PFM Preparation on Anterior Tooth

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Authored by:

Dr. Grace De Souza

Porcelain fused to metal (PFM) crowns consist of a metal coping (infrastructure) veneered with porcelain. PFM crowns have been used historically due to their combination of strength, durability and reasonable esthetics. PFM restorations may also be used as retainers for fixed partial dentures (FPD).

The materials needed for a PFM crown preparation are:

1. Scalpel blade and handle
2. Silicone putty impression material
3. Metal matrix band
4. Wooden wedges
5. High-speed handpiece
6. Low-speed handpiece
7. Coarse-grit flat-end tapered diamond bur
8. Coarse-grit football-shaped diamond bur
9. Fine-grit flat-end tapered (torpedo) diamond bur
10. A small diameter (or long needle) round-end diamond bur
11. End-cutting diamond bur

A PFM crown preparation on an anterior tooth (#21) should follow this sequence of steps:

1. Make a putty index prior to tooth preparation which will serve as a guide for the amount of tooth reduction. For this purpose, a silicone putty is properly mixed, and an impression is taken of the tooth to be prepared. This should include approximately two teeth mesial and distal to the tooth that will be prepared.

2. After curing, the index is cut into a labial and a lingual half with a scalpel blade. It can also be cut in half from buccal to lingual in order to assess the crown from another aspect.

3. Protect the tooth adjacent to the proximal wall that you will be preparing (tooth #11) with a metal matrix band stabilized with a wooden wedge. Under high-speed and water-cooling, break the mesial interproximal contact of tooth #21 using the small diameter diamond bur. Keep the tip of the bur away from the gingival tissue.

4. After protecting tooth #22 as previously described, break the distal interproximal contact of tooth #21 using the same small diameter bur.

5. For the incisal reduction, make 2 or 3 depth orientation grooves (approximately 1-1.2 mm deep) using a flat-end tapered diamond bur. Using the same bur, complete incisal reduction by connecting the grooves until the incisal edge is smooth. The bur should be slightly angled toward the lingual aspect.

6. The labial reduction is initiated with the flat-end tapered diamond bur. Make three depth orientation grooves in two different planes: the first in the gingival phase parallel to the long axis of the tooth and the second in the incisal phase, slightly inclined towards the incisal plane of the tooth. The initial depth of these grooves should be approximately 0.5 mm. Gradually connect the grooves to complete the labial reduction and ensure that the labial surface is smooth. This includes rounding off all line angles, including the incisal-labial, proximal-incisal and proximal-labial.

7. The depth of lingual reduction depends on the type of restoration. For a metal lingual surface, the final depth in the lingual concavity should be at least 0.7 – 0.8 mm and terminate in a 0.5-0.7 mm chamfer finish line; for a porcelain lingual surface, the depth in the concavity should be around 1 mm, and also terminate in a 0.5-0.7 mm chamfer finishing line. Start with the small diameter round-end diamond bur in the gingival third of the tooth. Make three depth orientation grooves approximately 0.5 mm deep, parallel to the tooth long axis. Connect the grooves while establishing the chamfer finishing line around the gingival margin. Continue moving the bur towards the proximal aspect of the tooth to connect the lingual surface to the proximal walls keeping the depth consistent. With respect to the lingual concavity, depth grooves can be placed prior to its reduction. This may be difficult, so an alternative approach is to reduce one half of the lingual concavity and use it as a reference for reducing the other half. With the football shaped bur reduce the lingual concavity (incisal edge to the cingulum) to the appropriate depth, depending on whether a porcelain or metal lingual has been planned. The transition between porcelain and metal, and therefore between the 1.2 mm labial shoulder and the 0.5 – 0.7 mm lingual chamfer, will occur approximately 1 mm lingual to the proximal contact. This will ensure that the proximal contacts remain in porcelain and will hide the metal as much as possible.

8. To finish off the preparation, use a diamond finishing bur to smooth and blend the totality of the crown preparation, rounding off any remaining sharp line angles.
The labial shoulder margin is defined and finalized with the flat-end tapered diamond bur and the end cutting diamond bur. The labial aspect should be at the gingival margin, while the lingual aspect may be 0.5 mm supragingival. Be sure there is a well-defined labial shoulder which transitions smoothly to a well-defined lingual chamfer.

Consult the preparation quick-guide and flowchart in the restorative manual for the recommended amount of reduction for all crown preparations.

Article Reviewed By

Dr. Greg Anderson & Dr. Joel Rosenbloom