Pediatrics: Stainless Steel Crown Restoration

Armamentarium
Crown-contouring pliers
Crown crimping pliers
Mirror
Spatula
Plastic instrument
College pliers
Perio-probe
Large spoon excavator
Heatless stone
Burlew wheel
Proper burs for this exercise,
#245 and a #133f finishing stone
Stainless steel crown

Step 1: Introduction, Anesthesia, and Crown Selection

Today's exercise is the stainless steel crown restoration. Indications have been discussed in class, so you just need to follow the guides. Stainless steel crowns are used in the full coverage restoration of both primary and young permanent teeth. The armamentarium for this laboratory exercise includes crown-contouring pliers, crown crimping pliers, mirror, spatula, plastic instrument, college pliers, perio-probe, large spoon excavator, heatless stone, Burlew wheel, and the proper burs for this exercise, #245 and a #133F finishing stone, and the stainless steel crown.

Local anesthesia is normally required for this exercise. Some of these teeth will already have been pulpally treated or may need pulp therapy, but you will still be required to proniae soft tissue anesthesia for the stainless steel crown fabrication. In the event that it's pulpally treated, you can administer an infiltration or you may administer papillary infiltrations around the marginal gingiva. Whenever a rubber dam is required, anesthesia is also required. A rubber dam clamp should be placed on the tooth distal to the one you work on.

Today's exercise involves the fabrication of a stainless steel crown on tooth letter K: the mandibular left second primary molar. A boley gauge or a perioprobe can be used to measure mesiodistal dimension. Our tooth measures about 10 millimeters. From the stainless steel crown kit - which provides an assortment of sizes for the mandibular left second primary molars - we select an appropriate crown that matches the 10 millimeter measurement that we took from the typodont tooth letter K. In our case a size 3 is an appropriate selection. In the event the tooth in question is grossly decayed, one should obtain crown dimensions from the corresponding tooth in the contralateral arch.

Step 2: Occlusal Reduction

Once anesthesia is achieved, we're ready to begin the exercise. We select a #245 tapered fissure bur. Using the #245 bur, we want to produce pilot cuts or guide cuts on the occlusal surface, establishing a 1 mm depth cut. Then you connect all of the guide cuts. Thus producing a uniform, occlusal reduction. I did the buccal surface, and I do the same thing from the lingual surface. The end result is a uniform reduction that mimics the shape of the original tooth.

Step 3: Proximal Reduction

Then switch the bur to a #133F diamond. What you want to do is to slice directly through the proximal surface. Starting from the buccal surface, you want to reduce or eliminate the contact without creating a ledge in the proximal space, and/or damaging the approximating tooth. Switch to the distal surface. Perform the same procedure.

Then you can use an explorer (in this case we are using a perioprobe). Slide through the proximal surface to ensure that you don't have contact.

Step 4: Round Line Angles

You look at the preparation so far and you notice that it is occlusally square. Notice that you've squared off the distal and the mesial proximal walls, and that all these line angles are sharp. If you study the internal detail of the crown, everything is rounded. Your preparation needs to reflect that roundness. So we go back to the preparation and round or bevel all line angles.

Step 5: Seat Crown, Check Occlusion, and Score Crown

Next take the pre-selected stainless steel crown and seat the lingual surface first, and with firm finger pressure, seat the crown over the prepared tooth. The snap indicates it's rolling over a height of contour, which is what gives you the retention that we're looking for.

We then check the occlusion and can see that we're almost in occlusion, but most significantly is the fact that the crown is too long. If we take an explorer and tease back the gingiva, we see the crown length is in excess of 1 mm subgingival. So next we'll shorten the crown length so that the crown will seat to a position where the gingival margin of the crown is 1 mm below the free gingival margin.

First we score a thin line using a sharp spoon excavator resting on the free gingival margin. If you use an explorer to do this procedure the scratch mark will be too wide so use a sharp spoon excavator. Do the same thing on the lingual surface. Then use the spoon excavator to lift the crown off of the prepared tooth.

Step 6: Crown Adjustment

Now study the position of the scratch line. You can see that the scratch line is well below, greater than 1 mm, longer than the position of the scratch line. So this crown needs to be shortened.

We use a heatless stone to shorten the crown. Hold the hand piece so that you can see where the scratch line is. With the heatless stone, we shorten the length of the crown. The proximal reduction is a line that connects the buccal line and lingual line and rises up in the proximal space.

Inside the crown, the heatless stone leaves a bur that can only be removed with a spoon excavator. So you just scrape the bur out. Remove the residual stainless steel that is forced internal of the crown.

Go back to the typodont for another seating, and a second scoring of the height of the free gingiva. You want to repeat this until you reach a point where the line doesn't change. Continue with the shortening of the margins. And repeat the removal of the bur using a large spoon excavator.

Return to the preparation and reseat. Position it back in the typodont and check the occlusion. Test the occlusion with articulating paper. The crown is in occlusion. Gingival length is 1mm below the free gingival margin.

Step 7: Crown Adaptation

Now we test the adaptation by taking the tine end of an explorer and feeling below the free gingival margin to determine if there are any open margins. We do this buccally, lingually and proximally. Note that you should not be able to lift the crown with the explorer. Since I can, it means our marginal fit is not tight enough. Marginal adaptation over height of contour provides retention, not cement.

Go back to the spoon excavator and lift the crown off. We want to use the contouring plier to contour the gingival third of the stainless steel crown. Place the rounded end inside and in an overlapping fashion, go around the margin of the crown, squeezing the contouring plier. We have contoured the gingival third and now we're going to crimp the margins to tighten the stainless steel. This final adaptation will snap the margins over all height of contours. Using a 139 plier, turn it so that the rounded end fits inside the crown. Using the crimping plier, crimp the margin all the way around, in overlapping crimps. About the last 2 mm of the length of the crown is where you're crimping.

Go back to the typodont and in a lingual to buccal roll with firm finger pressure you reseat the crown. Although we hear a snap, the adaptation still requires some adjustment. We're going to lift it and crimp it again. Then go back to the typodont to reseat the crown and you can hear the snap fit. Check the occlusion. So now we have a crown that is nearly complete and in occlusion. Marginal adaptation has been done. It fits to a point 1mm below the gingival margin.

Step 8: Finishing and Polishing

The only thing left to do is to finish and polish and then cement. Lift the crown off again. What we've done in shortening the length of the crown is to remove the knife-edge finish that it had. You can see that there's a blunt margin where the stainless steel crown adapts to the tooth. What we need to do is to take the heatless stone again and using an angle, recreate the knife-edge in the last 1 mm of the crown. We're not shortening it, just re-creating a knife-edge finish to the margin.

Remove the heatless stone, switch to a burlew wheel and repeat the same thing, creating a smooth polished finish. It removes the scratches and polishes the bevel.

Step 9: Cementation

Now we are prepared for cementation. We have our crown ready to go and a dry isolated field. Cementation of the crown is achieved by using a glass ionomer like Ketac cement. It is important to follow manufacturer's mixing instruction and to work fast as the cement sets fairly rapidly. You want a luting consistency of cement and this material is going to start setting as soon as you finish spatulating. So you want to have everything prepared. The rubber dam may be removed at this point and cotton roll isolation is achieved. Use an adequate amount of cement just enough to fill up the crown.

Step 10: Check Occlusion and Finish

Have the patient bite the crown into occlusion. Do not use a bite stick or a cotton roll. Biting on a roll or bite stick is going to create hypo-occlusion and over-seat the crown. When the cement reaches a gelled state you begin a removal of the excess material proximally and subgingivially. This may be achieved with a carving instrument and dental floss. Floss the interproximal areas to remove excess cement. Please remember that time is of essence as the cement sets rapidly.

Case completed.