Posterior Indirect Esthetic adhesive restorations

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اهداء

من قال أنا لها نالها

وأنا لها, وإن أبت رغما عنها أتيت بها

وصلت رحلتي الجامعية إلى نهايتها بعد تعب ومشقة ، لم تكن الرحلة قصيرة ولا ينبغي لها أن تكون ، لم يكن الحلم قريبا ولا الطريق كان محفوفا بالتسهيلات لكنني فعلتها ونلتها ، وما كنت أفعل لولا فضل الله فالحمد لله عند البدء وعند الختام .

إلى الذي زين اسمي بأجمل الألقاب ، من دعمني بلا حدود وأعطاني بلا مقابل ، إلى من سعى إلى راحتي ونجاحي ، إلى من علمني أن الدنيا كفاح وسلاحها العلم والمعرفة ، إلى من غرس في روحي مكارم الأخلاق داعمي الأول في مسيرتي ، و سندي وقوتي وملاذي بعد الله إلى فخري واعتزازي (والدي) .

إلى من جعل الله الجنة تحت أقدامها واحتضنني قلبها قبل يديها وسهلت لي الشدائد بدعائها ، إلى القلب الحنون والشمعة التي كانت لي في الليالي المظلمات سر قوتي ونجاحي ومصباح دربي ، إلى من تشاركني أفراحي و آساتي ، إلى أجمل ابتسامة في حياتي ، إلى أروع امرأه في الوجود (والدتي) .

إلى ضلعي الثابت وأمان أيامي ، إلى ملهمي نجاحي ، إلى من شددت عضدي بهم فكانوا لي ينابيع أرتوي منهم ، إلى خير أيامي إلى قرة عيني (أخواني - أخواتي) .

لكل من كان عون وسند في هذه الطريق الرفقاء السنين وأصحاب الشدائد والأزمات أهديكم هذا الإنجاز راجيين من الله تعالى أن ينفعنا بما علمنا وأن يعلمنا ما ينفعنا إلى (صديقاتي) .

إلي من تقاسمنا معهم مقاعد الدراسة فكانوا خير جليس (زملائي).

واهدي تخرجي وفرحتي إلى من أرادوا بي كسرا فخيب الله ظنهم وزدت قوة وجبرا ، إلى من أمسكوا بيدي لمساعدتي على النهوض (الأحباء والأعداء)

Introduction

For decades, the dental composite acts as the gold standard to esthetically restore the teeth. With a variety of techniques and materials, modern dentistry provides a wide range of restorative options. The development of adhesive procedures and their consistency has significantly altered clinical settings and modified certain core ideas of traditional dentistry. There is no denying that the application of adhesion in restoration has produced several benefits, including preservation, sealing, functionality, and aesthetics. These advantages are well-represented in the instance of PIAR. In cases of cavities with prolonged coronal damage, the clinical use of posterior indirect adhesive restorations is becoming increasingly common. Compared to a full crown metal-free preparation, the preparation for an adhesive partial restoration permits a larger degree of preservation of healthy tissue. Once they are cleaned and prepared, the following cavity classification that require restoration in the posterior area can have the following shapes (1) :

- **inlay (a cavity that does not need any cuspal coverage)**
- **onlay (a cavity with coverage of one or more cusps)**
- **overlay (a specific onlay typology with complete cuspal coverage)**
- **and veneerlay (an overlay with the involvement of the buccal wall and a preparation combined with a laminate veneer).**

To finish up this kind of indirect posterior restoration, since this process anticipates covering the entire clinical crown, it is appropriate to consider the entire crown into consideration.This article's goal is to discuss several significant PIAR related clinical protocol elements based on the adhesthetics approach. The words "adhesion" and "esthetics," when combined, form the term adhesthetics. In order to provide a tangible solution for certain practical aspects of adhesive dentistry that are less frequently addressed and codified in the scientific literature, the provided approach takes into account the most consolidated clinical protocols.

Aesthetic appearance is very crucial in modern dentistry. Patients are attracted to a restoration that matches the color of their natural teeth. Hence, an esthetic restorative material must simulate the natural tooth in color, translucence, and texture, yet must have adequate strength and wear characteristics, good marginal adaptation and sealing, insolubility, and biocompatibility. These materials must also remain color stable and maintain external tooth morphology to provide a lasting esthetic restoration. Presently, materials available for esthetic restoration are (2):

a) Direct esthetic restorative material:

- **Direct composite resins.**

b) Indirect esthetic restorative materials:

- **Indirect resin composite.**
- **Dental ceramics.**

The advantages of indirect tooth-colored restorations over direct are improved physical properties, Variety of materials and techniques, Wear resistance, Reduced polymerization shrinkage, Ability to strengthen remaining tooth structure, more precise control of contours and contacts, Biocompatibility and good tissue response and Increased auxiliary support.

Indications (2)

- Medium- to large-sized cavities where one or more cusps are missing.
- Cavities where the coverage of one or more cusps is advisable to improve the prognosis of the complex restored tooth.
- Morphological modification and/or raising of the posterior occlusal vertical dimension (OVD) in cases of oral rehabilitations on elements where a
- full-crown restoration would be too invasive.
- Cracked tooth syndrome, when the symptomatology needs to be managed to maintain the vitality of the tooth.
- Multiple medium- to large-sized cavities in the same quadrant (even if indirect inlay restorations are not the first choice).

Contraindications of indirect restoration (3)

- Deep subgingival preparations: This is certifiably not a flat-out contraindication, Deep subgingival preparations edges ought to be kept away from. These edges are hard to record with an impression and are challenging to finish. Moreover, attaching to enamel edges is enormously liked, particularly along gingival edges of proximal boxes.
- Weighty occlusal forces Ceramic restoration efforts might break when they need adequate mass or are liable to exorbitant occlusal stress, as in patients who have bruxism or holding propensities.
- Powerlessness to keep a dry field.

Advantages of indirect restoration (4)

- Making an optimal life structure of occlusal surfaces, with great control of contact focuses and development profiles.
- the possible use of ceramic materials such as lithium disilicate-reinforced glass-ceramics.
- Photothermal treatment (130°C for 7 min) works on the level of change of the composite and the physiochemical properties of the reclamation
- The possibility of an occlusion evaluation with an articulator This strategy emphatically diminishes the restoring shrinkage that happens outside the cavity, working on the peripheral sealing. The last curing shrinkage is in the thin layer of resin cement.
- Biocompatibility and great tissue reaction: Ceramic materials are thought of as the most synthetically dormant of all materials. They are biocompatible and generally related with a decent delicate tissue reaction.
- Most indirect strategies permit the manufacture of the rebuilding to be absolutely or to some extent appointed to dental lab technicians Such delegation considers more effective utilization of the dental specialist's time.
- Ceramic restorations are more wear-safe than direct composite restorations efforts. Laboratory-processed composite restorations wear more than ceramics, however not exactly direct composites in lab studies.

Disadvantages of indirect restoration (5)

- Short clinical track record: Indirect bonded tooth-colored restoration has become somewhat famous just as of late and is as yet not put by a large number. Not many controlled clinical preliminaries are accessible, so the long-term durability of these restorations although expected to be great, isn't especially very much recorded.
- Resin-to-resin bonding hardships: Laboratory-handled composites are profoundly cross-connected, so not many twofold bonds stay accessible for the chemical adhesion of the composite cement. Therefore, the composite reclamation should be precisely scraped or potentially synthetically treated to work with the attachment of the cement.
- Wear of restricting dentition and restoration: Ceramic materials can cause inordinate wear of contradicting enamel as well as restoration. Late upgrades in ceramic production have decreased this issue, however ceramics, particularly if unpleasant and unpolished, can wear contradicting teeth and restoration.
- Low potential for repair-Indirect restorations, particularly ceramic inlays/onlays, are difficult to repair in the event of a partial fracture.
- Difficult intraoral polishing: Indirect composite restorations can be polished intraorally with the same instruments/ materials used to polish direct composites. Ceramics, on the other hand, are more difficult to polish after they have been cemented because of either limited access or lack of appropriate instrumentation.
- The divergent wall of the restoration preparation leads to a wedging effect which may increase fracture possibility.
- Increased cost and time.
- Technique sensitive.
- Weakness of ceramics: A ceramic restoration can crack on the off chance that it doesn't give sufficient thickness to oppose occlusal forces or potentially that the restoration isn't properly supported by the cement medium and the arrangement. Breaks can happen either during an attempt in or after cementation, particularly in patients who create abnormally high occlusal forces.

Types of Indirect Posterior Esthetic Restoration(6)

Onlay

Are restorations that to some degree cover cusps, but not the entire occlusal surface. They are shown in class II cavities of large dimensions with lateral wall dividers to some extent supported without dentin cracks. On account of endodontically treated teeth, the presence of no less than one peripheral edge, and two well-supported axial walls in continuity with the peripheral edge itself, are required. Both composite and ceramic can be utilized.

Inlay

Are restorations without cusp inclusion, and would be demonstrated in teeth with saved vitality in medium to enormous class II cavities (MO/DO, MOD), with all-around protected buccal and oral walls. Composite is the best material. Presently, this kind of restoration is regularly performed with a direct procedure, hence getting similar predictability with a more conservative approach.

Overlays

Are total cusp-coverage restorations, indicated in class II cavities of large dimensions with the absence of support to axial walls and lack of marginal enamel and dentin (in vital teeth), and the deprivation of marginal ridge endodontically treated teeth, require complete coverage, even with slight remaining residual walls of satisfactory thickness. Composite or ceramic can be utilized. Ceramic (lithium disilicate glass-ceramic) is the best option material on account of various multiple restorations with wide coverage. Besides, due to its major strength and capacity to settle the cusp, ceramic is the best option for teeth impacted by crack tooth syndrome, using it with an all-out cusps covering.

Inlays and Onlays

Indirect Composite Inlay/Onlay Composite resin inlays and onlays are the treatment of choice in many situations3: Esthetic considerations, structural considerations, Abrasion considerations, Conservation of tooth structure, Supragingival margins, and Chairside repairs.

Advantages of Indirect Composite Inlays Compared to Direct Composite Restorations(7):

a) With the Indirect technique the dentist can
- more easily control the cervical adaption
- shape the interproximal and occlusal surfaces
- make an appropriate contact point

b) Through the processing and shaping of the composite in the laboratory, it is possible clearly to improve the material properties (density, wear resistance. and water absorption).

c) Since the clinical process is relatively simple for composite inlays, and it is easier to produce good and sealed margins, composite inlays show lower secondary caries frequency and fewer color changes than direct composites when used in the posterior region.

d) Reduced micro leakage.

Disadvantages Compared to ceramic Inlays(7):

- Lower wear resistance than ceramic inlays.
- Still inappropriate for substituting occlusal surfaces exposed to large forces.

Etched Posterior Porcelain Restorations(4)

Although new developments continually improve the composite resins used for indirect inlays and onlays, porcelain has numerous advantages.

Indications(9)

Etched porcelain inlays are suitable for any clinical situation for which porcelain has superior esthetics ability to restore strength to compromised teeth, and conservative treatments are indicated.

- Small to moderate carious lesions for which the patient requests a highly esthetic restoration.
- Large amalgam or composite restorations involving the mesial- or distolingual surface of a cuspid showing unacceptable discoloration or compromised contacts.
- Large carious or traumatic lesions with undermined enamel to the extent that a cast metal restoration or a full crown would otherwise be necessary for these situations the cross-linked resin-bonded porcelain restoration will bond to the remaining tooth structure, binding it together into what is, in effect, a homogeneous mass.
- The endodontically compromised tooth where the access cavity has compromised the strength and prognosis of the tooth. An etched porcelain restoration can be a conservative alternative to a post-and-core and hull-coverage crown.
- Heavily undermined incisal edge or proximal surface on an incisor requiring support to keep an otherwise pleasing intact tooth from fracturing.
- Class IV restorations replacing missing incisal and/or proximal aspects of the tooth.
- Teeth opposed by existing porcelain restorations, which otherwise would tend to wear extensively
- Teeth where it is difficult to develop retention form. The bonded restoration's adhesive nature may be more effective than other means of developing retention such as pins, periodontal crown lengthening, or a post and core after elective endodontic therapy.
- Patients for whom metal allergy is proven or suspected.

Contraindications(8):

- It is not a restoration of choice if an anterior tooth is grossly involved either proximally or cervically. There must be adequate tooth structure to support the restoration.
- When access to the lesion is poor and overcutting of tooth structure would be required E.g.; in rotated teeth.In such conditions, other restorations should be considered.
- Patients with poor oral hygiene and inadequate motivation.
- When short teeth preclude developing adequate resistance and retention forms. E.g.: Heavily worn-down teeth.
- Teeth with insufficient tooth substance for bonding.
- Preparations with excessive undercuts.
- Where adequate isolation is not possible.
- Teeth with large pulp chambers, which limit the reduction of tooth structure.
- Where posterior group function and reduced vertical dimensions apply strong lateral forces on the restorations.

Clinical Problems Associated with Ceramic Inlays and Onlays (4)

- Fracture
- Hypersensitivity
- Fit
- Marginal integrity
- Microleakage
- Bonding
- Cement wear
- Ceramic inlay/onlay material wear and opposing tooth wear
- Plaque accumulation, gingivitis, and secondary caries
- Colour
- Anatomic form
- Radiopacity

Double inlay technique: [12]	Gold and ceramic have long been used in prosthetic dentistry. In the posterior region, it is possible to use both materials with the double-inlay technique to add the strength of metal to the esthetics of ceramic.
Natural inlay: [13]	Here the restoration is milled from an extracted human tooth instead of a porcelain block.
Cerana-prefabricated inlay system [14]	Cerana Inlay System from Nordiska Dental offers quick and easy, durable ceramic inlays in a single visit without the need for a laboratory and the inconvenience of impression taking.

Table 1: inlay techniques

Complete Crown Restorations

Indications for a full crown are(8):

- Teeth with extensive decay
- Teeth weakened by extensive restorations
- Teeth with excessive extensive wear
- Teeth severely weakened or prone to fracture as a result of endodontic treatment
- Teeth fractured or compromised with extensive microcracks and needing to be restored
- Severely extruded teeth (to restore the plane of occlusion)
- Teeth with an inappropriately short coronal portion
- Malformed teeth
- Abutments for fixed partial dentures
- Long-span fixed partial dentures (where abutment teeth need maximum retention)
- Teeth with unattractive tissue recession and unsightly interdental spaces

Types of preparations(9)

The PIAR can be applied to various needs and different clinical goals. There is no clear classification in the literature for the different types of preparation; therefore, a classification is presented here based on clinical experience.

In the case of posterior onlay/overlay, three types of preparation can be applied to the main forms according to the adhesthetics protocol: butt joint, bevel, and shoulder. A veneerlay preparation may be used in the case of cuspal and buccal coverage. For tabletop on a worn dentition, the recommended preparation is an ultraconservative butt joint with a simple surface finish.

The butt joint(9)

requires minimal preparation and is therefore suitable for adhesive techniques. It is represented by an occlusal reduction that follows the evolution of the cusps and the main sulcus, so it is generally flat but with an inclined surface. At the level of the finishing line, the butt joint should have an inclined trend toward and follow the occlusal surface, which is then made more horizontal. The occlusal reduction is generally calibrated by burs with the presence of depth marks. (See fig. 1)

Figure1 : Butt joint preparation, which is not flat but mainly follows the inclination of the occlusal plane. The more peripheral margins (buccal and lingual) have a more horizontal

Indications for a butt joint preparation(9):

- Cuspal reduction to protect the teeth from the occlusal load.
- Cuspal fracture in the area of the occlusal third (or middle third, in some cases).
- Presence of strong abrasions/erosions of the occlusal surface (with the possibility of increasing the vertical dimension).

The bevel preparation(10)

is similar to the butt joint but with a substantial difference in the presence of an inclined bevel, generally 45 degrees or more, for an average length of 1 to 1.5 mm, which can be extended in exceptional cases. This beveling is generally present on the buccal side, but can also be on the palatal side (e.g., in cases where the cracking of the enamel within the preparation should be included or when more thickness and support is required for a restoration on a working cusp). Where there is a bevel on the whole circumference, the variant of a full bevel can be considered.
Bevel preparation. (See fig. 2)

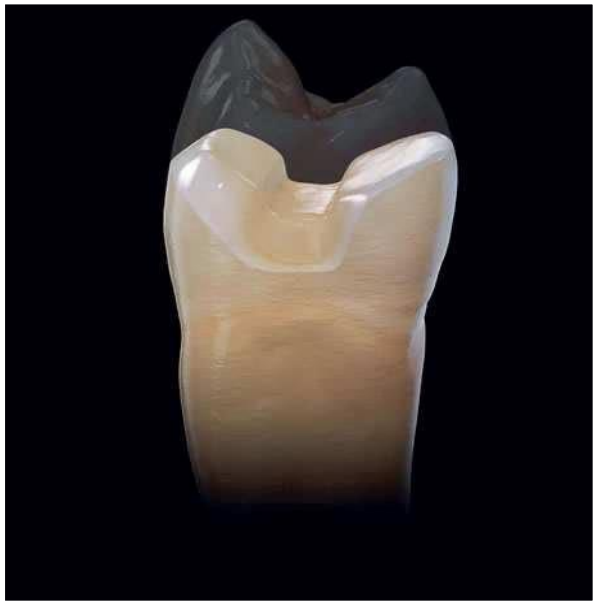

Figure 2 : This kind of design is a variant of the butt joint, where it is possible to create a bevel (usually between 1 and 1.5 mm in length) on one or more surfaces. In this case, it is evident on the buccal side.

Indications for a bevel preparation(10):

- Esthetic need for a more gradual integration of the restoration-tooth transition.
- Wider surface of external enamel, which enhances adhesive cementation procedures.
- To create more space for the restoration in the peripheral zone.

The shoulder(10)

is a preparation characterized precisely by a rounded shoulder, which develops on the peripheral part of the design. The central part is generally represented by the build-up (or block out), usually made of a resin-based material. The thickness of the shoulder is about 1 mm, thus allowing for the largest possible enamel thicknesses that enhance adhesive cementation procedures. The management of the finishing line must be realized with a geometrically determined bur, with a slightly tapered shape and a rounded inner corner. If the bur head diameter is 1 mm , it should be sunk to the entire thickness of the substrates to be prepared, but if it is larger , it should not be completely sunk.(see fig. 3)

Figure 3: Shoulder preparation. A rounded shoulder characterizes this preparation design. The depth of the shoulder is usually around 1 mm.

Indications for a shoulder preparation(10):

- Previous cuspal fracture to the cervical third (or medium third in some cases), and then, by effect, the central build-up automatically defines the peripheral shoulder design.
- Where greater structural protection is required for a cusp coverage with a cervical grasp.

Proximal preparation designs

There are three types of approaches for the interproximal areas according to the adhesthetics protocol: slot, bevel, and ridge up.

Slot: a frequent interproximal preparation is represented by this design, which has a rounded shoulder (coherent with the shoulder preparation), generally of about 1 mm. One reason for this preparation being so widespread is that this type of shoulder is naturally determined after the excavation of an interproximal carious lesion, allowing for the creation of a central reconstruction of the dental crown. (See fig. 4)

Figure 4: Slot interproximal preparation. This kind of design is very common, especially when a previous carious lesion has affected the area.

Bevel: a less intrusive preparation compared with the slot for reestablishing the interproximal region without going in too profoundly at the cervical level. This configuration offers a few benefits for a bevel preparation, for example, a surface of enamel, which improves the cement cementation system. This restoration is indicated when a broad restoration should be made to the interproximal region without a past carious lesion, and confined cervically contrasted with the contact region.
(see fig. 5)

Figure 5 : Shoulder preparation. A rounded shoulder characterizes this preparation design. The depth of the shoulder is usually around 1 mm.

Ridge up: The most conservative approach for the ridge when a cuspal coverage is performed. This configuration offers some advantages for a bevel preparation such as a good surface of enamel, which enhances the adhesive cementation procedure.
This preparation is indicated when an extensive restoration needs to be made to the interproximal area without a previous carious lesion, and localized cervically compared to the contact area.

- **The ridge preservation variant** of this approach allows for the maintenance of the integrity of the marginal ridge (Fig 6A),

- **whereas the ridge coverage variant** allows for minimal surface preparation (Fig 6B).

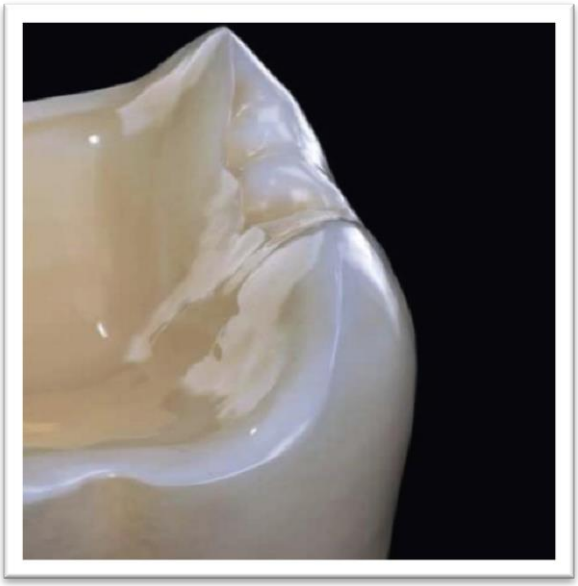

Figure 6A: ridge preservation variant.

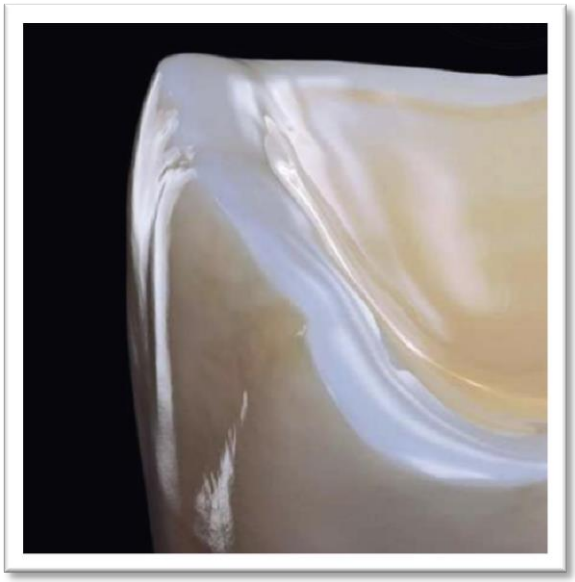

Figure 6B: ridge coverage variant.

Materials of indirect restoration(11)

Because of the adhesive retention of indirect restoration ,only the etchable ceramic material are used for such type of restorations .

Classifying ceramic restorative materials into three families, based on the presence of specific attributes in their formulation, as follows:

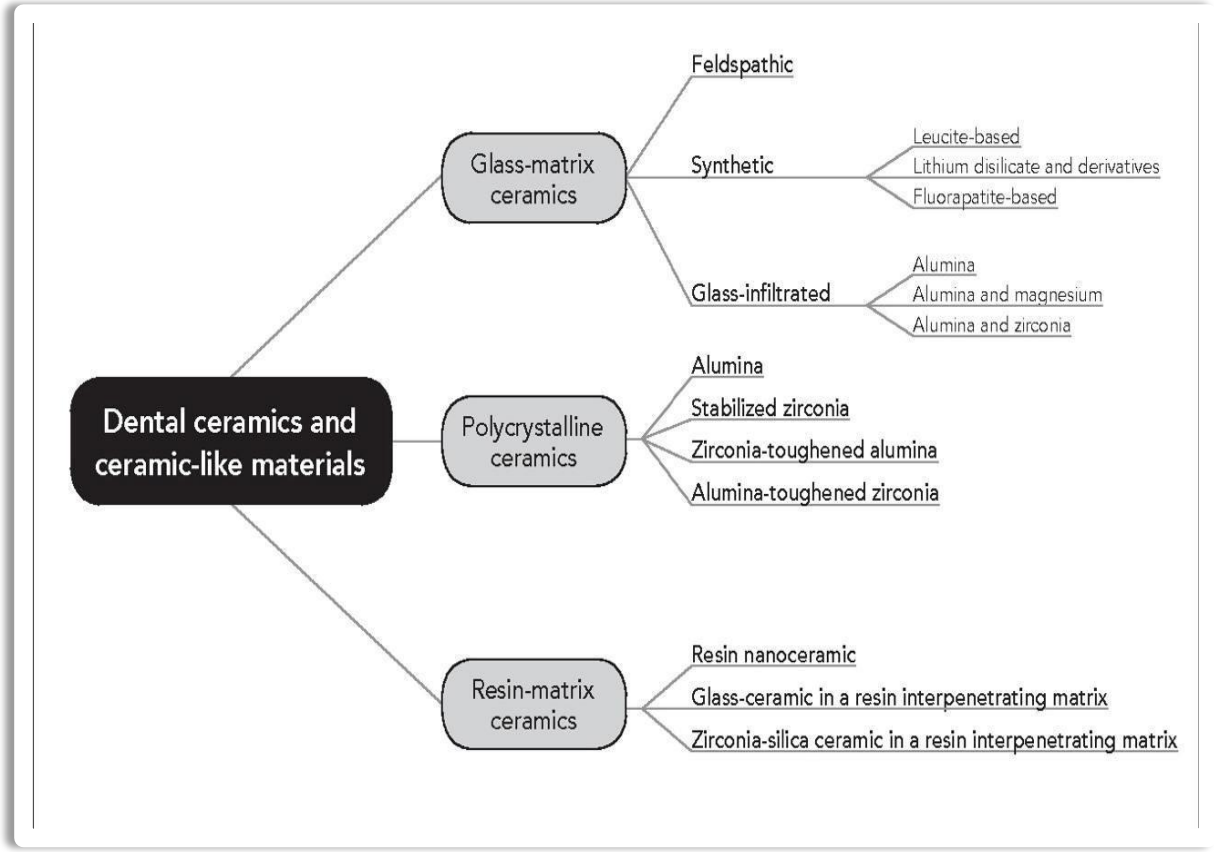

Table 2: materials of indirect restoration

Discussion:

What is the difference between the direct and indirect restoration?

It has been observed that the restorations resulting from indirect resin composites are relatively smaller in size than the direct ones as a result of the extra-oral preparation and polymerization shrinkage. However, the lost space has been reported to be usually compensated by the presence of luting cement in these restorations (fig. 7) **.(12)**

Figure 7: luting cement

Another difference between the two modalities is the need for secondary polymerization. Although direct resin composites are usually well-cured, it has been estimated that the degree of conversion only occurs up to 65%, which might not undergo complete polymerization, which has been a big limitation of these modalities.

On the other hand, indirect resin composites are reported with higher degrees of polymerization because as previously mentioned, they usually undergo further polymerization preparations by light, heat, pressure, and light curing.**(12)**

Accordingly, it has been estimated that the modalities are usually stronger and harder, with an estimated higher degree of conversion in up to 81% of them, probably due to increased amounts of polymerized resin particles.3,4 Besides, it was previously reported that the indirect resin composites have a higher resistance to occlusal wear than the direct ones, with an estimated value of <1.5 µm/year, which is probably due to the significantly enhanced physical properties of the modality.

Another advantage of indirect resin composites is the enhanced occlusal morphological outcomes as a result of the good control over the contours and other related structures because indirect composites are usually fabricated outside the oral cavity.

Filler contents are also more abundant in the indirect composites than the direct ones, which significantly enhances the physical properties of the compounds leading to enhanced strength, hardness, wear, and marginal integrity, and accordingly, the prognosis with these modalities is usually better than with the direct ones.**(13)**

Regarding esthetics, many previous studies have also reported on this outcome. Because indirect resin composites can be polished and fabricated within a laboratory, they have been reported with enhanced esthetics and better retention outcomes that usually last for an extended period over the outcomes that can be associated with direct composites. The attending clinicians can successfully obtain the pink and white desirable esthetics results because indirect resin composites can provide a variety of color combinations to the tooth and adjacent gingival tissues.**(14)**

In this context, a previous investigation by Lee et al compared the direct and indirect resin composites in their abilities to maintain color resistance following thermocycling. The authors reported that no significant differences were noticed between the two modalities in terms of color stability after 5,000 cycles of thermocycling. A significant difference was noticed regarding the changes in color coordinates. Besides, they also reported that the brand, shade designation, and shade group were all noticed to have a significant influence over the color changes of the indirect composites. The color changes with the two types of resin composites are attributable to many causes as chemical degradation, accumulation of stains, oxidated carbon double bonds, water resorption, dehydration, intact with rough surfaces, poor bonding, and water sorption. These causes can be either endogenous or exogenous and all have been reported to induce significant color changes to the resin composites. Furthermore, internal color changes have been reported to be even more important clinically than others regarding the color stability of the restoration materials. These have been reported to be in significant association with the form and type of the applied material and the period taken to perform polymerization. On the other hand, a previous investigation by Dietschi et al reported several factors that can significantly enhance the color stability of the different types of resin composites, including increased filler-to-resin ratio, water resorption, decreased particle hardness and size, and maintaining optimized matrix-filler coupling systems. Previous investigations of the color stability estimated with the indirect resin composites show that these types of composites are associated with sufficiently significant stability outcomes following storage in red wine and ultraviolet radiation.**(15)**

On the other hand, other investigations also reported that for 300 and 383h of accelerated aging, indirect resin composites were associated with unacceptable outcomes of color stability and esthetics. The aging of the indirect resin composites in ultraviolet radiations, coffee, mouth rinse, and tea was significantly associated with reduced color stability and unfavorable discoloration outcomes, as reported in a previous investigation by Stober et al. Accordingly, these variables should be considered with patients caring for esthetics to obtain better outcomes.**(16)**

It should be noted that the cost of indirect resin composites is higher than the direct ones, which is attributable to the extra laboratory work to achieve temporization and impression. Additionally, increased reduction of the tooth structure is also another disadvantage that is usually observed with indirect composites, a process that is done to develop adequate removal and insertion paths. Besides, it should be noted that changing the modality or modifying the colors is difficult as these are usually manufactured within the laboratory after many procedures.It was also demonstrated that the luting thin layer of the resin cement is subjected to shrinkage during the luting procedure for the completion of the restoration process. **(17)**

Many indications and contraindications were reported for the indirect resin composites. Indirect composites are indicated for laminate veneers, inlays and onlays, jacket crowns, full-coverage crowns, restorations based on implant support, in cases where occlusal coverage is required as in patients suffering from periodontal conditions or bone loss, retainers or bridges enforced with fibers, and in cases of indirect anterior restorations in patients suffering from enamel hypoplasia, fluorosis, abrasions, previous non-satisfactory esthetic restoration-related experiences, and diastemas.**(18)**

On the other hand, indirect resin composites should not be considered for the restoration of teeth suffering from a severe tear or wear as a result of temporomandibular joint affection and occlusal disharmony, in cases of parafunctional harmful habits, and in cases where isolation of the area where the procedure should be performed is difficult because indirect resins are sensitive. Despite the advantages of the indirect resin composites and the reported characteristics, reports from clinical studies indicate that both the direct and indirect modalities have almost similar favorable outcomes regarding esthetics and patient satisfaction.**(19)**

What is the ideal way to deal with a potentially fragile residual cusp? Should it be retained or covered? What is the adequate thickness required to support the occlusal load?

These questions form part of daily clinical practice for the restorative clinician, and although some authors have investigated them, the literature does not provide absolute answers.
Another concern for the restorative clinician is the partial or extended fracture of the dental crown, as the consequences can be very serious, both on vital and (especially) non-vital teeth.**(20)**
A particular type of restorative approach can prevent such fracture, especially in the presence of an occlusal overload. Even evident hard tissue cracks, especially if contextualized with the other aforementioned factors, may be determined by occlusal or accidental traumatic overloads. Moreover, teeth become more fragile with time, and therefore more susceptible to cracks and fractures, especially if previously weakened by restorative procedures or endodontic treatments. Resistance to fractures can be influenced by different factors such as the cavity dimension, the physical properties of the restorative material, and, in the case of indirect restorations, the cementation system used.**(21)**

In order to protect the weakened tooth, it is advisable to cover the cusp with partial or total restorations. The studies on onlays or partial crowns made with dental amalgam and conventional cementation techniques do not apply to the clinical situation of adhesive restorations.**(22)**
The PIAR ceramic partial crowns are cemented in an adhesive way, which not only protects the restorative material but also reinforces the other hard tooth tissue.**(23)**
The resin cement used for the cementations is elastic and tends to deform themselves, being able to absorb possible stress. Due to the performance of adhesive cements, the cavity preparations of the pre-adhesive era31,32 are no longer relevant because adhesion plays a fundamental role in maintaining the cemented restoration. Obviously, the effectiveness of the adhesive bond depends on many factors that have to be analyzed individually, eg, the quality and quantity of the hard tissue, the materials with which the cementation is made, the type of masticatory pattern of the patient, and the morphology of the preparation.**(24)**

Conclusion :

Evidence shows that esthetic outcomes are in favor of indirect resin groups. Furthermore, color stability outcomes for the two groups and evidence in this area was controversial.

Finally, many studies have reported that the clinical efficacy of the indirect resin composites is superior to the direct ones, while many others reported that they are similar, and only a few reported that resin composites are superior. However, preservation of tooth structure is better in direct resin. Regarding cost effectiveness, it is notable that direct resin is superior than indirect resin. Further studies are encouraged to determine the controvorseries between them.**(25)**

modern restorative dentistry is substantially adhesive. The conservative spirit should pervade all procedures. Preserving healthy tissue (not only dental, but also pulpal and periodontal) has be- come the priority. With this approach, indirect adhesive restorations are indicated in large cavities associated with cuspal coverage with absent or reduced amounts of cervical enamel.

The new principles of preparation discussed in this article can be applied effectively to all types of traditional adhesive restorations (inlay, onlay, overlay), and help to define a set of newly developed restorations (additional overlay, occlusal-veneer, overlay-veneer, and adhesive crown). The different types of restorations constitute a significant proportion of treatment options available for the rehabilitation of the posterior teeth, and allow us to define a new line between conservative and prosthetic treatments, in favor of a more conservative approach.**(1)**

A cavity diagnosis is very valuable when it comes to indication and the type of PIAR to execute. the clinician should decide whether to maintain, integrate or reduce some cusps for the purpose of final resistance of the complex tooth restoration.

It is strongly recommended to use the build-up or block out in nearly all cases of PIAR to effectively allow for the immediate protection of the

dentin, the filling of the undesired undercuts, and the determination of the thickness of the future restoration.**(2)**

The butt joint is the most advisable adhesive preparation, with its variant bevel in some cases. The shoulder preparation is almost always used for restorations that nave ‹ one or more previous cuspal fractures (to the third medium or cervical). The aim is to prepare the PIAR in an increasingly conservative way to balance the prognosis of the restoration.**(9)**

Figure 8: posterior indirect Restoration esthetics

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Thank you
For listening