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Operative Dentistry

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Tooth preparation for porcelain jacket crown.

Porcelain-fused-to-metal (PFM) crowns are among the most popular and reliable restorations because of its durability and natural esthetics. Using a cast metal substructure that is veneered with porcelain, this material closely mimics the appearance of a natural tooth. For this restoration to be successful, the tooth must be properly prepared and often substantial tooth reduction is required. The crown must be sufficiently thick enough to hide the metal substructure and the opacous porcelain used to mask this alloy. When preparing a tooth, a systematic and organized approach helps to ensure the prep is correctly shaped.

Tooth preparation involves several distinct steps which include, creating the guiding grooves for incisal or occlusal reduction, reducing the labial or buccal surfaces and axial reduction of the lingual and proximal surfaces. After those chosen steps are complete, all prepared surfaces can be finished.

Preparing Anterior Teeth for PFM Crowns

For good aesthetics, an anterior tooth should be reduced by at least 1.2 mm on its labial surface, although 1.5mm is the preferable size. Lingual surfaces are reduced by 1 mm and incisally by 2 mm using a rotary instrument. To successfully prepare the labial surface, a central cervical groove should be made parallel to the path of placement along the long axis of the tooth. Two further secondary grooves are made on either side. Incisal edge reduction grooves are placed and these must be approximately

1.8 mm deep. The depth of these grooves can be verified using a periodontal probe, they then should extend halfway down the labial surface. Next, the incisal edge is reduced and proximal contact is broken while maintaining a lip of enamel which protects the adjacent tooth from damage. Ideally, the incisal edge on an anterior tooth should be reduced by 2 mm, as this will allow for adequate material thickness, enabling the ceramist to create a crown with good incisal translucency. The proximal contacts are reduced and a 0.5-mm lingual chamfer is created. The tooth structure in between the depth grooves is removed, creating a cervical shoulder that should be approximately 1 mm wide. It should extend into the proximal embrasures. The easiest way to shape the lingual surface of an anterior tooth is using a football-shaped diamond. Generally, for anterior teeth, a

single guiding groove is placed in the central lingual surface. Preparation is completed with a fine grit diamond bur. Be sure to consider metal collars where possible, as this will help reduce the extent of the cervical tooth preparation. This is especially beneficial for teeth that have exposed root dentine or gingival recession.

Preparing Posterior Teeth for PFM Crowns

When preparing posterior teeth for PFM crowns, depth holes are created in the occlusal surface to facilitate the creation of occlusal depth cuts. Once these depth cuts have been completed, the occlusion can be reduced and a lingual chamfer and a buccal shoulder are created. The buccal shoulder preparation should extend at least 1mm lingually to the proximal contact. The preparation should extend slightly further mesially than distally, as it is more visible.

The occlusal surfaces of posterior teeth generally require 1.5 to 2 mm of clearance. Occlusal reduction may be less if the crown is fabricated with a metal occlusal surface or with a metal bite stop. All margins should be distinct and continuous circumferentially. All other angles must be rounded and the finished preparation should not have any obvious bur marks. Areas that are frequently missed during finishing include the incisal edges of anterior preparations and the transition from axial wall to occlusal in posterior preparations. Margins should be finished with diamonds or with hand instruments. The design of the shoulder does depend on the chosen margin. For example, a porcelain margin requires proper support and a 90° angle is preferable. This shoulder is also suitable for crowns with conventional metal collars, allowing the collar to be kept narrow and unobtrusive.

However, beveling the margin or sloping it allows for the porcelain to be better supported.

Errors to Avoid with PFM Tooth Preparation:

- *Lipping and gouging of labial shoulder. Be sure to think about your bur choice to avoid this mistake.*
- *Uneven labial shoulder. Make sure your depth stays consistent while preparing the tooth.*
- *Over preparation in some areas and under-preparation in other areas.*

Lack of interproximal space between preparation margins and adjacent teeth. Remember, the technician must be able to section the die, so there has to be enough space between the prepared tooth and other teeth.

Key Tips to Remember:

- *If you prefer a porcelain margin, be sure to use a shoulder prep*
- *If a patient suffers from bruxism, use a metal occlusion*
- *Always speak with your lab if a case varies or a patient has special circumstances. Prep guidelines may vary, especially when a PFM crown is part of a precision attachment case.*