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Porcelain veneers - An expedient approach towards aesthetic rehabilitations

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Abstract

Ceramic veneers have become a go to solution for many practitioners for the treatment of conditions like fluorosis, enamel discolouration, hypoplasia, amelogenesis imperfecta etc. With the advanced cements and techniques, the durability of prosthesis and prognosis of such cases has increased immensely. Not just clinicians, with increase in dental awareness even the patients are opting for a definitive solution for teeth discolouration.

In this case report, step by step guidelines to record, analyse smile, prepare and cement long span ceramic veneers has been described. Optimum Esthetic results and patient satisfaction could be achieved by adept following of the necessary steps in this case. Details of post operative instructions have been provided.

Keywords: Veneers, Fluorosis, Aesthetic rehabilitation, Smile analysis, Ceramic Veneers.

Introduction

Fluorosis of the tooth is a malformation defined by hyper mineralization of the enamel and hypomineralizations under it, produced by continuous fluoride consumption during tooth development.[7] Human and animal studies have shown such defects arise by anomalous effects of fluoride on enamel protein matrix breakdown or their by-product formation rates. Thus resulting in decrease in crystal growth in enamel maturation stage.[4] Water fluoridation has been shown in numerous studies to be an efficient and dependable public health strategy for lowering the incidence of dental caries. Metabolic changes are brought about in the ameloblasts due to excessive fluoride in drinking water. Levels above 0.5-1.5 mg\l are considered to be excess

fluoride concentration. This rise results in a condition known as dental fluorosis. When dental fluorosis affects the anterior teeth, it becomes an aesthetic issue. [7] Although the aetiology and symptoms of fluorosis have been well documented, there have been few studies on how to treat fluorosed teeth. Histopathological features are used for recording dental fluorosis index as per the method proposed by Thylstrup and Fejerskov .[4] The degree of fluorosis influences the choice of a treatment plan. In mild fluorosis cases bleaching and micro abrasion can be done; but, in moderate to severe cases, bleaching and micro abrasion are not found to be as effective. They can be used as a temporary solution at the most. Another option that can be undertaken for treating severe fluorosis cases are the composite veneers. Composite veneers have come a long way since their advent, still they have quite a few drawbacks like wear, marginal and incisal edge fractures, and discoloration[8] and debonding. According to authors, marginal defects and colour instability lead to failure of composite veneers 2.9% of cases.[6]

One of the more conservative treatment options are porcelain laminates that have ushered in a new age dentistry known as "aesthetic dentistry."[8] In the previous two decades, cosmetic dentistry has grown substantially, and restoring dental aesthetic look is a clinical problem. Ceramic veneers, also known as porcelain laminate veneers, are very thin ceramic restoration that are bonded onto the enamel surface covering the facial surface and a part the proximal surfaces of teeth that require aesthetic restoration. Pincus introduced this into dentistry as Hollywood veneers. According to him survival rates of these restorations range from 92% at 5 years to 64% at 10 years.

Porcelain veneers are known to retain plaque, are more stable and have better wear resistance. The long-term survival probability of laminate veneers has increased considerably thanks to developments in adhesive and bonding techniques.[8] Ceramic veneers were employed to present a patient with severe fluorosis with a step-by-step treatment plan.

Case Report

A 28-year-old male patient visited department of prosthodontics with a chief complaint of an unpleasant smile caused by generalized tooth discoloration.

Clinical Examination

Clinical examination revealed generalized fluorosis (Figure 1). No gross extra-oral facial deformity was seen in the patient. No muscle tenderness, TMJ pain and deviation was found while opening and closing.

On intraoral inspection it was found that patient had moderate form of dental fluorosis with respect to upper and lower arch. Patient had fair oral hygiene. On lateral excursive and protrusive movements no interferences were seen. There was 3mm of over jet and 1.5mm – 2 mm over bite in maximum intercuspal position. Clinical and radiographic investigations revealed the case as moderate form of dental fluorosis (Fig 1). The treatment plan selected for patient was to rehabilitate the teeth with incisal lingual wrap type porcelain laminate veneers for maxillary and mandibular anterior teeth.

A complete smile analysis was done. Smile line was found to be till middle third of anterior teeth. At rest lower anterior third was visible and during relaxed smile upper incisal third was visible. Bilateral Class I molar relationship was observed. The occlusion was found to be canine guided. Hard tissue midline was seen to be 5 mm ahead of posterior border of incisive papilla. Midline of maxillary arch was found to be coinciding with labial frenum and coinciding with lower incisor. Soft tissue midline coincided with columella.

Inter canine width was measured to be 4.6 cm (mesial). Mesiodistal width and height of all visible teeth were measured individually.

Visibility of teeth

5 4 3 2 1	1 2 3 4
3 2 1	1 2 3

Figure 1: Pre op photograph.

Figure 2: Intra oral examination.

Figure 3: Left and right Lateral occlusion

Figure 4: Bilateral Canine guided occlusion

Treatment Plan

Initial clinical examination was completed then preoperative photographs were taken. Upper and lower alginate impressions were made and diagnostic models were poured. After model analysis the patient was presented with plausible treatment options. Patient agreed to smile enhancement using ceramic veneers for his upper and lower anteriors given that he desired an optimum aesthetic and a long-term result. It was decided that the restoration with veneers would be done on the patient's upper and lower teeth, from his right 1st premolar to left 1st premolar. A facebow transfer and mock preparation was done to decide the occlusion and get a tentative idea of the final outcome.

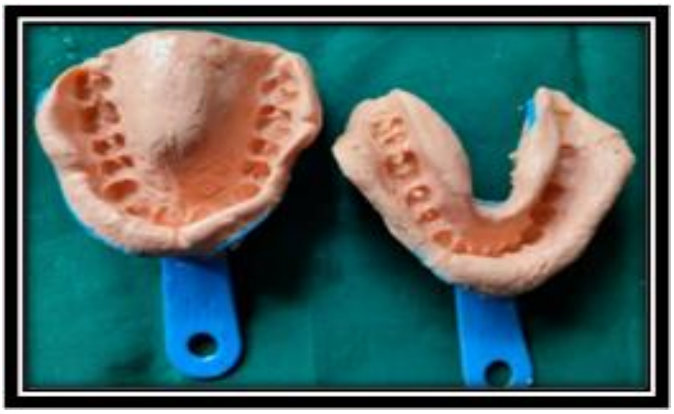

Figure 5: Diagnostic impressions of maxilla and mandible

Tooth Preparation.

For uniform reduction during tooth preparation, a silicon putty index guide (Dentsply Aquasil soft putty) was constructed over the diagnostic model. The index was sliced into 3 parts at the level of incisal, middle and cervical third horizontally from right to left. Under natural daylight, shade selection (VITA Classical shade guide) was made. The VITAPAN classical shade guide was used to select the required shade. For the cervical region, B2 was chosen, A2 for the middle third, and A1 for the incisal third.

To maintain adequate depth on the maxillary anterior teeth, a diamond depth cutting bur was used to create horizontal depth grooves on the labial surface. Care was taken not to damage the soft tissues or the adjacent unprepared teeth while extending the depth grooves from mesial to distal side. The bur was angles according to the angulation of the labial surface so as to attain proper depth of the guiding cuts. Depth grooves were limited to enamel preparation only and not extended into dentin to ensure best bond strength possible. Next step of tooth preparation was done with the help of a flat-end tapered diamond bur. Eight maxillary teeth were prepared to a depth of 0.5–0.75mm facial reduction with 1.5mm incisal reduction. A chamfer finish line was given at the gingival margin. The gingival and face embrasures were preserved in the proximal borders.

Figure 6: Teeth preparation

Final Impression and Temporization.

Some clinicians may argue that in veneer cases Provisionalization might not be as important a step as others, as the tooth reduction is minimal but to see this step should not be ignored as it gives an idea about the final outcome.

Following tooth preparation, gingival retraction cord was used to engage around the tooth by using cord packer in a limping manner. Impressions were made with the help of a polyvinylsiloxane material. For temporization, spot etching on the facial surface of each prepared tooth was done with 37% phosphoric acid. On

the enamel-etched spots bonding agent was applied and using a high-intensity light-emitting diode (LED)curing light it was cured for 20 seconds. Composite resin was placed and light cured for 10 seconds over each prepared tooth. A thin diamond disk was used to refine facial and lingual embrasures, the occlusion was modified according to need. The temporary restorations were polished using polishing discs. Another impression was made with the temporary restorations and the casts poured acted as a mock up for the reference of lab.

Figure 7: Composite temporisation

Veneer Try-In and Cementation.

lithium disilicate-reinforced glass ceramic material was used to fabricate ceramic veneers (IPS e. max Press, Ivoclar Vivadent, Schaan, Liechtenstein). First, the temporary composite restorations were removed. The bonding areas were cleaned and polished. Try in of the veneers was done to check for the shade and marginal adaptation.

Corrections were noted and sent to the lab for polishing and finishing. Intaglio surfaces of the veneers were etched first with hydrofluoric acid for 60 seconds then washed under running water for another 60 seconds. Then they were dried with an air syringe. Silane coupling agent (Monoband Plus, Ivoclar Vivadent, Schaan, Liech ten stein) was applied as a single layer on the veneers' fitting surfaces and dried after 60 seconds.

Then, etching was done of the prepared teeth with the 37% phosphoric acid for 30 seconds. Then the teeth were rinsed, and dried.

To prevent bonding to adjacent teeth and to successfully remove excess resin cement a clear mylar strip was placed interproximal Ly.

A bonding agent (Adhese Universal, Ivoclar Vivadent, Schaan, Liechtenstein) was applied on the prepared tooth surfaces. It was then air-thinned.

Figure 8: Try in done

Then, the prepared tooth surfaces were covered with Heli bond (Ivoclar Vivadent, Schaan, Liechtenstein). Resin cement was placed on the inner surface of the veneer. (Variolink Veneer, transparent shade, Ivoclar Vivadent, Schaan, Liechtenstein). Veneers were placed on the teeth by applying gentle pressure. Marginal adaptation was checked. The excess resin cement was then removed from the margins with the help of explorer. Then the resin was light cured. The method of light curing adapted was to cure the facial aspect for 40 seconds and lingual aspect of tooth for 40 seconds. The veneer cementation was done from centrals to premolars sequentially on one quadrant then the other. Gingival flash was removed with a scalpel after that. Finishing and polishing of ceramic margins were done using a flame-shaped fine diamond bur and polishing cups and points (OptraFine polishing system, Ivoclar Vivadent, Schaan, Liechtenstein). Finishing and polishing strips were used to finish interproximal contacts. The patient was satisfied with the final result.

Figure 9-11: Post insertion view

Figure 12: Post insertion results

Discussion

The goal of therapy in this case was to improve the patient's smile and restore the patient's teeth's aesthetics. Ceramic veneers, which are the treatment of choice for masking tooth discolouration in cases of moderate to severe fluorosis, were used to achieve this purpose.

Because they involve a minimum invasive design preparation, ceramic veneers can completely hide the discoloured tooth with minimal loss of sound tooth structure.

Furthermore, advancements in ceramic materials have aided this procedure. Ceramic veneers offer both predictable and long-term aesthetic improvement.

Porcelain veneers' durability and clinical success have been extensively studied in the literature. Ceramic veneers have been reported to provide a long-lasting and successful restoration, with a survival rate of 93.5 percent over ten years.[8] After a 6-year follow-up, satisfactory outcomes were observed in a case of fluorosed teeth repaired with porcelain laminate veneers.[8]Furthermore, multiple studies have shown that restoration with porcelain veneers produces acceptable aesthetic results in situations of mild to severe fluorosis. Tooth enamel hypomineralization is caused by high fluoride ingestion during the formative stage of enamel production, resulting in dental fluorosis. It causes varying degrees of intrinsic enamel discoloration. Tooth whitening, micro abrasions, direct composite veneers, indirect composite veneers, porcelain laminate veneers, all ceramic crowns, and metal ceramic crowns are some of the treatment options available depending on the severity of dental fluorosis.[7] For moderate to severe dental fluorosis, composite resin and porcelain are the most commonly used veneering materials.

Composite resins have some advantages, such as ease of use, reduced time commitment, and cost effectiveness, but they have some downsides, such as low wear resistance and discoloration, which makes them inferior to dental porcelain. The preservation of tooth structure appears to have become a crucial determinant of any

restorative procedure's long-term prognosis. The most significant benefit of porcelain laminate veneers is that they require very little tooth reduction. Only a 0.3 to 0.5 mm decrease on the labial surface was done in this case report. Porcelain laminate veneers have a significant advantage in that they rarely cause pulpal involvement. Another benefit of a highly glazed porcelain laminate surface is that it collects less plaque, which is vital for maintaining a healthy periodontal response. Because of the lifelike appearance of porcelain and the dispersion effect of the luting cement, excellent aesthetics are created. Porcelain laminate veneers, on the other hand, have their own set of constraints. When the remaining enamel is insufficient to guarantee proper retention, they should not be used. In the case of bruxism, the prognosis for veneers is uncertain. [8]

The patient was provided with a written set of post-operative instructions. It included the use of a soft bristled toothbrush, advised regular flossing, and the wearing of a mouthguard when participating in any contact sport or for potential parafunctional habits that the patient may possess. Patient was told not to use alcohol or alcohol-containing mouthwashes during the first 48 hours post insertion, Avoidance of hard food, nail biting, are some of the other things patient was advised against. Even though there is high clinical success rate and documented longevity of porcelain veneers, failures can occur for different reasons. Partial/complete fracture or debonding, incorrect placement, colour mismatch, marginal discoloration, loss of marginal integrity, postoperative sensitivity are some examples of failures. Regular dental check-ups and good veneer care, on the other hand, may extend their life without causing difficulties[5]

Conclusion

In aesthetic dentistry ceramic veneers are of paramount importance. If and when appropriate treatment plan and protocols are used in various fabrication stages they can bear excellent results. In this case report we have described step by step protocols in use of ceramic veneers to enhance the appearance of fluorosed teeth and the role it plays in enhancing patient's smile and self-esteem. With the advances in resin bonding cements and the reliable and durable bonding between enamel and porcelain we are able to modify and adapt more conservative designs and methods of teeth preparation.

The need for minimally invasive procedures arises as they reduce the risk of endodontic complications, preserve tooth structure and can provide highly pleasing Esthetic results. As every coin has two sides, this approach beholds high Esthetic potential but it is very technique sensitive in every step of the way. Even a minute negligence on the part of the operator can cause failure of the prosthesis. Taking care of the occlusion is necessary in static and dynamic positions. To achieve long term clinical success strict adherence to the clinical and technical phases play a major role.[8]

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