Knife edge
 - c. bevel
 - d. shoulder
 - e. chamfer

ii. Based on location of finish line

- a. Supragingival
- b. Equigingival
- c. subgingival

iii. Based on margin angle by Kuwata et al

- a. Margin angle b/w 0 and 30°
 - a. Bevelled margins
- b. Margin angle b/w 31 and 60°
 - a. chamfer
- c. Margin angle b/w 61 and 90°
 - a. Shoulder

iv. Pardo's classification:

- Inclined vertical Feather edge, shoulder with bevel
- Horizontal margins Shoulder, chamfer

FEATHER EDGE

- I. ADVANTAGE: Most conservative
- II. DISADVANTAGE: Over contoured restorations

- Not recommended now

KNIFE EDGE

- I. It is most conservative type of f.l.
- ii. It gives >135° cavosurface angle.
- iii. Pointed end tapered fissure bur is used

INDICATIONS

- I. Large pulp chambered tooth
- ii. Finish line on cementum
- iii. MOD onlay

ADVANTAGES

- I. Easy to prepare
- ii. Most conservative
- iii. Burnishable type of finish line
- iv. Ideal for marginal adaptation

DISADVANTAGES

- I. Indistinct margin
- ii. Over contoured restoration
- iii. Marginal distortion
- iv. Difficult to wax and cast

Bevel: It may be well defined as "SLANTING EDGE". GPT8th edition.

It is classified as low angled short bevel and high angled long bevel in accordance with A.J. Hunter.

Functions of bevel: it improves marginal seal, produces strongest enamel margin, improves retention and resistance form of the preparation, creates sliding joint effect and produces burnishable margins.

INDICATION of BEVEL:

Facial margin of maxillary partial coverage restoration
Inlay margin
Onlay margin

SHOULDER FINISH LINE: finish line design for tooth preparation in which the gingival floor meets the external axial surfaces at approximately a right angle. Flat-end tapered diamond end cutting diamonds are used to prepare shoulder finish line.

INDICATION: All ceramic crowns and labial margin of porcelain fused to metal crowns.

ADVANTAGES

- I. Aesthetically acceptable
- ii. Good crown contour
- iii. Adequate bulk
- iv. Less distortion

DISADVANTAGES

- I. Arduous to prepare
- II. Least conservative
- III. Danger of pulp exposure
- IV. Inferior marginal integrity
- V. Lacks sliding joint fit

Types of the shoulder are sloped shoulder, radial shoulder and shoulder with bevel.

Sloped shoulder: finish line design for tooth preparation in which the gingival floor meets the external axial surfaces at approximately 120°. It is indicated in facial margin of metal ceramic crown.

Radial shoulder: Shoulder finish line with rounded gingivoaxial line angle and 90° cavosurface angle. Radial shoulder on all ceramic preparation combines the support of ceramic with stress reducing radial shoulder.

Shoulder with bevel: it is used in facial margin of metal-ceramic crowns, proximal box of inlays and onlays and occlusal shoulder of onlays and mandibular three-fourth crowns.

Factors deciding placement of finish lines:

Aesthetics: The subgingival finish line suits for the high lip line and equigingival and supragingival suits for low lip line patients.

Biological width: it is the combined dimension of epithelial attachment (0.97mm) and connective tissue attachment (1.07mm) coronal to alveolar bone crest. It is measured by bone sounding. Minimizing transgingival probing depth by sulcus depth measures the biological width.

Table1. Biological width as per authors

author	Biologic width
Nevin and sukrow	2.73mm
Garguilo et al	2.04mm

Table2. Biological width variation as per intraoral position:

tooth	Biologic width
anteriors	1.75mm
premolars	1.97mm
molar	2.08mm

Table3. finish line position as per various authors in relation to various landmarks

Author	Landmark	Margin –landmark separation
Nevin and sukrow	Base of sulcus	Finish line coronal to base of sulcus
Garguilo et al	Base of sulcus	Finish line at base of sulcus
Wilson and Mynard	Base of sulcus	0.5mm coronal to sulcus

Eisman et al	Alveolar bone crest ABC	Finish line 2mm coronal to ABC
Fugazoto et al	ABC	Finish line 3mm coronal to ABC
Glickman et al	Free gingival margin FGM	0.5mm apical to FGM

Biologic width violation causes gingivitis, periodontal pocket formation, recession and tooth-restoration interface display.

Remedy for biological width is

- I. Surgical recontouring of alveolar bone
- ii. Orthodontic extrusion with supracrestal fibrotomy weekly

Depending on margin placement, types of finish lines

- a) SUPRAGINGIVAL FINISH LINE
- b) EQUINGIVAL FINISH LINE
- c) SUBGINGIVAL FINISH LINE

Supragingival finish line is used in low lip line cases.

Advantages are as under:

- I. Easy preparation
- ii. Easy to finish
- iii. Easy to duplicate
- iv. Easy to varyify fit of restoration
- v. Easy mentainance

Equigingival finish line: In a study on dogs Marcum et al found margins at crest caused less inflamation than those above or below it. F. Micheal Gardener, Margins of complete crowns – Literature review JPD Oct 1982, 48(4), 396-400.

Subgingival finish line: it is best avoided unless indicated.

Indications:

- I. Aesthetics
- II. Subgingival caries
- III. Erosion
- IV. Abfraction
- V. Dentinal hypersensitivity

Rationale of subgingival finish lines:

- Tooth-restoration interface latency
- To maximize resistance and retention form of tooth preparation
- To make significant contour alteration

Guidelines for subgingival margin placement are as under

- a. Free gingival margin(FGM)
- b. Alveolar bone crest(ABC)

- I. When sulcus depth is 1.5mm, finish line 0.5mm apical to FGM.
- ii. When sulcus depth (d) is >1.5mm, finish line is "sulcus depth, apical to FGM.
- iii. When sulcus depth is >2mm, crown lengthening is done.

Subgingival finish line exposure is carried out by mechanical, chemical, rotary gingival curettage and surgical methods.

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