

LITERATURE REVIEW

Occlusal clearance indicators- A review of clinical technique

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ABSTRACT

Optimum amount of occlusal reduction is an essential part of a tooth preparation. Various types of occlusal clearance indicators are being used for the assessment of tooth preparation. All these indicators are used to visualize the clearance for the fabrication of a restoration. The need for knowing all these indicators is of utmost importance to provide quality tooth preparations as well as maintain a harmonious occlusion.

Keywords: Flexible tab; Occlusal reduction bur; Prep gauges.

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INTRODUCTION

Teeth require preparation to receive restorations, and these preparations must be based on fundamental principles from which basic criteria can be developed to predict the success of prosthodontic treatment. During the preparation of teeth for restorations it is important that sufficient occlusal reduction of tooth structure is performed to accommodate the restorative material. It is often difficult to assess the amount of occlusal and axial reduction through direct observation. Inadequate or over reduction may compromise all the cardinal principles of preparation. Successful tooth preparation and subsequent restoration depend on simultaneous consideration of all these factors. [Table 1]

Principles	Occlusal Reduction	Axial Reduction	Finish Lines and Margins
Biologic	Pulp vitality, preservation of tooth structure.	Pulp vitality, Preservation of tooth structure	Type of finish lines and placement of margins - Preservation of gingival and periodontal health, adaptation, and marginal integrity of crown materials
Mechanical	Inadequate – failure of restoration	Inadequate – failure of restoration	Inadequate – fracture of brittle materials
Esthetic	Inadequate – thin ceramic layer exposing opaque layers in metal ceramic restorations	Inadequate – overcontoured restoration	Sub/supra gingival margin placement – material considerations

Table 1: Influence of Tooth reduction [occlusal, axial and finish lines] on Principles of Preparation

Unlike other human substance, dental tissues don't have regenerative capacity. Therefore, the removal of dental biological material should be planned and executed with maximum attention. The required

depth of incisal/occlusal reduction varies with different types of crowns and various surfaces of a tooth. Functional cusps would require maximum reduction. Clinical recommendations for occlusal reduction for various restorations vary: all ceramic and metallic restoration - 1 to 1.5mm, metal ceramic restoration -1.5 to 2.0mm.¹

PREDICTABLE OCCLUSAL REDUCTION DURING TOOTH PREPARATION:

Achieving adequate occlusal clearance precisely have been a challenge for the clinician, owing to visibility, access, saliva and other tissue factors. This can be extremely subjective, and more prone to errors as teeth have cuspal slopes that can hinder the view of lingual/palatal reduction achieved. Following are methods which are recommended to achieve predictable occlusal reduction.

1 Direct or indirect vision – Mirror is used while the teeth are in centric occlusion. However, this provides only an estimate that is partly obscured by the tongue, saliva, muscles of the cheeks, and diminished light focused on the lingual cusps.

2. Wide slip of baseplate wax (10mm) - It covers the entire quadrant with the prepared teeth. The softened wax is inserted over the preparation, and the patient is instructed to close into centric position. After the wax cools, it is removed and held up to a light source to observe penetrations and untouched parts of the wax baseplate.

•Disadvantage: relating the indentations in the wax baseplate to the tooth. It does not reveal precisely where to remove tooth structure when excessive light penetrates the wax. Also, the measurement of the wax thickness is difficult and time consuming.³

3. Blotting paper -The thickness of the paper is slightly less than 0.5 mm. The paper can be divided

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into 6 X 35. The thickness gauge is inserted intraorally over each reduced cusp of a tooth, and the patient is instructed to close in centric relation for each cusp. If the gauge slips through, enough tooth reduction has occurred to allow 1 mm of metal on a casting. Increased thickness of the gauge allows additional occlusal clearance. This procedure is repeated for each tooth. When the gauge doesn't slide through, additional tooth preparation is indicated. To find precisely where to reduce the tooth, the articulating paper section of the gauge is placed on the reduced occlusal surface and the patient is asked to bite together. The tooth is then reduced appropriately on the marked areas.²

4. Rubber band - The rubber band measures about 1/6 inch thick (1.1 mm), 3/8 inch wide, and 3 inches long. The rubber band may be cut to a length of twice the width of the occlusal marking paper.

•**Advantage:** The rubber band can be sterilized and used repeatedly and its flexibility helps to glide over the cusps.²

5. Thermoplastic sheet - The guide is seated in place intraorally, and the clearance is evaluated visually and quantified. An accurate duplication of the axial/occlusal contours is obtained through pressure vacuum and intimate adaptation of the sheet over the duplicate cast of the diagnostic waxing.⁴

•**Advantage:** It is easy to use and translucent, which allows visual evaluation as well as measurement of the clearance underneath the matrix through holes or slots made in the matrix.

6. Polyvinylsiloxane impression material (PVS): This material is used to make index of the unprepared tooth which is cut sagittally, axially and occlusally to verify the preparation.

•**Disadvantage:** It is bulky and not practical for posterior use (Fig 1)



Figure 1: PVS index

7. Prep gauge⁵: These are boomerang shaped, autoclavable silicone gauges that are available in 4 different thicknesses and are color coded for easy identification. (Fig 2)

1.1 mm gauge (Yellow): Non-functional cusps for Lithium Disilicate (LiDiSi), Porcelain

Fused to Zirconia (PFZ), monolithic metal and monolithic zirconia preparations.

2.1.5 mm gauge (Blue): Functional cusps for LiDiSi, PFZ, monolithic metal and monolithic zirconia preparations. Non-functional cusps for PFM preparations.

3.2 mm gauge (Green): Functional cusps for PFM preparations.

4.3.5 mm gauge (Pink): PFM reductions involving maxillary and mandibular antagonist teeth.

Once the desired amount of reduction has been achieved, the patient is asked to bite onto the gauge. The clinician should then try to pull the gauge through the buccal aspect (feeler gauge concept).

•**Disadvantage:** It does not indicate specific areas where the preparation may need further reduction.



Figure 2: Depicting prep gauges.

5. Occlusal Paints or sprays: They can be used in conjunction with the Prep Gauge, e.g. Arti-spot 2 from Bausch. The ink gets selectively transferred to areas that need further reduction, thereby adding tremendous value to the system.

6. The Occlusal Reduction Bur – It allows access to pits and fissures of the tooth from a vertical orientation. The bur has a unique angled stop that limits the bur at the designated depth. A cross-hatched pattern is formed on the occlusal surface that when connected yields a perfect inclined plane reduction. The bur is available in 1.0 mm 1.5mm, 1.8 mm, 2.0 mm, 2.2 mm, and 2.4 mm depths corresponding to proper occlusal reduction for various restorative materials. (Fig 3)



Figure 3: Occlusal reduction bur of 1.5mm depth

7. Flexible Clearance Tabs: They are manufactured to the thickness needed to check the preparation dimensions for crown and bridge work. The colour-coded Tab is drawn between the prepared tooth and opposing or adjacent dentition. If the Tab resists being drawn it indicates that there is insufficient clearance. When the Tab is drawn through freely, it shows that the correct clearance has been achieved. There are 3 types of Flexible Clearance Tabs available.⁶

a) 1mm (Pink): Tabs are designed for full cast crowns, porcelain fused to metal crowns with metal occlusal surfaces.

b) 1.5mm (Green): Tabs are used for full coverage porcelain fused to the metal, all pressable ceramics, porcelain jacket crowns and composite attached to metal.

c) 2mm (Blue): Tabs have been specifically manufactured for full coverage porcelain fused to metal, pressable ceramic porcelain and composite crowns.

CONCLUSION

An accurate and precise clearance should follow the basic principles of tooth preparation harmoniously. The devices listed above are some of the most commonly used occlusal clearance indicators and a dentist before starting a tooth preparation must be aware and be equipped with all these devices for ease to obtain predictable occlusal clearance.

CONFLICT OF INTEREST

There is no conflict of interest

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