

Partial Porcelain Veneers: Clinical and Laboratorial Considerations



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ABSTRACT

Being minimally invasive is for sure more challenging than being more aggressive, but the effort is worth it when considering the long term dental health. Being more aggressive makes everything easier, but becoming a better dentist to be able to produce better treatments should always be our goal. The main reason to do a partial porcelain veneer on anterior teeth is to be more minimally invasive. The main goal of this article is to discuss and compare 3 different types of restoration when using a partial veneer: Feldspathic ceramics on refractory, Platinum foil technique and Pressable Lithium Dissilicate technique.

KEY WORDS - ceramic dental, dental porcelain, veneers preparation, laminate veneers, dental veneers, ceramic veneers.

INTRODUCTION

Partial laminate veneers are the most conservative indirect restorations, designed to restore or reshape parts of the tooth. These small fragments of porcelain strategic allocated are the most conservative tooth restoration and the main reason to do a partial PLV on anterior teeth is to be more minimally invasive⁽¹⁻⁴⁾. It is definitely easier to do a full veneer when comparing to a partial one. Easier to fabricate, easier to try in, to bond, to match the color and most of all to hide the cement line on the long run. So the increased challenge is only worth because of the conservative concept of the treatment⁽²⁻¹⁰⁾. Saving tooth structure should be an obsession in modern dentistry. Ceramics are materials of choice for making partial veneers, because they have very high adhesion to tooth structure and maximum aesthetic^(2,9,11).

Other topics that will affect how conservative one can be are how to remove old restoration preserving as much as possible the natural tooth structure (burs x laser)^(6,8,12,13) and the tooth preparation design to achieve the desired color and shape⁽³⁾.

Minimally invasive and noninvasive veneers are becoming more popular approach^(1,4). The innovate conservative preparation designs for anterior teeth, such as partial veneers, can conserve significant amounts of sound tooth structure^(2,3). Conservative approaches allow preparations to be supragingival and enamel is kept intact. These factors had a positive effect on the success rate of laminate veneers^(5,14).

Usually the partial veneer on anterior teeth will be done on a couple of situations^(2,3): to replace an old restoration, fix a fracture, close a diastema, improve the space distribution usually combined with other veneers and/or crowns, change the shape of the tooth (from triangular to square, to close black triangles), for esthetic reasons (increasing the length or changing the shape) and to cover cervical abrasions or root exposure (type V restoration).

There are a couple of different restorative modalities when dealing with partial defects on anterior teeth. Significant differences in the amount of tooth structure removal were noted between preparation designs. Partial or complete veneers removed approximately 3% to 30%, and approximately 63% to 72% of the coronal tooth structure by weight, was removed when teeth were prepared for all-ceramic and metal-ceramic crowns⁽³⁾. Analyzing the options (pros and cons), taking into consideration material properties and different preparation designs:

Full veneer v/s Partial veneer: Partial veneers can be more

conservative but they are more critical when it comes to hiding the cement line and any staining that can happen. Also partial veneers are more critical when it comes to handling and bonding on the correct position due to the delicate size of the restoration^(3,15,16).

Direct composite v/s Indirect composite or ceramics : Direct composite is cheaper and may be easily modified and repaired. But the indirect composite or ceramic have better physical properties (resistance to staining, wear, fracture)⁽¹⁾. The dentist needs good skills to do a direct composite, the indirect requires skills from the technician. The big advantage of doing a direct is a better chance of matching the color and no need for color communication with the lab^(2,9,15-17)

Indirect Composite v/s Indirect Ceramics: Composite is usually less expensive than ceramics but ceramics has better longevity, better physical and optical properties. The adhesion of ceramics to dental tissues is significantly higher than the composite, allowing its use in more conservative preparations, such as partial PLVs^(1,15,17,18).

Mechanical interlocking with enamel is more stable than the bond to dentin. Tooth preparation should preferably not remove healthy tooth structures unnecessarily. This will guarantee a larger quantity of remaining enamel and greater strength of the tooth, as flexion of the tooth may be related to fractures and debonding^(3,5-7,11,15,19).

Options on materials and techniques

The main options compared on these articles regarding materials and techniques when it comes to fabricating a partial porcelain veneer are: Feldspathic porcelain on refractory, feldspathic on platinum foil and pressed lithium dissilicate^(1,4,8).

Some advantages and disadvantages^(4,8) (Table 1)

Technique	layered Refractory	layered foil	Pressed E.max
layering	full	full	small or non
thickness	0.3mm	0.3mm	0.2mm
handling	sensitive	sensitive	easier
precision	good	average	best
bonding		great	
finishing	easier	easier	sensitive
esthetic		great	

Either the refractory and the foil technique allows a multilayer build-up, that means that we can add more opacous material on areas that we need to block the light and more translucent material where we need more light transmission. The pressed partial veneer is monolithic (one color and one opacity) with some small incisal layering if necessary. It means that if restoring a defect that involves dentin and enamel areas with different colors and opacities the pressed restoration can present some limitations. For example, an extense class IV type of restoration that one needs to reproduce the dentin color with more chroma and opacity to block the light on that area and then also recreate the incisal and interproximal translucency, or on cases with wide diastemas that we also need to combine different



Fig 1. Pre op situation. An old composite class IV restoration on the incisal edge of #9 (tooth 21). Need for replacement due to esthetic reasons.



Fig 2. Removing an old restoration and conservative tooth preparation. The cord on the mesial was placed to help expose the area where the finishing line will be placed.



Fig 3. Prep finalized. A mini chamfer on the finishing line was created. The internal surface was completely rounded avoiding stress on the ceramics.



Fig 4. Acrylic temporary generated by a silicone index made over the pre op situation. The temporary margin are over extended to increase the retention and bonded in to place utilizing the spot etch technique. It's also important to take the provisional out of occlusion, in centric and protrusive excursion.



Fig 5. The refractory die. A perfect copy of the stone die, reproducing all the prep details. The lower portion of the refractory die is placed in distilled water. The refractory will absorb the water from the bottom to the top expelling the air once inside it.



Fig 6. Working model with the refractory die and the lingual silicone index in position. The wash bake is done with clear ceramics to improve the blending of the margins by picking up the underlined color. To fit the refractory into the working model a special silicone base was fabricated.

chromas, opacities and translucencies, on these cases we may have more limitations with monolithic restorations.

On the other hand, the monolithic pressable restoration (emax lithium disilicate, for example), usually allows the fabrication of restorations⁽⁹⁾ with better fit and physical properties and easier handling when comparing to a feldspathic partial veneer.

When comparing the refractory with the foil technique we also have some pros and cons. The foil technique has a faster fabrication process. The refractory technique has several extra steps as: duplication of the die with all the setting times involved, the degaseification bake, soaking on water in between each bake, sand blasting the refractory and fitting the ceramic piece on the stone die.

The foil technique is really fast and can be done over any type of model system without having to fabricate an additional die. The other advantage of the foil is that you can apply any type of ceramic (feldspathic, alumina, zirconia, etc) on top of the same type of foil⁽⁴⁾. On the refractory technique we have to match the thermal expansion coefficient of the refractory with the ceramic, so usually you have different types of refractory for each type of ceramics.

Another advantage of the foil when compared with the refractory is that you can create more delicate margins with the foil. You can remove the foil and preserve these thin margins. With the refractory usually you lose some of these thin margins when sandblasting to remove the refractory material.

The biggest advantage of the refractory over the foil is the fit. Clinically we see a better fit with refractory when comparing with the foil. Remembering that the pressable system will overcome both, refractory and foil when it comes to precision.

If using a feldspathic ceramic one can utilize the refractory or the platinum foil technique. When having a very clear chamfer with a thicker margin the refractory technique can work very well. If the idea is to use a feldspathic ceramic but the margins are very thin, the foil technique usually gives a better result because one can preserve the thin margins that usually are lost when sandblasting the refractory off the veneer⁽⁴⁾.

How small and how thin can the ceramic fragment be?

Depends on the ceramic material and system utilized. The main options are: Feldspathic on refractory, feldspathic on platinum foil or a pressable system. The feldspathic ceramic is more delicate and the restoration when below 0.5mm can be very fragile and difficult to handle. When utilizing the pressable Lithium Disilicate material, the restoration can be as thin as 0.3-0.2mm and still have good resistance⁽⁸⁾. Regarding the size, these pieces can be as small as possible, the limiting factor will be the handling, the smaller the more difficult to try-in and to bond. Sometimes it can be very difficult to position the ceramic piece and check the fit when using gloves. Removing the gloves just to try them in and bond can be an option with small pieces.

The main steps and techniques that will be discussed:

1. Removing an old restoration to prepare for the new one (Burs vs Laser)
2. Tooth prep design to allow for ideal esthetics (color and shape) and physical properties being as minimal invasive as possible. That means, reducing not more neither less than the exact amount necessary.
3. Provisionalization. Options on materials and techniques.
4. Lab steps. Which system can allow more predictability and more efficiency achieving ideal esthetic result.
5. Try-in and adjustments. Handling these little pieces intra orally.
6. Bonding. Technique and materials.
7. Finishing after bonding. Removing the cement excess and polishing, probably the key steps to achieve a good interface between ceramics and enamel.
8. Occlusal adjustments.
9. Maintenance and long term success.

1. Removing an old restoration

In many cases when doing a partial veneer one needs to remove an old restoration that was in place (Fig 1). The key is to remove the old restoration grinding as little as possible healthy tooth structure (Fig 2). The conventional way to remove it is to grind down the old restoration utilizing burs, better if utilizing a microscope or a loop. Despite the effort not to touch healthy structure, some kind of reduction is inevitable.

So, every time one needs to change the restoration the size of it will get bigger and bigger. A new way to remove bonded restorations is by utilizing laser. To do so the restoration needs to be thin enough for the laser to destroy the bonding interface^(12,13).

2. Tooth prep design for partial veneers

The prep should be design to enable ideal esthetics and ideal physical properties, in the most conservative way possible^(2,5,7,10,14).

After rounding and smoothing out all the internal surface of the preparation the key moment will be the determination of the extension of the restoration by determining the position of the finishing line. It will depend on the reasons one is doing the restoration. For example, if closing a diastema or a black triangle, the prep needs to go more subgingivally to allow for change on the emergence profile. If changing the length, the prep needs to be extended to the lingual surface. Another very important aspect to be analyzed is the path of insertion. Creating undercuts on the cervical area is very common and this will lead to open margins.

Another decision is how should be the finishing line to better blend the interface between ceramic and enamel. Should one create a very clear margin or an irregular finishing line for better blend. Should one create a chamfer (Fig 3), an endless bevel or just slightly bevel the margins.

A clear chamfer can help with the try-in process and help with the positioning but on the other hand it will make more difficult to hide the interface between the enamel and the ceramics, the cement line. That is why we recommend no specific finishing line, but instead to bevel it and allow an irregular and thin ceramic margin. Usually we will over extend the ceramic margin and polish it down after bonding achieving a more invisible interface. In many situations, if the path of insertion allows, the partial veneer will be done prepless and the finishing line will be determined by the technician to allow the ideal design.

Another aspect to be analyzed regarding the prep design is the occlusion. The ideal is that the centric occlusal contact doesn't fall right over the interface between ceramics and enamel. When preparing, one should analyze that and place the finishing line either before the contact and leave it in enamel, or after leaving it in ceramics. Also, one has to analyze the protrusive movement. Sometimes there is enough space in centric but when moving the mandible forward the lower teeth may get closer to the preparation showing the one has to prep more or adjust the lowers.

3. Provisionalization

Options: Acrylic or Bis-acrylic with a silicone index done over a wax-up (Fig 4). Over extend the margins to create retention. Direct composite done also with the help of a silicone index^(7,8).

4. Laboratory steps

The Feldspathic Partial Veneer with the refractory technique⁽⁸⁾

The technique consists on duplicating the stone die into a refractory die where the ceramic can be built on top of it and baked.

The steps and challenges when building-up a partial feldspathic veneer:

- Precise process of duplication from the stone die to the refractory. High quality precision silicone has to be used to reproduce all the details of the preparation (Fig 5).
- One has to utilize a special die/model system that allows the positioning of the refractory die on the working model (Fig 6). This is a disadvantage of the refractory technique when comparing with the platinum foil or pressable technique that doesn't require any type of special model system.
- Prior to the build-up the refractory needs to go through a degaseification cycle on the ceramic oven, to avoid contamination of the ceramic. After each bake the refractory also needs to be soaked in to water to be completely hydrated before the next ceramic addition (Fig 5). Both process increases the working time and becomes a disadvantage when comparing to the platinum foil technique.

- 1st bake, the "Wash" bake, with clear ceramics to blend better the interface and hide the cement line (Fig 6).

- 2nd bake, the main bake, where opacius dentin (if needed) (Fig 7), dentin and enamel are added (Fig 8). Masking the shadow of the preparation becomes the main challenge. To improve the blend of the interface one needs to overextend the

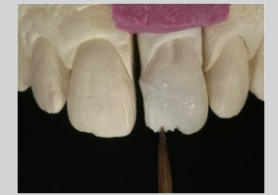


Fig 7. Opaque dentin material is used to replace the missing dentin. Blocking the light on this area is important to maintain the correct value and match the adjacent tooth, as well as masking the tooth preparation (IPS d.sign ceramics-Ivoclar Vivadent AG, Schaan, Liechtenstein on GC refractory-GC Germany GmbH).



Fig 8. The main bake is followed by the addition of regular dentin, enamel and opalescent materials. The silicone guide will help on the positioning of the incisal edge and its effects.

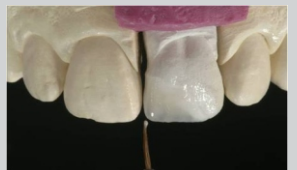


Fig 9. An internal staining was made to mimic the white spots of the adjacent tooth. This staining was stabilized before applying the final thin layer of incisal and opalescent materials.



Fig 10. Final shape and texture, recreating the incisal grooves.



Fig 11. The rubber wheel is used to finish the texture and to thin out the margins without chipping it.



Fig 12. Sandblasting with Aluminum oxide 110um at 1.5 bar (20psi). This procedure is very delicate since the thin margin has to be preserved.

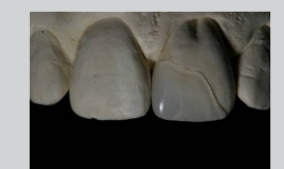


Fig 13. The precision of fit of the restoration depends on the quality of the refractory die. To achieve ideal fit one should use a high quality silicone material to duplicate the stone die. The photo shows clearly the ceramic margin over extended in comparison with the prep finishing line.



Fig 14. Checking the position of the incisal edge with the silicone index to avoid intra oral adjustments.

ceramic build-up over the finishing line, this extension will be polished down after bonding. The whole build-up is guided by the silicone index that was fabricated over the pre op model or diagnostic wax-up (Fig 8).

- A 3rd bake can be done if necessary for final shape corrections with enamel and translucent materials. If some staining is needed, the ideal is to do an internal staining (Fig 9), overlaid with a thin layer of ceramics. This way the staining will not be removed with the superficial polishing procedures neither with the finishing after bonding procedures.

- **Shape and texture.** Shaping according to the morphological parameters of the adjacent teeth but also according to the remaining part of the restored teeth (Fig 10). The challenge here is to try to reproduce the natural texture of the remaining enamel surface of the restore teeth since any discrepancy will make the restoration visible. One has to be careful to not over grind the marginal areas and harm the fit of the restoration. Remember that one has to leave a thin over extension of the ceramics beyond the finishing line. The ideal is to shape these areas with a soft diamond rubber wheel (Fig 11), under the microscope avoiding diamond burs on these areas.

- **External Stain and glaze.** The external staining, if necessary has to be minimal and away from the margins since this area will be polished after bonding and any staining will be removed. As mentioned above the texture and quality of light reflection are very important to blend in the ceramic piece to the remaining enamel, the glaze process and the after glaze polishing procedures are very important steps to reproduce the natural dental look. A thin layer of glaze paste is used and the glaze bake is done with a final temperature that will not remove the texture details.

- **Divesting after glazing.** The key is to preserve the very thin margins through the process of sand blasting to remove the refractory from the ceramic piece. To do so a thin Aluminum Oxide is used (110microns) under low pressure (below 2 bars). (Fig 12)

- **Adjusting the fit with microscope.** After removing the refractory the ceramic piece has to be adjusted to the stone die. The fit needs to be checked under the microscope and some small internal adjustments can be made to improve the fit. The utilization of a marker spray can be useful to detect the exact areas that need to be ground. After fitting on the single die, the next step is to fit on the solid model (Fig 13), to check the inter-proximal contacts and the occlusion. Also, on the solid model, the shape of the restoration will be checked in relation to the other teeth. The silicone indexes is used to help on this analysis (Fig 14), and the final color is checked (Fig 15).

- **Checking the occlusion.** The restoration has to be adjusted in centric and in protrusion. The protrusive adjustment (Fig 16) is very important, and a premature contact on the restoration can improve the risks of debonding or fracture.

- **Preparing the restoration for bonding** ^(8,9). The outside of the restoration is protected with wax and the inner part is etched with Hydro fluoridric acid 10% for 20-60 seconds depending on the manufacturer instructions. The ideal etching procedure should create a choky appearance (Fig 17). The acid is rinsed out and the restoration is placed in the ultra sonic for 3-10min, then cleaned with the steamer and dried out completely. The next step is the silanization. Two thin layers are applied and dried with a hair drier for 60 seconds. The ideal is to do the silanization before trying the restoration, to protect the etched surface from contamination.

5. Try-in and adjustments.

As mentioned before, the trying should be done after the silanization. This will protect the etched inner part of the restoration from the contamination that can happen during the try-in process. The recommendation is to silanate the restoration in the lab. This will allow the dentist to speed up the try-in process without having to worry about doing it chair side and having to wait the ideal time for the silane to act.

The first step of the try-in process is to check the inter-proximal contact with a thin occlusal paper. If necessary, the adjustments are made with a smooth diamond rubber wheel. The ideal is to do it without gloves due to the very small size of the restoration. Then the amount of pressure is checked by holding the restoration in position and flossing the inter-proximal area. The fit can only be checked after adjusting the inter-proximal contact.

The second step is to check the fit all around the margins. If necessary some small adjustments can be made by utilizing a colored spray to mark the interference and remove it with a

small round diamond bur.

The third step is to check the esthetics, color and shape. Small changes in shape can be done with the rubber wheel. Remember that big changes on shape will harm the internal ceramic build up, remove the staining and the glazed surface. When working with feldspathic ceramics on refractory or platinum foil, the room for changes after removing the restoration from the refractory or foil is small because of the limitation of re-baking these pieces without harming the fit. That is a big advantage of utilizing a pressable systems that can allow re-bakes in a more predictable way giving more freedom for changes and adjustments after the try-in.

To analyze color and shape, the try-in has to be done by placing some material inside the restoration to keep it in position and to analyze the color ⁽²⁰⁾. With thin restorations, the final color will be the combination of the color of the restoration plus the color of the cement, plus the color of the remaining tooth structure (stump shade). The simplest way is to add some drops of water in between the restoration and the tooth, another option is to add glycerine. The ideal is to try-in the restoration with try-in paste so one can analyze the color aspects when combined with the cement color. The thinner the restoration is the more the stump shade and the cement shade will interfere with the final color. So having a composite cement kit that has different colors can make a difference. The color analyzes should also be done before the tooth gets dehydrated, so the adjusting procedures that needs to be done before checking the color shouldn't take too long and also the mouth should be kept closed as much as possible. The ideal color analyzes is done when the restoration is perfectly fitted into position, that's why some adjusting procedures are done before checking the color to make sure the restoration is completely fitting and the try-in paste thickness is the same as the final cement will be, that means that the try-in paste will mimic perfectly the final situation. (Fig 18)

6. Bonding Technique and materials.

Although research shows that the background color of the tooth is even more important than the color of cement, it is known that the interaction between natural dentin, shade of resin cement, and their interaction on the final color of ceramic after cementation of the restorations is very important for the success of the partial PLV ⁽²⁰⁾. An inappropriate color of the resin cement may devalue the end result or lead to failure. Bonding sequence ^(7,9,11): Figs 19-24

7. Finishing after bonding ⁽⁸⁾

The ideal is to avoid burs. The excess should be removed with blades, as much as possible, and utilize burs as minimum as possible (Fig 25). Then refining the margins by polishing it with rubber tips (Fig 26-30), from more course (blue tip, Fig 26) to less (grey tip, Fig 28).

The ideal is to use the rubber tips instead of using the wheels (Fig 31) due to 2 factors: First, the tips will create horizontal micro grooves and the discs will create vertical grooves. The horizontal grooves will look more natural. Secondly because the tips will give more stability when grinding. The base of the tip will be supported by the ceramics giving a better stability during the polishing procedure. The key is to avoid grinding too much, increasing the gap or creating a ledge between the ceramics and the enamel. One has to understand that the ceramics has different resistance from the enamel, the enamel is softer. If the rubber tip is not supported mostly by the restoration, the chance of grinding more the enamel than the ceramics is big, creating a ledge that will be visible.

After using the rubber tips, the utilization of sand discs (soflex. Fig 29) and a silicone tip with pomes (Fig 30) will give the final luster.

Analyzing the light reflection is very important to check if the match between ceramics and enamel is good. The light reflection line should have continuity when moving from the ceramics to the enamel. A ledge will break this continuity showing the restoration. The other aspect is the quality of light reflection that needs to be controlled by polishing correctly the ceramics to achieve similar optical property of the enamel.

As one can see the finishing and polishing are both very delicate procedures and have major importance to blend in the restoration.

8. Occlusal adjustment ^(7,17)

Adjusting the bite :- Centric and protrusion. The importance of adjusting the bite, in protrusive movement, for longevity of the restoration when the veneer involves the incisal edge of anterior teeth. (Fig 32)



Fig 15. The photo shows a nice light transmission of the ceramic with the opalescent effect. It is also important to notice the presence of the opaque dentin blocking the light towards the preparation edge.



Fig 16. Very important to check the protrusive excursion and make sure the 2 centrals are touching at the same time and with similar intensity to avoid extra load on the partial veneer.



Fig 17. After the etching procedure, the inside of the restoration should present a choky appearance. The restoration is then placed in to the ultrasonic for 10min followed by the silanization.



Fig 18. The try in is made after silanating the partial veneer with Try-in paste (Try-in paste/Liquid Strip- Ivoclar Vivadent AG, Schaan, Liechtentein).



Fig. 19



Fig. 20



Fig. 21



Fig. 22

Fig 19-22. Etching the tooth, starting with the enamel and following with the dentin (thoroughly wash and dry gently). A thin layer of primer, followed by adhesive, and soft air.



Fig 23. Bringing the restoration into position with the help of a stick with a sticky point. Due to the small size, it is difficult to position it with the fingers.

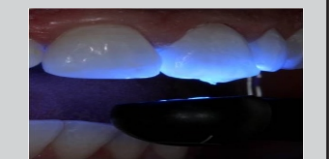


Fig 24. A prior polymerization of 3-5 seconds facilitates the removal of the cement. After that, the final polymerization should proceed for about 40 seconds per side.

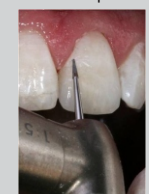


Fig 25. Removing the excess with burs should be avoided. The ideal is to utilize the blades.

9. Maintenance and long term success-final considerations

There are many aspects that need to be analyzed before deciding on the type of materials and techniques when doing a partial veneer.

Durability- Due to the fact that these restorations are usually bonded to enamel, the long term stability is usually very good (3,6,7,11).

Occlusal adjustment- If the partial veneer is utilized to increase the length of the teeth, the occlusal adjustment becomes very important, not only in centric but mostly in protrusive movement. A poor adjustment in protrusive movement can increase the chance of chipping or debonding.

Esthetic- If the teeth were bleached before bonding the restoration, there is a bigger chance of seen a difference on color between restoration and enamel. The solution can be to re bleach the tooth after a while to improve the match. Usually when bleaching the tooth, the ideal is to wait 2 weeks before taking the final shade and producing the final restoration to allow the tooth color to stabilize. If staining is seen after a while, re-polishing the interface can be the solution.

When the restoration requires extreme difference of color and opacity, the best option will be a layered restoration.

Refining polishing procedures, under the microscope, and doing final photos after a week of bonding (Fig 33 - 34), when normal hydration of the tooth is back. By than a real color analyzes can be done, as well as an analyzes of the interface restoration/tooth and texture blend.

Resistance- When resistance and handling are the main issue, the pressable system with a reinforced ceramics as Lithium Dissilicate is the best option. The press technique with a reinforced ceramics will also allow for thinner restorations, and that is major when working with partial veneers. The Lithium Dissilicate veneer can be reduced to 0.2mm in a very consistent way. One disadvantage when working with a reinforced ceramics is the difference of strength when compared with the enamel. This creates a more difficult match when it comes to texture and contour. When polishing and finishing these restorations, the chance of creating a ledge between the ceramics and the enamel is bigger due to this difference on strength. Finishing a feldspathic ceramics and making it to look like enamel is definitely easier.

Fitting- Regarding the precision, all the systems can provide an acceptable fit, but the press system is definitely do one that gives the best fit in a more consistent way. Another big advantage of the press veneer is to be able to do additional modifications regarding color and shape due to fact that one can bake the veneer after the try-in in a very easy way maintaining the fit and physical properties intact.

Hiding the cement line- Usually the common problem of these restorations is the interface between ceramics and enamel. Staining the cement line is usually a problem long term. Also the change on color since the tooth has a bigger chance of changing color when compared with the ceramics. The success to hide the interface between ceramics and enamel will depend on many factors. Apparently the best results will be achieved when:

-Not producing a clear chamfer but instead, preparing an endless bevel or a prepress situation.

-Keeping the margins 100% on enamel.

-Smoothing out and rounding the internal surface of the preparation.

-Precise impression, stone models, dies and duplication procedures. Lab procedures always under the microscope.

-Smoothing out the ceramic margins as thin as possible and over extend these margins over the enamel for further polishing it out after bonding.

-Utilizing clear light cure composite cement.

-Removing the cement excess with care, under the microscope, mainly with blades, avoiding burs.

-Polishing with rubber tips, focusing on not creating a ledge, blending the line angles, the light reflection and the texture between the ceramics and the enamel.

CONCLUSION

Partial PLVs are suitable alternatives to the direct restorations of resin composite and conventional ceramic veneers, since that combine high aesthetics, strength and adhesion in a minimally invasive approach.

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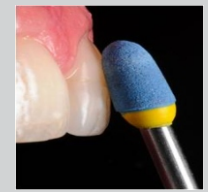


Fig. 26



Fig. 27



Fig. 28



Fig. 29



Fig. 30

Fig 26-30. Finishing with rubber tips (Brassler), from more coarse (blue) to less (grey). Sof-lex disc (3M- ESPE Dental Products, USA). Silicone cone with pomes.

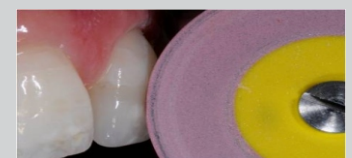


Fig 31. Finishing with rubber discs is not ideal. The chances of creating a ledge between ceramics and enamel are bigger when comparing with the rubber tips.



Fig 32. Anterior guidance equilibration: notice the even contacts in the anterior region with occlusal paper.



Fig 33. Final esthetic outcome.



Fig 34. Intra-oral final outcome showing adequate color, shape and texture.