No-prep veneers versus traditional veneers: Steps and follow up cases

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ABSTRACT
A beautiful smile is a smile that looks good, natural, healthy, conservative and can last. No-prep indirect veneers are a conservative cosmetic treatment that can be made of 0.3 mm thick laminate. They have many advantages over traditional veneers but have limited case selection, is more technique sensitive, and the absence of finish line is claimed to indirectly result in gingival irritation. The aim of this report is to state and explain the differences between traditional veneers and no-prep veneers, the steps followed for no-prep veneers in the reported cases, and to present the treatment and follow up of 4 different no-prep veneers cases in terms of esthetic longevity, periodontal health, patient satisfaction and overall impact of the treatment. The non-prep veneers used in these cases were made from Cerinate feldspathic pressable porcelain which is a leucite-reinforced glass ceramic by DenMat®. During the seven years of follow up with the patients, none had debonding failure. It was found that: meticulous oral hygiene and commitment to follow-up appointments had a great impact on the periodontal health outcomes, cleaning the gingival and interproximal areas is more challenging than traditional veneers, Fracture/chipping of the non-prep veneers is one of the disadvantages encountered specially at the very thin gingival margin, adequate adaptation of the non-prep veneers is crucial for the success of the treatment and that treatment is highly satisfactory with avoidable adverse outcomes. It is suggested that patients with no-prep veneers come to
follow up appointments more frequent than twice a year (3-4 times a year) and to have more meticulous oral hygiene measures of brushing at the gingival areas and flossing due to the higher susceptibility of plaque accumulation due to the absence of finish line.

**Keywords:** Dental veneers, Cosmetic dentistry, Cerinate, Dental esthetics, Dental porcelain, Dental laboratories, Dental general practice, Dental education, Dental materials.

1. **INTRODUCTION**

**Traditional versus no-prep veneers**

A smile has been one of the strongest beauty traits and one of the most attractive features across the world. Health and longevity are being associated with beauty. Therefore, a beautiful smile is a smile that looks good, natural, healthy and can last. Patients are now seeking more conservative cosmetic treatment options. It is our obligation as health care givers to be very clear and explicit on the available alternatives and possible long-term risks of treatment procedures. Esthetic dentistry requires comprehensive integration of multidisciplinary treatment options to get the best and long-lasting results.

Indirect dental ceramic veneers are one of the most common smile-transforming esthetic treatment options that can, within limitations, correct the crowding, close spaces, and modify the shape and shade of teeth (Di Mowafy et al., 2018). They require the removal of natural enamel tooth structure during preparation to allow a space of about 0.5-0.7 mm for the minimum thickness of veneers (Omar et al., 2010; Walls et al., 2002) and to be able to produce a smile that is more aligned in a mild to moderately crooked teeth. Teeth preparation makes this treatment irreversible and requires the use of provisional acrylic or resin veneers to cover the reduced teeth until the final veneers are produced in the laboratory for try-in and bonding. Teeth preparation can lead to discomfort and sensitivity and where thin enamel is present, such as the cervical region, teeth preparation through dentin cannot be avoided (Omar et al., 2010; Ferrari et al., 1992) which might cause pain and thus requires the use of local anesthesia before tooth preparation and veneer cementation. Case selection is a crucial step for veneer treatment and other more conservative treatment options must be discussed in details with the patient when applicable.

No-prep indirect veneers (also called Lumineers) are getting more attention for possessing similar cosmetic qualities of veneers in addition to being a more conservative treatment which made them different than veneers in many other no-prep-dependent aspects (Di Matteo, 2009). No-prep veneers are made from special Cerinate feldspathic pressable porcelain that is very strong it can withstand up to 216 MPa and can be made as thin as 0.3 mm in thickness which is much thinner than the minimum thickness of traditional veneers (Lumineers, 2020). The main difference between traditional and no-prep veneers is that the latter do not require significant removal of natural tooth structure if any, and this is the key difference that leads to many other comparisons (Figure 1).

No-prep veneers have the advantage of the elimination of post-operative sensitivity and pulpal irritation that might happen as a consequence of tooth reduction in traditional veneers (Zarone et al., 2018). As the procedure is painless, it does not require the use of local anesthesia. It is a fast technique as it does not require tissue management during impression taking and requires two appointments only; one for record taking and then for bonding. There is no need for provisional restoration between appointments (Zarone et al., 2018). Also bonding to retained natural enamel will result in stronger long-term bonding and marginal integrity (Zarone et al., 2018; D’Arcangelo et al., 2018; Fondriet and Roberts, 2010). No-prep veneers have the advantage of being a reversible treatment as they can be removed if the patient decides not to have them anymore (Zarone et al., 2018). As there is no removal of tooth enamel during teeth preparation, no room for the no-prep veneers is created and that requires the use of ultrathin dental ceramic laminates described as contact lens thin (What is a Lumineer, 2020) of 0.3-0.5 mm thickness (Lumineers, 2020; Strassler, 2007; Malcmacher, 2005). These ultra thin laminates give a more natural appearance mimicking the translucency of natural enamel.

No-prep veneers are indicated as an aesthetic procedure that can be used, within limitation, to restructure the shape and color as well as to correct chipped or cracked teeth and as an alternative to orthodontic treatment for the alignment of slightly mal-aligned teeth and closing the gaps between spaced teeth (Zarone et al., 2018; Malcmacher, 2003; Miro et al., 2015). They are contraindicated for patients seeking remarkable whitening of severely discolored dentition, patients with moderate or severe crowding or protruded teeth that requires teeth reduction to avoid unaesthetic bulky appearance (Javaheri, 2017; Touati et al., 1999; Black, 1982), patients with bruxism, teeth with inadequate enamel surface to bind to (Cho et al., 1998), and severely destructed teeth that requires full coverage. A list of comparison between conventional and no-prep veneers is presented in (Table 1).

The aim of this case report is to state and explain the differences between traditional veneers and no-prep veneers, to present the treatment steps carried out for four no-prep veneers cases and their follow up in terms of esthetic longevity, periodontal health, patient satisfaction and overall impact of the treatment.
Figure 1 No-prep effect tree in Lumineers. Blue are considered advantages and red are considered disadvantages.

Table 1 Comparison between no-prep and conventional veneers.

<table>
<thead>
<tr>
<th>Traditional Veneers</th>
<th>No-prep veneers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Require sufficient tooth preparation/reduction.</td>
<td>Minimal to no tooth preparation/reduction required.</td>
</tr>
<tr>
<td>Finish line is available.</td>
<td>No finish line available.</td>
</tr>
<tr>
<td>Presence of finish line makes seating, bonding and curing of the veneers easier and can be done one by one.</td>
<td>No-prep veneers have to be placed all together to seat each other during bonding and before light curing.</td>
</tr>
<tr>
<td>Can be used in mild to moderate crowding of teeth.</td>
<td>Can only be used in perfectly aligned teeth or teeth with mild crowding.</td>
</tr>
<tr>
<td>Requires anesthesia before tooth preparation and bonding</td>
<td>No anesthesia is required.</td>
</tr>
<tr>
<td>None reversible procedure.</td>
<td>Reversible procedure.</td>
</tr>
<tr>
<td>Porcelain thickness 0.5-0.7 mm.</td>
<td>Porcelain (Cerinate) thickness can be as thin as 0.3 mm.</td>
</tr>
<tr>
<td>Does not cause protrusion of teeth.</td>
<td>Teeth protrusion cannot be avoided although it is minimal and case dependent.</td>
</tr>
<tr>
<td>--------------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Requires temporization between visits.</td>
<td>Does not require temporization between visits.</td>
</tr>
<tr>
<td>Longer chair time.</td>
<td>Less chair time.</td>
</tr>
<tr>
<td>After bonding the veneers, no step at the finish line created.</td>
<td>No finish line, a small step is present and has to be reduced during finishing.</td>
</tr>
<tr>
<td>Veneer margin can be placed subgingival.</td>
<td>Laminate margin has to be placed at the gingival margin.</td>
</tr>
<tr>
<td>Binds to cut enamel and might bind to dentin</td>
<td>Binds to natural enamel only (stronger bond).</td>
</tr>
<tr>
<td>If a crowned tooth exists, remaking the crown to match the rest of the veneers is mandatory.</td>
<td>Can cover existing porcelain crown without the need to remove and change the crown.</td>
</tr>
</tbody>
</table>

2. MATERIALS AND METHODS

No-prep veneers step-by-step

The no-prep veneers used in these cases were made from Cerinate feldspathic pressable porcelain, a leucite-reinforced glass ceramic product by DenMat®. Cerinate is highly strong and translucent leucite-reinforced feldspathic pressable porcelain that can be produced into an exceptionally thin and strong veneer of 0.3 mm (Lumineers, 2020). Details for no-prep veneers assessment, records-taking, and placement are explained in this section. Other patient-specific interventions are mentioned at each individual case report.

Assessment and Consultation

Medical history was reviewed to ensure the patient is not suffering from any systemic health condition that may affect periodontal health and/or treatment. Dental history was reviewed including the patient’s chief complaint, dental care routine, and past dental treatments. Clinical examination was meticulously carried out to make sure the case is suitable and not contraindicated for the treatment. Clinical examination included extraoral (temporomandibular joints TMJ and lymph nodes), and intraoral examinations:

**Soft tissue**: mucogingival relationships, sufficiency of the attached keratinized tissue, presence of high frenal attachment, assessment of the color, shape, and texture of the gingiva, signs of gingival inflammation or any exudates, plaque index using disclosing solution and amount of calculus, recording the probing depth, using the periodontal probe to assess the position of the gingival margin to detect any recession or hyperplasia and to assess bleeding on probing.

**Hard tissue**: teeth condition and presence of any attrition, abrasion, erosions, cracks or mobility, presence of any prosthesis and or restorations and their condition, caries, occlusal relationships, occlusal trauma, fremitus, and pulpal conditions. Nabers probe was used to detect the presence of any furcation involvement.

Radiographic examination was done for the diagnosis and evaluation of caries (interproximal caries and extension), pulpal and periradicular conditions, assessment of alveolar bone health, trabeculation pattern and the presence of any resorption, funneling, abscess, and or trauma. Patients’ radiographs were not presented in this paper as they were not retrievable in the digital system of the clinic which was closed and the practice moved to another clinic. Diagnostic casts were also made for evaluation of occlusion, teeth position, relations, and conditions.

Patient seeking cosmetic dental treatment were informed of all possible treatment options. Even those coming to the clinic seeking literally, “No-prep veneers” treatment. A good discussion of the limitations, advantages and disadvantages has taken place. If the patient decided to have no-prep veneers and the case is indicated, a good discussion with the patient to understand his/her background and expectations was carried out. Patients were asked to bring a photo of a smile they would like to have or they find beautiful for the next appointment. They were asked to explain why they find the teeth in the photos beautiful and starting from there to discuss the shape, alignment, shade and size of teeth and whether this can be applied or suitable to his/her case. Notes were taken and discussion of the limitations, advantages, disadvantages and other treatment options was made with the patient. The patient can also choose, for an extra cost, to have a mockup of the new teeth to be made in wax if they would like to have an idea of the shape and alignment and make any possible modifications before the actual no-prep veneers are fabricated. Patients get to choose the shade they would like to have. Also, patients were informed that the final shade of the bonded no-prep veneers will
be the accumulation of the shade of the pre-existing teeth, the bonding resin and the thin laminate. More discussion on the shade is carried out during the try-in step to make sure the patient is satisfied with the final shade.

**Teeth preparation**

Teeth must be caries free and all existing restorations must be intact. Minor adjustment to the teeth can be made in cases such as:

- If we are going to bond the no-prep veneer to ceramic surface e.g. crowned tooth, then we have to do minor reduction on the ceramic surface to remove the glaze layer.
- Minor reduction of the incisal and/or occlusal surfaces (if you want to wrap the incisal edge or level the teeth)
- Minor enameloplasty of the teeth edges to reduce malalignment or sharp edges.
- Some reduction of the labial surface within enamel if necessary. Some clinicians prefer to do it anyway to open enamel rods, remove the enamel pellicle in order to enhance bonding. This was not done in any of the cases presented in this paper and throughout the follow up, no single debonding has occurred.

The patient must be informed and has to consent to the above adjustments beforehand.

**Records-taking before sending the case to the laboratory**

- Extraoral photographs (Full face frontal and lateral and close-up smiling and none smiling).
- Intraoral (frontal, occlusal upper and lower arches, and lateral right and left sides)
- Existing shade(s), patients were included in this step to agree on the selected current shade of their teeth as this will help in the future when they want to compare it to the shade of their new smile.
- Prospective shade for the Luminerees, and during this step a good discussion with the patient to select the shade and explain that the selected shade will not look as light as that of the shade guide as the final shade will be the product of accumulation of shades from the existing teeth, resin cement and the laminate and that the try-in step will give more indication and resemblance to the final shade with different try-in pastes until we get the most satisfactory and desired result.
- Two Upper and two lower polyvinyl siloxanes (Aquasil, DentSply Sirona, Charlotte, North Carolina, USA) precise impressions was taken using the low-viscosity and monophase in wash out impression technique.
- Filled and completed no-prep veneers prescription form according to the specific case requirement and the current and selected shades. The filled forms were not presented here for patients’ confidentiality.
- All of the above records were sent to the Zabadne Sterling lab (Dubai, UAE) together with the photo of the smile the patient brought with him/her to guide the lab during the fabrication of the no-prep veneers. The lab requires no-prep veneers-certified Dentist to accept the case (License number included in all lab forms).
- When the no-prep veneers arrived back from the lab, they were checked to make sure they are placed in order and they are free of cracks or voids. Careful handling of the very thin and delicate laminates can be carried out using the veneer placement tool (LumiGrip®, DenMat, Lompoc, California, USA).

**Try-in step**

This step should be done before etching the fitting surface of the laminates and teeth. The try-in paste bonding kit (Ultra-bond® Plus Try-in Paste) (Table 2) was used. During this step, the fitting and the final shade of the no-prep veneers with the try-in paste must be checked. A bow retractor was used to avoid misplacement of the no-prep veneers by the patients’ lips and cheeks as they move. A piece of gauze was placed inside the mouth so that if any laminate fell into the mouth, the gauze will act as a net to hold it and prevent aspiration or swallowing of the laminate. If the fit is adequate and the shape and shape are approved by the patient, the laminates will be carefully removed and the try-in paste wiped using cue tips or dry cotton pellets. Some Tenure S® (Table 2) supplied in the LUMINEERS system can also be used to wipe the try-in paste efficiently and any residue of Ultra-bond Plus Try-in Paste will be polymerized by Tenure S.

**Table 2** Materials description as disclosed by the manufacturer:

<table>
<thead>
<tr>
<th>Material Name</th>
<th>Composition</th>
<th>Weight %</th>
<th>Manufacturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ultra-bond®</td>
<td>ethoxylated bis-phenol-A dimethacrylate</td>
<td>45-55</td>
<td>DenMat, Lompoc, California, USA</td>
</tr>
<tr>
<td>Plus Try-in</td>
<td>triethylene glycol dimethacrylate</td>
<td>10-15</td>
<td></td>
</tr>
<tr>
<td>Paste</td>
<td>silica</td>
<td>10-15</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ethyl 4-dimethylaminobenzoate</td>
<td>0.001-0.005</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2-(2' hydroxy-5'-octylyphenyl) benzotriazole</td>
<td>0-0.5</td>
<td></td>
</tr>
</tbody>
</table>
### No-prep veneers’ fitting-surface preparation

The fitting surface of the laminates was etched using 2.5% hydrofluoric acid HFA (PorceLock®, DenMat, Lompoc, California, USA) for three minutes. Then it was washed and the Porcelain Conditioner (Table 2) was applied for 30 seconds and then rinsed well. A layer of Primer (Cerinate Prime) (Table 2) was then brushed on the fitting surface. After this step, the laminate can be stored until the bonding appointment time. Just before bonding, Tenure A and B (Table 2) were mixed together and applied as a one coat on the fitting surface. Tenure S was then applied in one layer.

### Patients’ teeth preparation

All intraoral preparations and bonding were made using magnification lenses of 2.5 X. Teeth were etched using 37% phosphoric acid (Etching gel, Cosmodent Inc., Chicago, IL, USA) for 15 seconds. If we are bonding to a porcelain crown, the crown bonding surface was etched with 2.5% HFA (PorceLock®) for three minutes. Very careful care was taken when using HFA inside the patient mouth and the gingiva at the crown to be etched was covered using light-cured resin barrier (OpalDam™, Ultradent Products Inc., South Jordan, UT, USA). Then the etchant was rinsed well and teeth were dried using stream of air. Tenure A and B were then mixed and applied in three to five coats until the etched surfaces become moist and shiny. A thin layer of Tenure S was then applied as the last layer.

<table>
<thead>
<tr>
<th>Composition</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>butylated hydroxytoluene</td>
<td>0-0.01</td>
</tr>
<tr>
<td>Tenure S&lt;sup&gt;®&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>Porcelain conditioner</td>
<td></td>
</tr>
<tr>
<td>Citric acid</td>
<td>30-40</td>
</tr>
<tr>
<td>Cerinate Prime</td>
<td></td>
</tr>
<tr>
<td>Organosilane ester</td>
<td>20-30</td>
</tr>
<tr>
<td>Ethoxylated bis-phenol-A dimethacrylate</td>
<td>5-10</td>
</tr>
<tr>
<td>n-butanol</td>
<td>60-70</td>
</tr>
<tr>
<td>Triethylene glycol dimethacrylate</td>
<td>1-5</td>
</tr>
<tr>
<td>Ethyl 4-dimethylaminobenzoate</td>
<td>0.1-1</td>
</tr>
<tr>
<td>2-(2’ hydroxy-5’-octylphenyl) benzotriazole</td>
<td>0.1-1</td>
</tr>
<tr>
<td>Di hydroxyethyl p toluidine</td>
<td>0.01-0.1</td>
</tr>
<tr>
<td>Camphorquinone</td>
<td>0.01-0.1</td>
</tr>
<tr>
<td>Gamma-glycidoxypropyltrimethoxysilane</td>
<td>1-5</td>
</tr>
<tr>
<td>Hamma-methacryloxypropyltrimethoxysilane</td>
<td>1-5</td>
</tr>
<tr>
<td>Tenure A</td>
<td></td>
</tr>
<tr>
<td>acetone</td>
<td>85-95</td>
</tr>
<tr>
<td>NTG-GMA salt</td>
<td>3-5</td>
</tr>
<tr>
<td>2 propanone</td>
<td></td>
</tr>
<tr>
<td>Tenure B</td>
<td></td>
</tr>
<tr>
<td>acetone</td>
<td>80-90</td>
</tr>
<tr>
<td>Bis[2-[2-methy-1-oxoally]oxyethyl] dihydrogen benzene-1,2,4,5-tetracarboxylate</td>
<td>10-15</td>
</tr>
<tr>
<td>UltraBond Plus resin cement</td>
<td></td>
</tr>
<tr>
<td>urethane dimethacrylate</td>
<td>25-35</td>
</tr>
<tr>
<td>silica</td>
<td>25-35</td>
</tr>
<tr>
<td>triethylene glycol dimethacrylate</td>
<td>5-10</td>
</tr>
<tr>
<td>2-(2’ hydroxy-5’-octylphenyl) benzotriazole</td>
<td>1-5</td>
</tr>
<tr>
<td>di hydroxyethyl p toluidine</td>
<td>0.1-0.5</td>
</tr>
<tr>
<td>benzyol peroxide</td>
<td>0.1-0.5</td>
</tr>
<tr>
<td>ethyl 4-dimethylaminobenzoate</td>
<td>0.01-0.2</td>
</tr>
<tr>
<td>camphorquinone</td>
<td>0.01-0.2</td>
</tr>
<tr>
<td>butylated hydroxytoluene</td>
<td>0.01-0.2</td>
</tr>
</tbody>
</table>
Bonding the No-prep veneers

The resin cement (Ultra-Bond Plus) (Table 2) was used with the shade corresponding to the shade of the accepted try-in paste during the try-in step. This is a light-cured resin cement material as dual cure resin cements should not be used to avoid the color change over time caused by the degradation of residual tertiary amines and the darkening of the cement due to the oxidation of the unreacted carbon double bonds (Pissaia et al., 2019; Turgut and Bagis, 2011; Kilinc et al., 2011; Almeida et al., 2015). A small amount of resin cement was applied to the fitting surface of the laminate and the teeth were seated one by one starting from the central incisors and moving distally without curing. Care was taken not to push down on the laminates to avoid creating internal flexural stresses that might lead to microfractures and compromise the longevity of the veneer. Excess cement was removed using soft brush and Tenure S (DenMat, Lompoc, California, USA). Final check of the fitness and seating of the teeth was made before tack curing each tooth (for one second) using a plasma arc (PAC) curing light (Sapphire® Plus, DenMat, Lompoc, California, USA), with wavelength Range: 400-500 nm and light intensity (curing mode): 1975 - 2320 mW/cm², (Sapphire, 2020) to ensure the No-prep veneers don’t move around during the final curing and also allows us to remove gross excess cement before complete curing of the resin cement. Final curing was done from the facial and lingual sides for each tooth for five seconds using PAC curing light (Sapphire® Plus), if using a different light-cure, make sure to check the sufficient curing time required by the curing light manufacturer.

Occlusion checkup

Patient’s occlusion was checked after bonding of the no-prep veneers in centric relation (maximum intercuspal position MIP) using the blue articulating paper while asking the patient to bite together taping their teeth and then adjust the restorations as needed. Also, occlusion was checked in eccentric relation (excursive movements) using red articulating paper and adjusting as needed.

Finishing and Polishing

The use of 4X magnifying glasses is crucial during this step. Directly after bonding, removal of the gross resin cement at the gingival and lingual areas was done using Schure 349 scaler (DenMat, Lompoc, California, USA) (Figure 2) (Doctor’s Guide, 2012) gently as the bonding matures in 24 hours. A second visit was scheduled to complete the removal of excessive cement from the embrasures and also to remove any porcelain ledges. The following burs (Figure 3) (Doctor’s Guide, 2012) were used for complete cleaning and finishing and to remove any porcelain ledge at the margins:
- Extra-fine smoothing diamond,
- 12 fluted carbide bur,
- Football diamond, (Figure 3 c) was used to remove excess cement on the palatal surface of anterior teeth.
- Mosquito interproximal diamond, (Figure 3 d)
- CeriSaw (DenMat, Lompoc, California, USA) (Figure 4a) (Doctor’s Guide, 2012) was used to breakup and resin between the teeth and separate them by first inserting it between the teeth in a sawing motion then in a rocking motion. Fine grit CeriSander (DenMat, Lompoc, California, USA) (Figure 4b) (Doctor’s Guide, 2012) was used to smoothen the interproximal surfaces. Polishing was done at the end using polishing cup and Porcelain Laminate Polishing Paste (DenMat, Lompoc, California, USA) with a generous amount of paste and with care not to overdo this step to avoid removing the glaze layer.

Figure 2 Schure 349 scaler
Figure 3 Lumineers Finishing Burs: a: Extra-fine smoothing diamond, b: 12 Fluted carbide bur, c: Football diamond, d: Mosquito interproximal diamond.

Figure 4 CeriSaw (a) and CeriSander (b):

3. CASE REPORTS

Case 1

Patient information
Forty-five years old female, none smoker, came to the clinic seeking overall dental treatment and a Hollywood smile turnover. She was persistent to have the whitest smile ever. She lives abroad and comes back once or twice a year to stay for three to four weeks.

Chief Complaint
“I want to have perfect white teeth without cutting or grinding my teeth”.

Clinical findings (Figure 5)
The patient had good oral hygiene and mild plaque induced gingivitis. She had multiple restorations: large occlusal-distal OD restoration on tooth #15 which is discolored, mesial M and distal D discolored resin composite restorations on tooth #12, D discolored resin composite restoration on tooth #23, back-to-back resin composite restorations on teeth #24 and #25, OD resin composite restoration on tooth #34, and OD resin composite restorations on teeth #44 and #45. Multiple PFM crowns on teeth #16, #21, #26, #36, #35, and #46. Gingival margin discrepancy at tooth # 21 which is root canal treated and covered with porcelain fused to metal PFM crown with mismatching shade of the adjacent counterpart.

Diagnostic assessment
Clinical and radiographic examinations were performed. Recurrent caries was present under the M and D restorations of tooth #12. Pocket depth assessment showed less than 3 mm pocket depth all around each tooth. Slight bleeding upon probing at the buccal surfaces of upper molars and lingual surfaces of lower incisors. Crowns were intact with no caries detection.
Therapeutic interventions
For restorative intervention, replacement of resin composites on tooth #12 after caries removal was done. For periodontal intervention, supra and subgingival scaling and polishing with fluoridated paste was done. Oral hygiene instructions were given and follow up appointment was scheduled after 4 weeks. During the follow up appointment, gingival margin leveling at tooth # 21 was done using diode laser (Epic 10™, Biolase Inc., Irvine, CA, USA) with 940 nm wavelength and laser set up for gingivectomy procedure. Making sure there is at least 2 mm of keratinized gingiva and that the attachment at the bottom of the gingival sulcus is at least 3 mm away from the crestal bone to avoid impingement on the biological width during no-prep veneer placement and avoiding exposure of the root surface. Reduction of the incisal edge of the crown at tooth #21 was done to level it with its adjacent counterpart. Patient was called after 1 week for follow up and records taking. She decided to have no-prep veneers on her upper teeth first and to bleach the lower teeth. Bleaching of the lower teeth was performed and the patient’s lower teeth shade moved from A3 to A2. It was explained that it is not possible to match the shade of the lower teeth after bleaching to the whitest shade.
preferred to the upper teeth. She was asked to bring photos of the smile she wishes to have or considering beautiful for discussion to the next appointment.

**Timeline for No-prep veneer placement**

The patient was given the option of having a mockup made for her to check the shape and size of the prospective no-prep veneers for an extra charge but she preferred to start without it. Records were taken as described before and sent to the laboratory together with the no-prep veneers prescription form filled according to the examination of and discussion with the patient. The case was sent for the fabrication of no-prep veneers on the upper teeth from tooth #15 to tooth #25 (second premolar to second premolar). The existing shade of the patient’s teeth was A3 at the lateral incisors and A2 for the rest of the upper anterior teeth and the agreed upon shade for the no-prep veneers was BL1 according to shade guide (Ivoclar Vivadent Bleach, Schaan, Liechtenstein). The case was received in two weeks and the upper no-prep veneers were bonded using LUMINEERS bonding kit (Ultra-Bond Plus, DenMat, Lompoc, California, USA) with the resin cement shade chosen and agreed on during try-in (Figure 6). Patient was given post Lumineers placement instructions verbally and in an understandable written form (Arabic and English language). The patient was informed that she will have to come for regular follow-up visits every six months for checkup and scaling and that if she is abroad she has to visit a certified dentist there to do so.

**Figure 6** Case 1: After placement of the upper Lumineers only, a: Close up smile, b: Frontal, c: Occlusal upper, d: Occlusal lower, e: Left side, f: Right side (Rt = right, Lt= Left).
Follow-up and outcomes
Patient had to travel urgently before the follow up appointment and she completed the clean-up and removal of excessive resin at a dental clinic abroad. Phone call follow up reminder was made to ensure the patient had gone through all necessary steps. After six months from placement of the upper no-prep veneers, the patient came back to have no-prep veneers for her lower teeth. Same steps were performed and lower no-prep veneers were bonded (Figure 7). Patient was coming every year for her checkup and scaling and was doing so with her dentist abroad so she doesn’t miss her twice-a-year checkup and scaling appointments. No complaints and no fractures or debonding for up to seven years of follow up (Figure 8).

Figure 7 Case 1: After placement of the lower Lumineers too, a: Close up smile, b: Frontal, c: Occlusal upper, d: Occlusal lower, e: Left side, f: Right side (Rt = right, Lt= Left).
Figure 8 Case 1: During seven years follow-up, a: Close up smile, b: Frontal, c: Occlusal upper, d: Occlusal lower, e: Left side, f: Right side (Rt = right, Lt= Left).

Case 2
Patient information
A 39 years old female, Smoker of 1 pack of cigarettes a day and shisha. She is eager to have a white perfect smile ASAP without teeth preparation.

Chief Complaint
"I am a smoker and I’m tired of having to bleach my teeth all the time and I’m not satisfied even after bleaching, I want an everlasting white smile without cutting my teeth".

Clinical findings (Figure 9)
The patient had fair oral hygiene and mild plaque induced gingivitis. Her teeth had tobacco stains and multiple resin composite restorations: teeth # 16, 11, 22, 36, 34, 45, 46 and 47, and multiple missing teeth # 17, 15, 24, 25 and 44. She has a three-unit bridge on the upper left side with teeth # 23 and 26 as abutments. The bridge was constructed with the canine shaped as a first premolar
and the space was replaced by second premolar pontic. Tooth # 15 was replaced by an implant that was not restored for few years and had bone resorption; the patient doesn’t remember exactly when it was implanted. Tooth # 46 has failed RCT and recurrent caries and was diagnosed as hopeless and scheduled for extraction.

**Figure 9** Case 2: Before Lumineers placement, a: Close up smile, b: Frontal, c: Occlusal upper, d: Occlusal lower, e: Left side, f: Right side (Rt = right, Lt= Left).

**Diagnostic assessment**
Clinical and radiographic examinations were performed. No recurrent caries detected except for tooth # 46. Periodontal pocket depth measurement was less than 3 mm around all teeth. Slight bleeding upon probing at the buccal surfaces of upper molars and lingual surfaces of lower incisors. Crowns were intact with no caries detection.

**Therapeutic interventions**
For surgical intervention, the patient had tooth # 46 extracted. For the periodontal intervention, supra and subgingival scaling and polishing using fluoridated paste were done. Oral hygiene instructions were given and follow up appointment was scheduled after 4 weeks. Patient was given the prosthetic options for replacing her missing teeth by either implants or 3 unit’s bridges. The pros and cons of each treatment option were explained in details and she preferred to have implants. Periodontal consultation was taken regarding the replacement options for missing tooth # 15 if it is possible to have new bone graft and implant or not. If the implant...
was not an option, she would need to have 3-units bridge with tooth # 14 as an abutment prepared for crown instead of receiving a no-prep veneer. Also, periodontal consultation was made regarding the possibility to replace tooth # 46 by an implant or, if not, a 3-units bridge. The periodontist consultation confirmed that both teeth # 15 and # 46 can receive a bone graft and an implant instead of 3-units bridges.

Figure 10  Case 2: Wax up model of the prospective Lumineers, a: Frontal upper and lower view in occlusion, b: Frontal upper view, c: Frontal lower view.

Timeline for No-prep veneer placement
The patient was given the option to have a mockup made to check the shape and size of the prospective Lumineers. To save time, the patient preferred to see the photos of the wax up of the no-prep veneers instead of having to attend an extra appointment for the mock up try-in on her teeth (Figure 10). She decided to have no-prep veneers on both her upper and lower teeth. Records were taken as described in previous section and sent to the laboratory with the no-prep veneers prescription form filled according to the examination of and discussion with the patient. It was planned to have no-prep veneers on the upper teeth from tooth #14 to tooth #22, on the abutment on tooth # 23, and on the pontic of the bridge, and on the lower teeth from tooth # 35 to tooth # 44. The
existing patient’s teeth shade was A3 and the agreed upon shade for the no-prep veneers was BL1 according to shade guide (Ivoclar Vivadent Bleach, Schaan, Liechtenstein). The case was received in four weeks and the upper no-prep veneers were bonded using LUMINEERS bonding kit (Ultra-Bond Plus, DenMat, Lompoc, California, USA) with the resin cement shade chosen and agreed on during try-in (Figure 11). Patient was given post Lumineers placement instructions verbally and in an understandable written form (Arabic and English language). The patient was informed that she will have to come for regular follow-up visits every six months for checkup and scaling.

![Figure 11 Case 2: After placement of the upper and lower Lumineers and before final finishing, a: Close up smile, b: Frontal, c: Occlusal upper, d: Occlusal lower, e: Left side, f: Right side (Rt = right, Lt = Left).](image)

**Follow-up and outcomes**

Patient was coming every six months for her checkup during the first two years then she did not attend two of her follow-up appointment and was seen after a year and a half reporting that she has been through some health issues and had to do operations and was not able to visit the dentist. Her oral hygiene status was fair and scaling and polishing was done with no complications noticed. No complaints and no fractures or debonding for up to six years of follow up. Patient missed her photography appointments which resulted in the unavailability of the six years follow up photos.
Case 3
Patient information
This case is a 28 years old female, none smoker and works at a hospital. She came to the clinic wanting to align her teeth non-orthodontically. She is not into a very white smile and would like natural light shade teeth.

Chief Complaint
“I want my teeth to be more aligned specially my lower canines, I don’t like how my lower canines outstand. I don’t want to do orthodontic treatment and I don’t want to cut my teeth. I want a natural look and I don’t like to have super-white teeth as they look fake”.

Clinical findings (Figure 12)
The patient has good oral hygiene. Multiple composite restorations on teeth # 15, 14, 24, 25, 26, 37, 36, 35, and 45. Multiple amalgam restorations on teeth # 17, 26, 27, 46 and 47. Tooth # 15 and 35 had sufficient root canal treatment.

Figure 12 Case 3: Before Lumineers placement, a: Close up smile, b: Frontal, c: Occlusal upper, d: Occlusal lower, e: Left side, f: Right side (Rt = right, Lt= Left).
Diagnostic assessment
Clinical and radiographic examinations were performed. No caries detected. No bleeding upon probing. Pocket depth < 3mm around all teeth. Tooth # 35 has a large resin composite filling deficient distally and tooth # 36 has deficient mesial resin composite filling which create a gap between #35 and 36 lead to mesial tipping of tooth # 36.

Therapeutic interventions
Teeth # 15 and 35 are root canal treated with large resin composite restorations and need crown coverage instead of just facial laminate to increase the longevity and integrity of the teeth so they were prepared to receive full ceramic crowns. Teeth has to be minimally reduced on the facial side especially the upper teeth (tooth #14 to tooth #25) and the lower teeth (tooth #34 to tooth #45) to reduce crowding and prominence of the canines for better alignment and less bulking of the no-prep veneers (Figure 13).

Figure 13 Case 3: Upper (from tooth #14 to tooth #25) and lower (from tooth #34 to tooth #45) teeth after facial enameloplasty to reduce crowding and prominence of the canines and after preparation of teeth #15 and 35 to receive full ceramic crown coverage. a: Frontal, b: Occlusal upper, c: Occlusal lower, d: Left side, e: Right side (Rt = right, Lt= Left).
Timeline for No-prep veneer placement

The patient was given the option to have a mockup to check the shape and size of the prospective Lumineers but she preferred to start without it. She decided to have no-prep veneers on both her upper and lower teeth. Records were taken as previously described and sent to the laboratory with the no-prep veneers prescription form filled according to the examination of and discussion with the patient. It was planned to have the no-prep veneers on the upper teeth from tooth #14 to tooth #25 and on the lower teeth from tooth #34 to tooth #45 and full ceramic crowns on teeth #15 and 35. The existing shade of the patient’s teeth was A3 and the agreed upon shade for the no-prep veneers was BL2 according to shade guide (Ivoclar Vivadent Bleach, Schaan, Liechtenstein). The case was received in four weeks and the upper and lower no-prep veneers were bonded using Lumineers bonding kit (Ultra-Bond Plus, DenMat, Lompoc, California, USA) using the resin cement shade chosen and agreed on during try-in step and the crowns were bonded using RelyX unicem (Figure 14). Patient was given post Lumineers placement instructions verbally and in an understandable written form (Arabic and English language). The patient was informed that she will have to come for regular follow-up visits every six months for checkup and scaling.

Figure 14 Case 3: After placement of the upper and lower Lumineers and before final finishing, a: Close up smile, b: Frontal, c: Left side, d: Right side, e: Upper occlusal (Rt = right, Lt= Left).

Follow-up and outcomes

Patient moved to another country to continue her education after 1 year from having her no-prep veneers. She started complaining of bleeding gingiva and pain after four years. She was advised to visit a dentist where she is to do checkup and cleaning. She
reported that she feels better and the bleeding stopped few days after scaling. After 5 years she came back for follow up and cleaning, disto-gingival margin of the no-prep veneer at tooth #12 was chipped. The patient preferred not to change the no-prep veneer on this tooth as it does not show during talking or smiling so the chipped margin was smoothened. On her 6th year follow up, (Figure 15) tooth #14 had carious lesion at the occlusal tooth-no-prep veneer interface, upon caries excavation the lesion was superficial and it was restored without the need to replace the no-prep veneer. Tooth #27 had an incipient carious lesion on the mesiopalatal surface located gingivally and a note was recorded and the patient was notified about the need to follow up this lesion. Tooth #35 had a gingival recession of 1.5 mm with no sensitivity. Patient was advised to take more care of her oral hygiene, to attend her follow up and scaling appointments every six months and to use a soft bristle tooth brush and to brush gently and floss every day.

Figure 15 Case 3: During six years follow-up, a: Frontal, b: Occlusal upper, c: Occlusal lower, d: Left side, e: Right side (Rt = right, Lt= Left).

Case 4
Patient information
This patient is 22 years old female, none smoker and a student at the university. She just finished her orthodontic treatment and would like to have a smile turnover. Patient is exacting and demanding.
Chief Complaint
“I want to change the shape, color, and shininess of my teeth but without cutting them. I want to have a Hollywood smile on my upper teeth only”.

Clinical findings (Figure 16)
The patient has a good oral hygiene. She had recently completed her orthodontic treatment and is wearing a fixed lower retainer and a removable upper retainer. She has multiple resin composite restorations on teeth #17, 16, 26 and 27. Tooth # 26 was RCTed and had a very large resin composite filling. Patient was advised to see an endodontist for consultation regarding the adequacy of the root canal treatment and then to cover the tooth with a full crown for a better prognosis and longevity but she preferred not to have crown coverage on tooth #26.

Figure 16 Case 4: Before Lumineers placement, a: Close up smile, b: Frontal, c: Occlusal upper, d: Occlusal lower, e: Left side, f: Right side (Rt = right, Lt= Left).

Diagnostic assessment
Clinical and radiographic examinations were performed. No caries detected. No bleeding upon probing. Pocket depth < 3mm.
Figure 17 Case 4: Mock up for the upper teeth presenting the proposed shape and alignment of the Lumineers.

Figure 18 Case 4: After placement of the upper Lumineers and before final finishing, a: Close up smile, b: Frontal, c: Left side, d: Right side, e: Upper occlusal (Rt = right, Lt = Left).
Therapeutic interventions
The patient desired to have no-prep veneers on her upper teeth only and to bleach the lower teeth. She was asked to bring photos of the smile she wishes to have or considering beautiful for discussion the next appointment. Bleaching of the lower teeth was performed before selecting the shade for the upper teeth. Patient was informed that bleaching can result in only 1 to 2 shades lighter than the original teeth shade. Bleaching of the lower teeth was performed and the patient’s lower teeth shade moved from A2 to A1. The patient chose to have the very light shade of BL2 for the upper teeth Lumineers. It was explained to the patient that the selected shade might not match the shade of the lower teeth after bleaching and she accepted that as her lower teeth don’t show during smiling or speaking.

Timeline for No-prep veneer placement
The patient was given the option of having a mockup to check the shape and size of the prospective Lumineers and she agreed to have it. A mockup of the proposed no-prep veneers was fabricated using a putty impression of her upper teeth waxed up model from tooth #14 to tooth #24 as an index and Bis-acrylic composite temporization material (Protemp™ Plus Temporization Material, 3M™, St. Paul, MN, USA). The patient was satisfied with the shape and alignment of the proposed no-prep veneers (Figure 17). Records were taken as previously described and sent to the laboratory with the no-prep veneers prescription form filled according to the examination of and the discussion with the patient. It was decided to have the no-prep veneers on the upper teeth only from tooth #14 to tooth #24 as the second premolars do not appear during smiling or talking. The existing shade of her teeth was B1 and the chosen shade for the no-prep veneers was BL2 according to shade guide (Ivoclar Vivadent Bleach, Schaan, Liechtenstein). The case was received in four weeks and the no-prep veneers were bonded using Lumineers bonding kit (Ultra-Bond Plus, DenMat, Lompoc, California, USA) using the resin cement shade chosen and agreed on during try-in (Figure 18). Patient was given post Lumineers placement instructions verbally and in an understandable written form (Arabic and English language). The patient was informed that she will have to come for regular follow-up visits every six months for checkup and scaling.

Follow-up and outcomes
Patient was not committed to her follow up appointments. She was seen only twice in six years. After 6 years she came for scaling and her clinical examination showed fair oral hygiene, bleeding upon probing, pocket depth < 3 mm around all teeth and plaque accumulation. She had newly developed occlusal caries lesion on tooth # 47 and she extracted tooth # 16 which was root canal treated and had large resin composite filling, the patient reported that the extraction was done at another clinic after she fractured the tooth. Oral hygiene instructions were reinforced and scaling and polishing with fluoridated prophylaxis paste was done. The patient was in a hurry and intraoral photos were not taken.

4. DISCUSSION
The conservative characteristic of no-prep veneers together with the cosmetic outcome seems ideal, but the fact that there is no removal of tooth structure limits the case selection and makes it pivotal to comprehensively evaluate the suitability of each case (Fondriest and Roberts, 2010; Javaheri, 2007). No-prep veneers can only be used for the correction of well-aligned to mildly crowded teeth. Also, a small but not insignificant protrusion of 0.3-0.5 mm cannot be avoided. There is no finish line and thus no-prep veneers placement is a challenging procedure when compared to conventional veneers, it is technique sensitive, requires learning curve and skills (Zarone, 2018) to ensure a well-adapted set of no-prep veneers to the tooth structure and to each other. The bonding procedure of no-prep veneers differs from conventional veneers in that it requires the placement of all no-prep veneers at once before light-curing can be applied (Doctor’s Guide, 2012). It was perceived when using this technique that it ensures that the laminates are well-fitted on the teeth and in correct position as no-prep veneers use each other as a reference for alignment instead of the finish line. The thin Cerinate ceramic no-prep veneers can properly mimic the translucency of enamel (Ghen, 2006) but that makes it difficult to mask the underlying shade of heavily stained teeth and bonding resin cement which makes it unsuitable for the treatment of cases with heavy discoloration such as Tetracycline stained teeth. It is also important to convey this information to the patient during the shade selection for more realistic expectation. Also, this makes it crucial to perform the try-in step using different shades of try-in pastes for the selection and application of the appropriate bonding resin cement shade. Adaptation of the no-prep veneers on the unprepared tooth surface is challenging and of high importance as the poor internal fit can result in the development of high stresses at the interface that can lead to cracking of the ultrathin no-prep veneers as proven by finite element analysis by Megan et al. (D’Arcangelo et al., 2018; Magne, 1999). Another concern in no-prep veneers treatment is the cervical margin; the absence of a finish line where the margin of the no-prep veneers can adapt and the difficulty to fabricate a veneer of less than 0.3 mm thickness in the laboratory, (McLearn, 2006) this result in an over contoured margin that mandates the placement
of the cervical margin of the no-prep veneers at the level of the gingival margin and not subgingival to avoid gingival irritation and to make it possible to clean and maintain. Therefore, the finishing step for no-prep veneers includes not only the removal of the excess resin but also the reduction of the small bump at the cervical margin using carbide finishing bur to have a more continuous margin with the tooth surface. This step requires manual dexterity and yet the perfect tooth-restoration margin and emergence profile is difficult to achieve and a small over contouring cannot be completely avoided. This might increase plaque accumulation and lead to gingival irritation (D’Arcangelo et al., 2018; Molina, 2016). This claim was reported to be null by Yu et al who evaluated the periodontal health of the traditional versus non-prep veneers restorations (Yu, 1998). Up to now, this claim has no sufficient evidence and more clinical studies with a sufficient follow-up period are needed.

In the presented cases, it was found that in case # 1 the patient maintained her oral hygiene very well and to a higher extent when compared to patients in cases # 2 and 4 who maintained acceptable oral hygiene and to case # 3 who failed to maintain proper oral hygiene. It was also found that the patient in case # 1 had no periodontal problem while the patient in case # 3 had some periodontal complications and reported gingival inflammation and bleeding. It was also noticed that the periodontal health is in direct relation with the degree of oral hygiene care followed by the patient as it is the case with patient having no Lumineers but maybe the periodontal complications are more exacerbated with the no-prep veneers cases. This could be confirmed in future clinical research comparing the periodontal health status in patients with traditional veneers and no-veneers to no-prep veneers patients to better understand the no-prep veneers -periodontal health relation.

It was also noticed that during the six to seven years follow up of the patients, none of the cases had debonding complication. This can be attributed to the strong long-lasting micromechanical bonding to uncut enamel surfaces avoiding the possibility of dentin exposure during traditional veneer preparation and thus a weaker bond strength and longevity to dentin.

5. CONCLUSION
According to the cases discussed in this paper and along the journey of follow up, it was noticed that: none of the cases had debonding of the laminates. Patients’ adherence to oral hygiene and commitment to follow up appointment plays a major role in the success of no-prep veneers treatment. No-prep veneers treatment needs more meticulous oral hygiene measures and more frequent follow up appointment as cleaning the gingival and interproximal areas is more challenging than veneers with finish lines. Fracture/chipping of the no-prep veneers is one of the disadvantages especially at the very thin gingival margin. Inadequate adaptation of the no-prep veneers is detrimental to the success of the treatment. No-prep veneers treatment is highly satisfactory with avoidable adverse outcomes with appropriate case selection.

Within the limitations of this review/case study, it is suggested that no-prep veneers patients come for follow up appointments more frequent than twice a year (3-4 times a year). It is also important to explain to the patient before treatment that having no-prep veneers will need more meticulous oral hygiene measures of brushing at the gingival areas and flossing due to the higher susceptibility of plaque accumulation due to the absence of finish line.

Abbreviations

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Author contributions
This report is completely performed and written by the single author solely.

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Conflict of interest
The author declares that there are no conflicts of interest.
**Informed consent**

Written and Oral informed consent was obtained from all individual participants included in the study. Additional informed consent was obtained from all individual participants for whom identifying information is included in this manuscript the consent form according to the International Committee of Medical Journal Editors’ (ICMJE) recommendations (informed consent of patients to use their photos) in both languages they understand (English and Arabic) and were given the choice to ask and discuss their concerns and to either agree by signing or refuse. All patients in this report agreed to and signed the informed consent form.

**Ethical approval**

Not applicable for this particular report.

**Data and materials availability**

All data associated with this study are present in the paper.

**Peer-review**

External peer-review was done through double-blind method.

**REFERENCES AND NOTES**

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