ISSN: 2581-5989
PubMed - National Library of Medicine - ID: 101738774

International Journal of Dental Science and Innovative Research (IJDSIR)

IJDSIR : Dental Publication Service

Available Online at: www.ijdsir.com

Volume – 5, Issue – 5, September - 2022, Page No. : 32 - 37

Aesthetic reconstruction of Ellis class 2 fractured lateral incisor using Partial-bonded restoration: A case report

[1]Vijay Venkatesh Kondas, MDS, Professor and Head of the Department, Department of Conservative Dentistry and Endodontics, SRM Kattankulathur Dental College and Hospital, SRM Institute of Science and Technology

[2]Eldho Jijy Varghese, MDS, Department of Conservative Dentistry and Endodontics, SRM Kattankulathur Dental College and Hospital, SRM Institute of Science and Technology

Corresponding Author: Eldho Jijy Varghese, MDS, Department of Conservative Dentistry and Endodontics, SRM Kattankulathur Dental College and Hospital, SRM Institute of Science and Technology.

Citation of this Article: Vijay Venkatesh Kondas, Eldho Jijy Varghese, "Aesthetic reconstruction of Ellis class 2 fractured lateral incisor using Partial-bonded restoration: A case report", IJDSIR- September - 2022, Vol. – 5, Issue - 5, P. No. 32 – 37.

Type of Publication: Case Report

Conflicts of Interest: Nil

Abstract

Bonded porcelain restorations are a predictable and durable treatment option that can restore not only the strength and function of the teeth but also the aesthetic appearance. One important requisite in adhesive dentistry is the preservation of sound enamel. Following biomimetic principles, employing minimally invasive applications and adhesive technologies is of paramount importance for a successful outcome.

During the last decade, in relation of better understanding of pulp biology and the development of bioactive materials, vital pulp therapy has been reinvestigated as a definitive treatment of mature permanent teeth. The advantages of maintaining integrity of pulp are numerous; this strategy seeks to keep all the functions of pulp, especially the vascularization, innervation, immune competency, neurosensory, and proprioceptive functions of the tooth. The dentin-pulp complex would also continue to protect itself by stimulating the formation of tertiary dentin or a mineralized barrier against insults.

The purpose of this article is to demonstrate a complete reconstruction of a severely fractured lateral incisor almost exposing the pulp tissue, using regenerative protocol followed by reinforcement using partial prepared bonded ceramic restoration.

Keywords: partial bonded ceramic restorations, aesthetic, minimally invasive treatment modalities, Biodentine, vital pulp therapy

Introduction

The so-called "no prep" techniques to anterior bonded porcelain restorations have resurfaced in the previous decade as a genuine trend for simplicity. Those noninvasive procedures, which were already popular in the 1980s, were hampered in the 1990s and 2000s by aggressive ceramic preparations, which were the product

of simplified but unscientific laboratory methods. The recent comeback of simplistic procedures appears to be a logical response to the preparation mania of the 1990s and 2000s, and was aided by technology advancements that allowed for the production of considerably thinner, pressable ceramic veneers.[1-7]

It appears that veneer tooth preparation concepts are in a reciprocating pendulum, ranging from a right-wing approach to a left-wing extreme, as detailed by Dr. Goldstein in a very fair and well-presented opinion piece. The clinician may find himself navigating in the midst of those conceptions, and may even feel guilty for not being able to adjust to those shifting concepts. However, the dentist should always be the decision maker, based on scientific facts as well as his common sense and expertise. The therapy must be founded on knowledge, wisdom, and experience, as well as a carefully crafted recipe that will result in the proper treatment for a specific individual, while also adhering to enamel preservation standards. Patients will gain in terms of aesthetics and health by conserving tooth structure and learning different treatment options.[1-7]

Minimally invasive preparations and adhesive restorations do not necessitate extensive tooth reduction in most cases. Healthy tooth structure is preserved wherever possible in majority of cases, and the quality of adhesion between the dental tissues and the restorative material (ceramic or resin) is predictable, resulting in a fully "restored structure" that is mechanically stable which allows the dentition's protection and longevity. However, the porcelain thickness at the cervical margin is a significant challenge. It's not only a challenging area to work with in the lab, as it's prone to cracking during finishing and polishing, but it's also a difficult transition with the tooth following adhesive luting. This is frequently owing to the lack of a clearly defined finish line. A ceramic piece that is clinically difficult for seating and cementing because to a lack of adequate preparation and well-defined cervical margins may result in erroneous positioning of the restoration following adhesive bonding. Furthermore, because the ceramic bits are so thin, significant colour and optical effects are difficult to achieve.[1,8-15]

This article presents a clinical case, discussing preparation and adhesive protocol related to the management of severely traumatized tooth preserving vitality of pulp using the vital pulp therapy technique followed by reinforcement using partial bonded ceramic restoration.

Case Presentation

A 39 year old female patient was referred to the Department of Conservative Dentistry and Endodontics with a chief complaint of fractured upper right lateral incisor and central incisor. The patient underwent an accidental fall on the same day morning after which she had visited the dental hospital within 1 hour of trauma. The initial clinical procedure included careful analysis of the fractured teeth, intraoral periapical radiographs in different angulations, occlusion, periodontal examination, and facial and intraoral photography. Intraoral examination revealed tender on percussion on permanent maxillary right lateral incisor, Ellis class 2 fracture in permanent maxillary right lateral incisor and Ellis class 1 fracture in permanent maxillary right central incisor, pain on percussion on permanent maxillary right lateral incisor, generalised grade 1 fluorosis.[2] Radiographic examination revealed Ellis class 2 fracture in permanent maxillary right lateral incisor and Ellis class 1 fracture in permanent maxillary right central incisor. She was diagnosed with Ellis class 2 fracture in permanent maxillary right lateral incisor with reversible

pulpitis and Ellis class 1 fracture in permanent maxillary right central incisor with reversible pulpitis. (Figure 1)

Emergency management

Consent form was duly signed by the patient before the advent of the treatment. Administration of local anesthesia with 2% lidocaine and 1:100000 Epinephrine under rubber dam isolation was carried out. According to the manufacturer's instructions, BIODENTINE™ (SEPTODONT) powder and liquid were mixed to achieve a creamy consistency. A 2-mm-thick layer of the cement was placed for pulp protection in tooth #12 using an MTA carrier (GDC). The cement was allowed to set for 12 mins. This was followed by placement of GIC (Type 1, GC Gold Label, Japan) liner. Once the liner was set, the exposed dentin was sealed using Immediate Dentin Sealing technique. The rubberdam was removed and a preliminary impression was taken using vinyl polysiloxane material K-0084 (Densply, Aquasil) to prepare study cast and working cast.

Tooth preparation to receive the restoration

A thorough analysis of the final outcome was planned based on the amount of the existing sound enamel, remaining tooth structure, facial profile and occlusion. Following loss of tooth structure (approximately 60%) a decision was taken to proceed with core build up to replace lost coronal tooth structure; there is a lack of literature available, providing scientific data whether to include remaining tooth material and proceed with butt joint preparation. Literature related to restoration of upper anteriors using partial bonded or simply fractured portion alone with long term follow up is unknown. It was decided to include cervical tooth enamel for preparation where a sound enamel was present all around to support partial bonded restoration. Treatment was finalized as a little preparation in enamel about 0.3mm was required to be included. Preparation was initiated and composite core was included. During the second visit after one week of initial visit, the patient was asymptomatic. The enamel margins were planned and smoothened using rubber polishing bullet run under electric motor following manufacturer's instructions. This is followed by application of rubber dam and liquid dam for isolation.

The tooth surface was treated with G-Premio BOND™ 012696 (GC Tokyo Japan) universal 8th generation bonding agent and is left for 10 s followed by light curing for 20 s according to manufacturing instructions. Core build up was carried out using G-aenial universal flow composite 1012021 (GC Tokyo Japan) and incremental build up using A2 Enamel Z250 Microhybrid (3M ESPE, St. Paul, MN, USA) packable composite. Sufficient sound enamel margins were left intact to receive the indirect bonded restoration. Finish lines were provided using short diamond torpedo bur and the tooth preparation was finished using shofu supersnap r0500 (Shofu Dental Corporation 1225 Stone Drive San Marcos, CA) polishing discs (Figure 2,3).[1] Retraction paste was applied according to manufacturer's instructions and heavy body and light body polyvinyl siloxane K-0084 (Aquasil, Densply) impressions were taken.

Cementation of permanent restoration

In the third visit, the marginal fit of the final restoration was checked and shade matching was done. Isolation was carried out using cotton rolls and retraction cord was packed to provide isolation from gingival cervicular fluid. Cellofane tapes were spread onto adjacent teeth for isolation. The permanent maxillary right lateral incisor was etched using Eco-Etch W42611 (Ivoclar Vivadent, Shaan, Liechtenstein) universal etchant and rinsed after 15s. Tetric N Bond T08588 (Ivoclar Liechtenstein)

universal bonding agent was applied, air blown and cured for 20 s under manufacturer's instructions. The intaglio surface of the restoration was etched using Ceramic etchant V23918 (Ivoclar Vivadent, Shaan, Liechtenstein) and rinsed under manufacturer's instructions. Monobond N Y07407 (Ivoclar Vivadent, Shaan, Liechtenstein) primer was applied followed by application of Tetric N Bond T08588 (Ivoclar Liechtenstein) universal bonding agent. The base paste and catalyst paste (clear version) of VARIOLINK V37749 (Ivoclar Vivadent, Shaan, Liechtenstein) dual cure resin luting cement was mixed and was applied onto the intaglio surface of the restoration. The restoration was seated onto the prepared tooth surface and light cured for 5 s. The excess resin cement was removed after curing for 2s using a scalpel blade no.12, followed by light curing on all the surfaces for 20 s according to manufacturer's instructions.1 During this appointment the Ellis class 1 fracture on permanent maxillary right central incisor was restored using the conventional incremental layering technique using flowable and A2 Enamel Z250 Microhybrid (3M ESPE, St. Paul, MN, USA) packable composite. Finishing and polishing of the restorations were carried out using shofu r0500 (Shofu Dental Corporation 1225 Stone Drive San Marcos, CA) polishing kits. (Figure 4,5)

Discussion

One of the most difficult challenges in aesthetic dentistry is restoring a smile in the anterior region after a trauma while maintaining the vitality of the pulp and keeping as much sound tooth tissue as possible. Complex bonded posterior indirect adhesive restorations are a routine option in clinical practice. One of its indications involve the need for a cuspal coverage. When it comes to anterior teeth, the use of an adhesive/ bonded post is not required but not contraindicated if done using a conservative approach. Different preparation designs can be selected or used depending upon the remaining tooth structure. Butt joint is most commonly followed in adhesive technique but with a variant of butt joint, the bevel is useful for providing a more enamel in the preparation. More than one preparation design can be used depending upon the situation in order to have a predictable prognosis. An indirect restoration should not have any undercuts inside the cavity where the undercut area can be blocked out with a flowable composite. Remaining tooth structure plays a fundamental role in the design of the preparation. Tooth preparation consists of dentin and ideally completely surrounded by enamel. Prepared dentin surface should be clean and no irregularities should be present. This allows easier flow of the luting cement and promotes better internal adaptation and marginal fit of the partial crown so that the restoration can be properly seated. The enamel prisms were sectioned obliquely to give good mechanical support for restoration. The better the adaptation, the lower the thickness of luting cement layer. The use of a chamfer at the cervical level proved to be more successful for the laboratory technician, and it also makes it easier for the dentist to deliver and place the restorations. A mini-chamfer has undeniable biologic benefits, such as a better emergence profile, uniform stress distribution a softer transition with the tooth, and no damage to the ceramic during hand-finishing techniques, all of which can lead to bacterial plaque formation. Obliquely sectioned enamel rods increases good quality bonding with more enamel. Here the retention of restoration relies on bonding. Quality of bond to restoration is of key importance and is the most important factor for long term success. The effectiveness of adhesive bond depends on quality and quantity of hard tissue, materials used for adhesion, masticatory

pattern and morphology of preparation. Adhesion to dentin and composite is good, but good quality enamel provides the most durable bond. Best prognosis is guaranteed with a complete enamel preparation. Good surface and quality enamel enhances adhesive cementation procedure and when there are no previous carious cavities or interproximal caries.[1, 16-20]

Conclusion

Treatment planning is critical to the clinical outcome of partial bonded restorations. Predicting the end result, limiting tooth preparation, and enhancing the comfort of patients (less drilling) should all be regarded key steps toward less invasive dental treatments. However, putting this concept into practise necessitates knowledge and experience with adhesion protocols, which must be carefully executed.

Reference

1. Molina IC, Molina GC, Stanley K, Lago C, Xavier CF, Volpato CA. Partial-prep bonded restorations in the anterior dentition: Long-term gingival health and predictability. A case report. Quintessence Int. 2016 Jan;47(1):9-16.
2. Dean JA (10 August 2015). McDonald and Avery's Dentistry for the Child and Adolescent (10th ed.). Elsevier Health Sciences. p. 132. ISBN 978-0-323-28746-3.
3. Goldstein MB. No-prep/ minimal-prep: the perils of oversimplification. Dent Today. 2007;26:10.
4. Nosti J. “Thin is in” the art of minimal and no prep veneer. J N J Dent Assoc. 2009;80:30–31.
5. Lowe RA. No-prep veneers: a realistic option. Dent Today. 2010;29:80– 86.
6. Mizrachi M, Lowe RA. A new and economical concept no-prep veneers. Dent Today. 2011;30:138,140,142–143.
7. Friedman MJ. Porcelain veneer restorations: a clinician’s opinion about a disturbing trend. J Esthet Restor Dent. 2001; 13:318–327.
8. Edelhoff D, Sorensen JA. Tooth structure removal associated with various preparation designs for anterior teeth. J Prosthet Dent. 2002;87:503–509.
9. Magne P, Belser UC. Novel porcelain laminate preparation approach driven by a diagnostic mock-up. J Esthet Restor Dent. 2004;16:7–16.
10. Rdaz GM. Minimum thickness anterior porcelain restorations. Dent Clin North Am. 2011;55:353–370.
11. Burke FJ. Survival rates for porcelain laminate veneers with special reference to the effect of preparation in dentin: a literature review. J Esthet Restor Dent. 2012;24:257–265.
12. Gresnigt M, Ozcan M. Esthetic rehabilitation of anterior teeth with porcelain laminates and sectional veneers. J Can Dent Assoc. 2011;77:b143.
13. Hunter AJ, Hunter AR. Gingival margins for crowns: a review and discussion. Part II: Discrepances and configurations. J Prosthet Dent. 1990;64:636–642.
14. Balevi B. Limited evidence on the best position for prosthetic margins. Evid Based Dent. 2013;14:103–104.
15. Papageorgiou SN, Papadelli AP, Koidis PT, Petridis HP. The effect of prosthetic margin location on caries susceptibility. A systematic review and meta-analysis. Br Dent J. 2013;214:617–624.
16. Gurel G, Sesma N, Calamita MA, Coachman C, Morimoto S. Influence of enamel preservation on failure rates of porcelain laminate veneers. Int J Periodontics Restorative Dent. 2013;33:31–39.
17. Larson TD. 25 years of veneering: what have we learned? Northwest Dent. 2003;82(4):35–39.

18. Pumas M, Van Meerbeek B, Lambrechts P, Vanherle G. Porcelain veneers: a review of the literature. J Dent. 2000;28:163–177.
19. Al-Wahadni A, Martin DM. Glazing and finishing dental porcelain: a literature review. J Can Dent Assoc. 1998;64:580–583.
20. Wells D. Low-risk dentistry using additive-only (no-prep) porcelain venners. Compend Contin Educ Dent. 2011; 32:50–55.

Legend Figures

Figure 1: Pre-operative photograph

Figure 2: Planning of enamel

Figure 3: Core Build up

Figure 4: Immediate Post-operative photograph

Figure 5: Follow up after 6 months