

A Comparative Evaluation of Ceramic Veneers and Direct Composite Resins for Anterior Teeth Restoration



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INTRODUCTION

In contemporary dentistry, the demand for dental restorative materials that meet both esthetics and function needs has increased. As a new dental restorative material, porcelain has gained its popularity by its esthetics, strength and convenience to fabricate at chairside with the help of CAD/CAM technology. However, the longevity and prognosis of porcelain veneers have not been shown to be superior to the classical direct composite resin material. The advantages of direct composite resin veneers include: The material is more affordable than laminate veneers. It's also easier to repair than indirect veneers. Direct composite veneer is less invasive to tooth structure. On the other hand, indirect laminate veneer requires more removal of tooth structure, and is difficult to repair. However, the concerns for composite veneer is that it's susceptible to alterations of surface gloss, and discoloration is expected overtime.

Composite veneers and porcelain laminate veneers use two different acid etching techniques: to use composite veneers, enamel needs to be etched with phosphoric acid then bind to bis-GMA resin. In contrast, HF acid is used to etch porcelain intaglio surface, and phosphoric acid etches enamel. This makes the bonding of porcelain to tooth structure possible.

The choice of materials to restore anterior dentition should be evidence based rather than falling into marketing hype. Therefore, the objective of this review is to describe the material and technique differences of these two materials in order to help clinician make a final decision as to which material to choose.

MATERIAL OPTIONS

Ceramics	Glass-matrix ceramics (Glass-CER):		Composite Resins
	Feldspathic	Zirconia-reinforced lithium-disilicate	
	-Original -Low survival rate -Etched with 9 to 10% HF for 90 s	-Most universally used -5% HF etch for 20 s	Microfilled -Susceptible to chipping due to their low filler content. - Much less popular after the introduction of sub-micron hybrid and nanofilled composites
	leucite-reinforced -Common -5% HF etch for 60 s		Hybrid - Made them stronger than microfilled composites, but more difficult to obtain a smooth surface - Excellent flexure strength and fracture toughness even when compared to glass-CER. They have been used in dentistry for over 30 years for anterior and posterior restorations, with some changes in filler type and size
	zirconia-reinforced lithium-disilicate -Short-term clinical results have been disappointing due to craze line fractures at 1 year.		Nanofilled -Excellent Polishability -High gloss - No clinical evidence that nanofilled composite resins result in better overall clinical behavior than hybrid composite resins
Polycrystalline or oxide ceramics	Zirconia -The strongest tooth-colored material -The most durable tooth-colored material in clinical practice. -Not etched with HF -Not indicated for anterior veneer restorations		Universal - a new generation of composite resins that includes microfilled, nanofilled and hybrid composite resins. - They are indicated for all direct restorative procedures: class I to class VI direct restorations and direct veneers. -Most of them follow the trend of simplification with fewer shades and one translucency because of some type of chameleon effect. -They have an excellent polish retention -Cost less than some of the most popular composite resins.

DIFFERENCES FROM A CLINICIAN'S PERSPECTIVE

	Direct veneers (composite resin)	Indirect veneers (glass ceramics)
Materials and instruments needed	Dental instruments are basic and not expensive	Requires complex materials, instruments and laboratory techniques. Clinicians need specialized bur kits, elastomeric impression materials, special resins to fabricate provisional restorations, dentin adhesive, composite cement.
Number of appointments	1 or 2 appointments	Usually require 3 appointments. 1. Clinical exam, study models, photography. 2. Tooth preparation, definitive impression, fabrication and cementation of provisional restorations. 3. Try-in and cementation.
Technical complexity	Clinician needs specific training and some artistic awareness to be able to define and customize the morphology of the restoration and combine opacities to obtain the exact shade.	Clinician needs specific training and technical dexterity to prepare teeth. Must be familiar with the cementation technique and respective materials. Excellent communication with the dental technician is paramount to the success of ceramic veneers
Who is responsible for the esthetic and functional outcome?	The dentist is solely responsible for the success of the treatment.	Although the dentist is still responsible for the overall treatment, the fabrication of the restorations is carried out by a dental technician.
Biological considerations	In many situations, the treatment is carried out without removal of tooth structure, which may increase the durability of the restorations.	Very rarely can the treatment be carried out without preparation of the tooth structure. In some cases, "no-prep" veneers may induce periodontal alterations.
Adhesive interface	Simple joint, adhesive layer "sandwiched" between the tooth structure and the composite resin.	Complex joint with two adhesive layers; one "sandwiched" between the tooth structure and the composite cement, while the second one is "sandwiched" between the composite cement and the restoration intaglio.
Translucency	Composite resins are available in multiple translucencies for the same shade (enamel, dentin and body), plus opaques, and special shades for bleached teeth. The combinations of shades as direct mock-up is an advantage.	Both the thickness and shade of the glass-CER affect its translucency. Shade affects translucency parameter less than thickness. ¹⁸ The final shade also depends on the luting composite cement.
How reversible is the treatment?	Treatment is reversible for the cases in which there was no removal of tooth structure.	In most cases, it is irreversible as a result of the tooth preparation.
Longevity	In general, the esthetic longevity related to shade and gloss stability is fair.	In general, the esthetic longevity related to shade and gloss stability is excellent.
Need for periodical maintenance	Need to be repolished periodically to increase the longevity of the restoration, specifically shade and gloss. With the newest composite resins, on average once per year.	Esthetics is very durable, unless the luting cement or the dentin adhesive undergo discoloration. The restoration itself does not need esthetic maintenance.
How difficult is to repair restorations?	Repair is easy and quick using the same restorative material, which provides a very good esthetic outcome.	Repair is not technically difficult, however cannot be accomplished with the same material that the restoration is made of. Therefore, the esthetic result may be compromised. The technique usually involves a dentin adhesive and a composite resin. Etching glass-CER with hydrofluoric acid (HF) improves substantially the bonding strength. HF must be used cautiously in the mouth due to its corrosive effect.
How easy is to replace restorations?	Technically very easy, quick, with no need for sophisticated materials. A Bard-Parker surgical blade is recommended to remove thin layers of residual composite resin. Some dentists use UV light to be able to distinguish residual composite resin from tooth structure.	The technique is more complex and time-consuming for indirect veneers. Because it uses specialized materials, it is more costly than the technique used for direct veneers. In most cases the restoration must be removed with a diamond bur in high-speed under abundant water irrigation. Some dentists recommend the use of specialized lasers that interact with the composite cement layer.

COMPOSITE RESIN VENEERS

PORCELAIN VENEERS

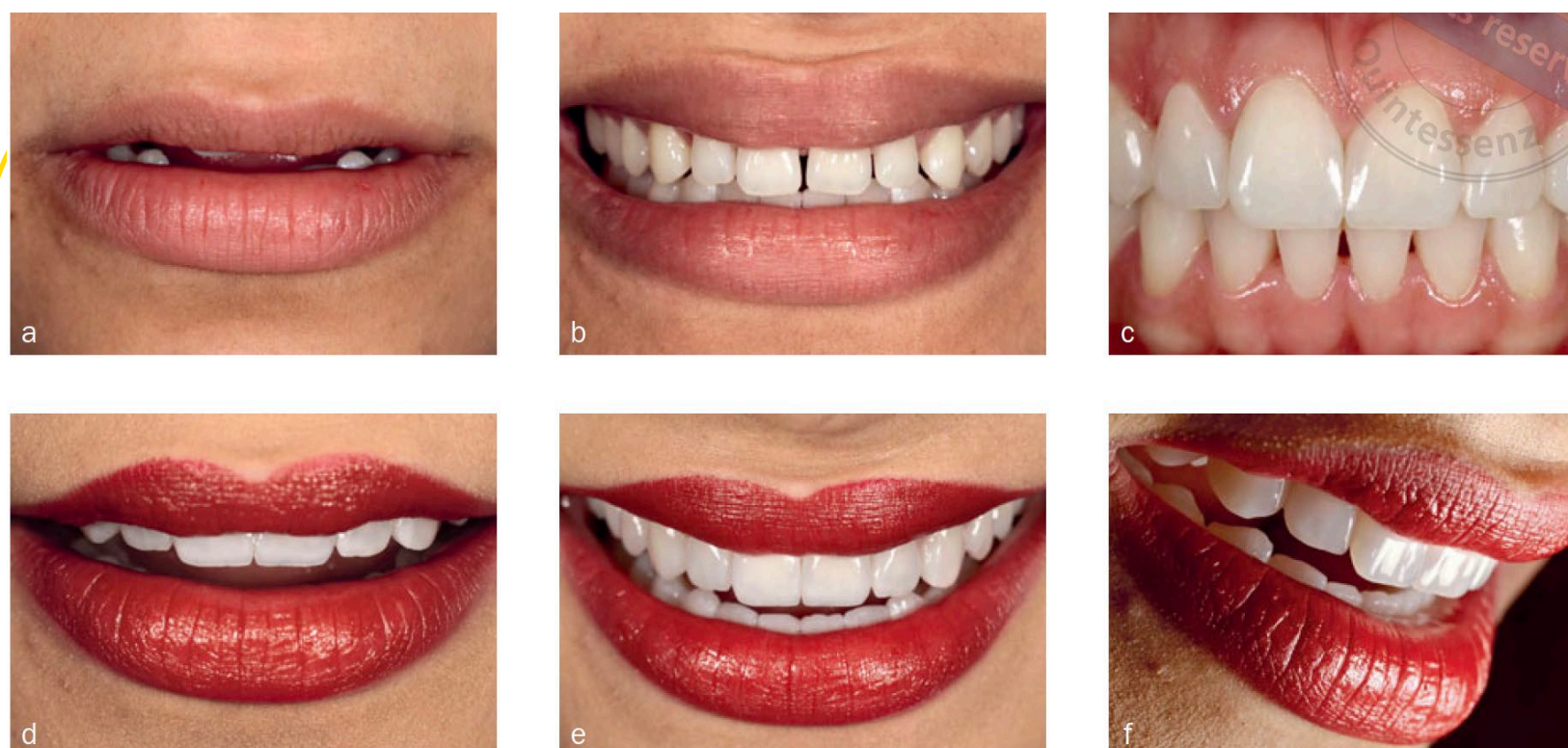


Fig 1. 6-unit maxillary direct composite resin veneers to close diastema and improve esthetics
a. pre-op frontal view at rest position: hidden maxillary incisors lead to compromised esthetics
b. Pre-op frontal view of patient's smile: multiple diastemas
c. Post-op frontal view after 6-unit maxillary direct composite resin veneers without any tooth preparations
d, e, f. Esthetic results at different angles



Fig 2. Direct composite veneers to reshape the maxillary lateral incisors.
a. Pre-op frontal view showing the unsymmetrical appearance of tooth #7 and #10
b. Isolation and positioning of a PVS guide fabricated on the patient's waxed-up stone model.
c. No tooth preparation was performed
d. Final result after polishing



Fig 4. Porcelain veneer on discolored tooth #9 due to trauma.
a. Pre-op view
b1. Preparation of tooth #9 with enamel still visible on the labial surface
c1. Rely X Veneer (3M Oral Care) shade A1 try-in paste
d1. RelyX Veneer (3M Oral Care) shade B0.5 try-in paste
e. After cementation with dental adhesive and RelyX Veneer (3M Oral Care) shade B0.5 light-cured composite cement.



Fig 5. Porcelain veneer with lithium-disilicate glass-CER on a peg lateral.
a. Pre-operative view of #7.
b. Image immediately after finalizing the tooth preparation for a glass-CER veneer.
c. After adhesive cementation and finishing.

COMPOSITE VENEERS MAINTENANCE

PORCELAIN VENEERS WEAR AND REPAIR

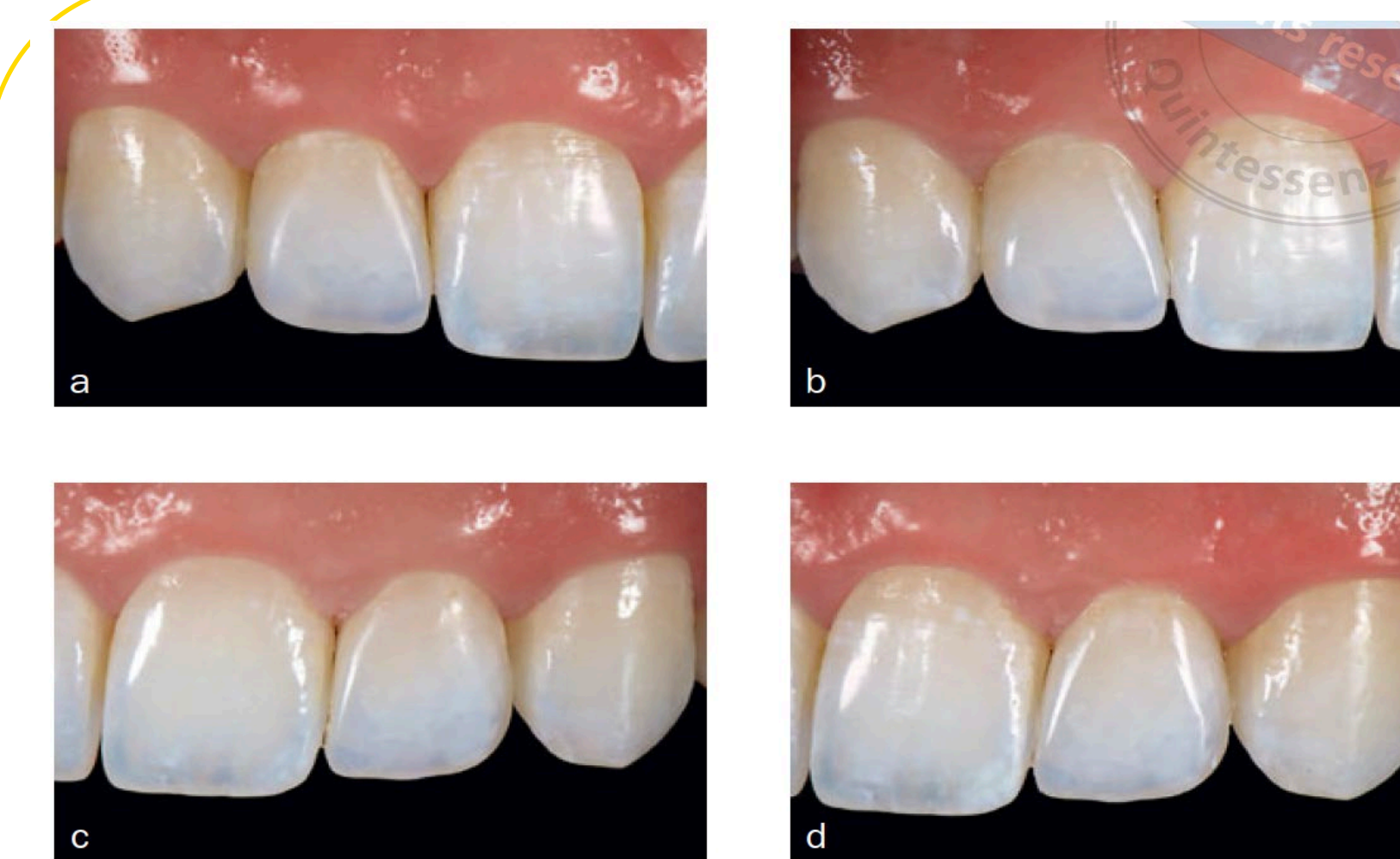


Fig 3. Periodic maintenance of composite resin veneer on lateral incisor #7 and #10.
-Composite restoration of tooth #7 before (a) and after (b) periodic maintenance;
-Composite restoration of tooth #10 before (c) and after (d) periodic maintenance.

Composite veneer need to be repolished periodically to increase the longevity of the restoration, specifically shade and gloss. With the newest composite resins, on average once per year.



Fig 6. Porcelain veneers after several years of clinical use. Marginal discoloration, recurrent caries lesion on tooth #9 and gaps due to deficient bonding around dentin margins. The veneers on teeth #9 and #11 have already been repaired with composite resin.

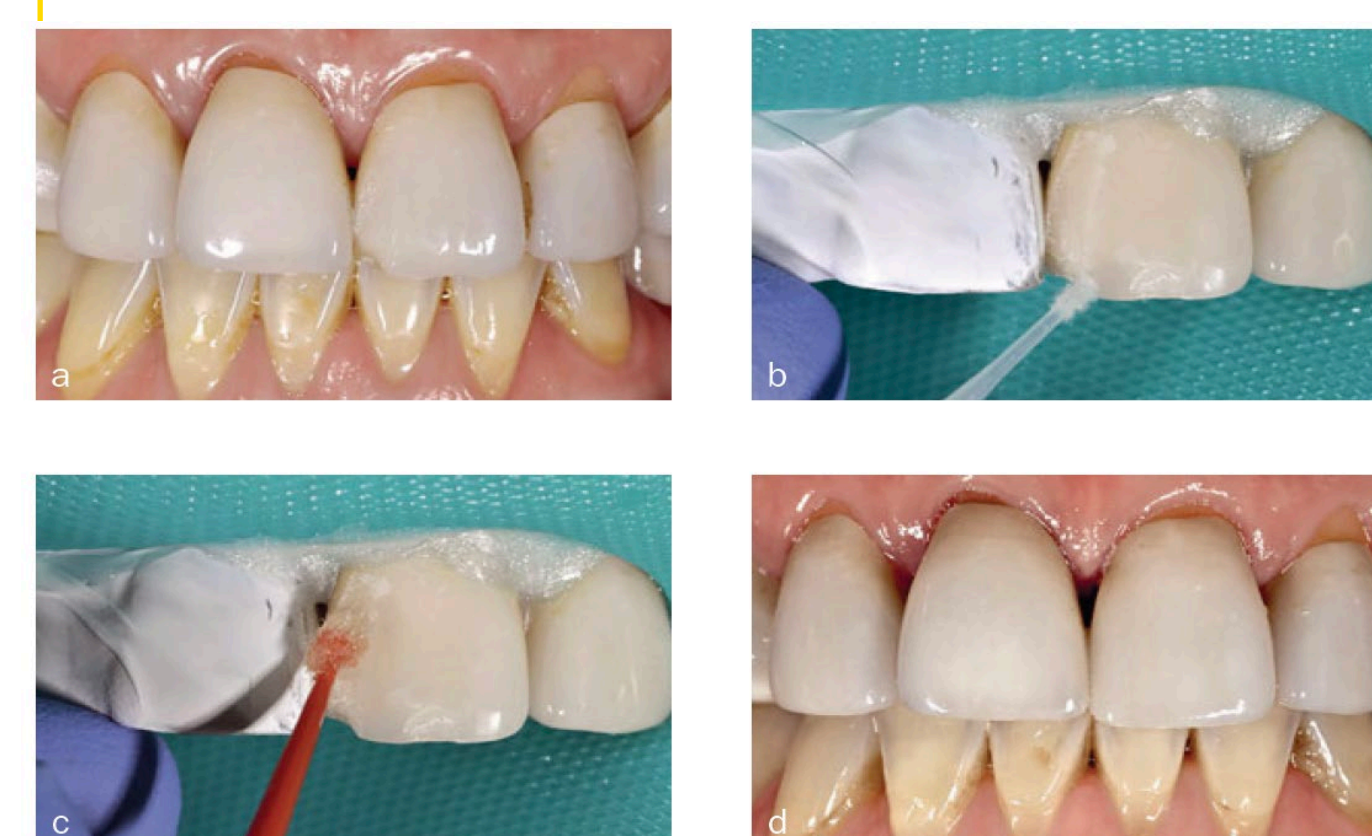


Fig 7. Intraoral repair of a glass-CER veneer.
a. Pre-op. Chipping of tooth #9 incisal edge
b. The chipped surfaces were etched with 9.6% HF for 60 s, rinsed off with water for 2 min, and thoroughly air dried. This image shows the application of a silane coupling agent, which was left for 60 s and air dried
c. dentin adhesive was applied to the chipped surfaces, gently air dried for 10 s and light cured for 40 s. A hybrid composite resin was inserted, light cured and polished
d. Final result

CONCLUSION

REFERENCES

- The goal to restore anterior dentition should be evidence and case based.
- Composite resin veneer is less invasive to dentition, easy to repair and more affordable. However, it is susceptible for discoloration overtime.
- Porcelain veneer has excellent longevity, does not need esthetic maintenance. The drawback is that it's more technically complex, hard to repair and replace.
- Dentists should be familiar with the dental restorative materials and know the limitations of them. This will help decide as to which material to choose.
- Despite the increased marketing hype of porcelain veneers in contemporary dentistry, composite resin veneer remains a remarkable choice to restore anterior esthetics and maintain function at the same time.

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