

## Minimally Invasive Approach for Anterior Dental Aesthetics: Case Report

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### ABSTRACT;

Minimally invasive dentistry adopts a philosophy that integrates prevention, remineralization and minimal intervention for the placement and replacement of restorations. Minimally invasive dentistry reaches the treatment objective using the least invasive surgical approach, with the removal of the minimal amount of healthy tissues. This case report is aimed at reporting the treatment of a 34-year-old female patient with aesthetic concerns in the anterior teeth using a minimally invasive approach and evaluating the clinical performance after 1 year.

**Keywords:** Minimal invasion ; adhesive technique; composite materials.

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### I. INTRODUCTION;

Minimum (or minimal) intervention dentistry (MI) can be defined as a philosophy of professional care concerned with the first occurrence, earliest detection and earliest possible cure of disease on micro (molecular) levels, followed by minimally invasive and patient-friendly treatment to repair irreversible damage caused by such disease.[1,2]

Minimally Invasive Dentistry (MID) from a day-to-day dentistry perspective, focuses mostly on cariology and restorative dentistry, even though it embraces many aspects of dentistry. [3]The concept of MID supports a systematic respect for the original tissue, including diagnosis, risk assessment, preventive treatment, and minimal tissue removal upon restoration.[4] The modern approach to the management of the disease of caries relies on dentists taking the role of physician first, and surgeon second. [1-5]



Fig.1 ;A female presented with a broken incisal edge on tooth No. 9 (central incisor) and recurrent decay and a failing restoration on tooth No. 10 (lateral incisor).

Minimal intervention techniques are generally considered in relation to initial carious lesions. However, it appears logical to apply the same principles to extensive cavities as well as to the replacement of failed existing restorations. [2,4]As the cavity becomes larger, there is an increasing need to consider protection of remaining cusps because they become seriously weakened by loss of the central core of the crown and therefore become subject to the development of splits at the base.[6] However, it is possible to develop a

protective cavity design without undue sacrifice of remaining tooth structure, at the same time that maintenance of occlusal anatomy and correct contact with the opposing arch are ensured.[7,8]

Achieving imperceptible esthetic results can be challenging unless predictable techniques and materials are used. Through the use of new and exciting materials, the most esthetic results can be attained in a reasonable amount of chair time. With predictable solutions, we will meet the high esthetic demands of our patients.[1-6]

Composite resins have vastly improved through the years. The latest evolution in composite technology, G-aenial Sculpt ,has to vast improvements in the physical properties that make this



Fig.2:Minimally invasive Class IV tooth preparations were performed using micro-prep burs. To create an invisible margin, scalloped bevel margins were used along the facial cavosurfaces of both teeth.

nanotechnology composite resin strong and beautiful. Improvements in the nanofiller technology are attributed to this progress.[7,8]

This composite resin features a high density and uniform dispersion technology for better wear resistance and gloss retention; it is also self-polishing for a long-lasting, shiny, mirror-like surface finish.[8] The new high performance filler is additionally silane treated to help bind the filler to the resin matrix, thereby increasing the flexural strength.[9]

A smile can be transformed by direct or indirect restorations. Full crowns or porcelain veneers are treatment options that offer esthetic and functional excellence.[2 ]However, these options are considered to be invasive and expensive.[3,10]

The bonding capabilities of adhesive systems to both enamel and dentin make it possible to address unesthetic smiles by performing minimally invasive treatment involving adhesives and resin composites.[4-7]The popularity of these procedures are due to the materials' esthetic and functional qualities, allowing dentists to correct or improve esthetic problems with practicability, efficiency, and predictability.[11]

Many aesthetic treatments are used for these aesthetic imperfections. Problems such as Turner's hypoplasia, fluorosis, and external factors are usually treated with methods including bleaching, microabrasion technique, and laminate veneer restoration.[2,3,5] The selection of the optimal treatment technique is related to the degree of discoloration [9]. This case report is aimed at reporting the treatment of a 34-year-old female patient with aesthetic concerns in the anterior teeth using a minimally invasive approach and evaluating the clinical .

### **Case Presentation**

A 34-year-old female presented with a broken incisal edge on her central incisor (# 9) along with recurrent decay and a failing restoration on her lateral incisor (#10) (Figure 1). Upon examination, it was determined that a MID Class IV approach would be the best option for cosmetic restorative correction. In the past, bonding composite resin on an incisal edge could lead to short-term failure. However, good success can be attained with a composite resin that has excellent flexural strength.



Fig.3:A minimal tooth preparation was done on tooth No. 10 to preserve the integrity of the lateral incisor.

First, minimal invasive preparations with scalloping bevel margins were done with micro-prep burs (Figure 2 and Figure 3). Then multi-purpose G-Premio BOND adhesive resin was used with a selective-etch technique. After etching the enamel with 32% phosphoric acid, the adhesive was placed for 10 seconds, then blown thin for 5 seconds using forced air. The adhesive was light-cured for 10 seconds. In addition to using this versatile adhesive resin with a selective-etch technique, it can also be used with a self-etch or total-etch method. According to the manufacturer, the result is a very thin (3 $\mu$ m) adhesive layer with high shear bond strength (35 mPa). Because of the resulting thin adhesive layer, G-Premio BOND can be flexibly used for direct and indirect restorative dentistry.



Fig.4;Using a complex layering technique, tooth No. 10 was successfully restored. In recreating the incisal edge of tooth No. 9, a lingual shell was first sculpted with G-aenial Sculpt A1.

There are several “keys” to achieving a successful Class IV restoration. Composite resin shade selection, preparation design, and sequence of composite resin layering are important for accurately blending the composite resin to the existing dentition. In addition, using the correct finishing and polishing technique is equally essential in obtaining a seamless and invisible esthetic restoration.



Fig.5;Using finishing burs and polishing disks, a matt finish was first attained.

In restoring both tooth prep sites, the latest generation of nanotechnology composite resin was used. A sequence of composite resin layering was done to blend the composite resin to the existing tooth and create a polychromatic effect. In restoring tooth No. 10, a thin layer of shade A1 was placed along the lingual aspect to mimic the lingual enamel coloration. Then, as a dentin replacement, an opaque dentin shade (AO2) was placed to assist in blocking out any shine-through of light. Using a freehand sculpting technique, universal shade A1 was sculpted over the opaque dentin composite resin as an enamel replacement. Finally, a translucent layer, AE (Adult Enamel), was blended over the facial cavosurface margin as the final layer to create a natural chameleon effect. In restoring tooth No. 9, a lingual shell using G-aenial Sculpt A1 was first bonded to recreate the proper lingual contour and color (Figure 5). Then color modifiers—gray and opal tints—were artistically painted and light cured to mimic incisal characterizations of the adjacent central incisor. Finally, a thin layer of AE was sculpted along the facial surface with an artist's brush to recreate natural facial contours (Figure 6).

After final light-curing, esthetic contours were refined using aluminum oxide finishing disks, finishing burs, and finishing paste. Thus, using proper technique and state-of-the-art dental materials, natural color, contour, and finish to mimic natural tooth can be achieved (Figure 7).



Fig.6; Fine polishing showed a beautiful mirror-like finish.

## II. Discussion ;

Thanks to the durability, load resistance, esthetics, and predictability of composite resins, they can be used to improve smile esthetics at a low cost, offering greater conservation of tooth structure compared to indirect restorative materials with relatively high clinical performance.[5,10] The range of composites allows dentists to use different combinations of shade, translucency, and opacity which make it possible to re-create specific details and aspects of the patient's natural dentition. In addition, color is distributed evenly within the restoration.[11] Several direct techniques are available for esthetic enhancement. When several large multilayered restorations are desired, the matrix technique (using a silicon index) is extremely effective in guiding the reproduction of the ideal proportions, shapes, and anatomy created with a diagnostic wax-up, which saves invaluable chairside time.[12,13]

The concept of minimal intervention dentistry is based on all the factors that affect the onset and progression of disease and therefore integrates the concept of prevention, control and treatment . [11]The field is wide including the detection of lesion as early as possible, the identification of risk factors (risk factors) and the implementation of preventive strategies and health education for the patient. [14]This philosophy involves prevention of disease and preservation of tooth structure<sup>2</sup>. The concept evolved as a consequence of our increased understanding of the caries process and the development of adhesive restorative materials.[15]

In this case patients desire highly esthetic results using minimally invasive procedures. With the advent of dental technology, minimally invasive dentistry can be achieved with beautiful and strong results.

Minimally invasive dentistry adopts a philosophy that integrates prevention, remineralization and minimal intervention for the placement and replacement of restorations.[15,16] Minimally invasive dentistry reaches the treatment objective using the least invasive surgical approach, with the removal of the minimal amount of healthy tissues<sup>3</sup> .[17]. With advanced techniques of diagnosis and the principles of microdentistry, dental caries now is discovered much earlier.[8] The application of its concepts has been termed 'Minimally Invasive Dentistry', '**Minimal Intervention Dentistry**' or '**Preservative Dentistry**'. [1,2,3,18]

Porcelain laminate veneers are nowadays commonly used for aesthetic purposes owing to their better aesthetic properties, higher resistance to abrasion and discoloration, and better biological harmony with the oral flora.[1-6]

In contrast to Black's principles of cavity preparation, which included the establishment of outline form including extension for prevention, the development of resistance and retention form, creation of convenience form, the treatment of residual caries, the finishing of cavity margins and cavity toilet, now the general principles of tooth preparation are determined by:[20]

- The nature and extent of the lesion. [1-5]
- The quantity and quality of the tooth tissue remaining following preparation. [1-6,8,9]
- Functional load. [1-5]
- The nature and properties of the restorative system to be used.[6-12]

In general the minimum amount of tooth substance should be removed to ensure appropriate access and the placement of the required restoration.[21] With developments in the range and properties of the materials available for the restoration of teeth, it is now possible to consider the preparation of teeth as an exercise in damage limitation, with due consideration of both the macroscopic and microscopic features of the biophysical environment into which it is intended to introduce a restoration.[22] This concept was neatly described by Anusavice<sup>1</sup> as a preservative approach to the operative management of dental caries and associated lesions. [23]

Composite resins or porcelain materials are generally preferred materials for aesthetic procedures. In this study, lithium disilicate glass ceramic material was used. Besides its satisfactory aesthetic quality, it also has high endurance against stretching, breaking, and chemicals.[24] The rate of abrasion of the opposite teeth is lower, and the material has higher transparency compared with all other porcelain types [21, 22].

To be able to prepare teeth efficiently and effectively, it is essential to understand the processes of the diseases of teeth, have a detailed working knowledge of tooth anatomy, the structure and properties of the tooth tissues and pulp biology, and have a clear understanding of the basic principles of occlusion.[25-27] In addition, one must understand the mode of action, functions and limitations of the instrumentation used to shape and fashion enamel and dentine in the oral environment.[28-29]

### **III. Conclusion ;**

The direct restorative treatment is simple, effective, and minimally invasive, resulting in a shorter period of treatment while offering the possibility of reversibility. Composite restorations with the aid of a silicon index are easy to place and inexpensive while providing patients with satisfaction in their personal appearance.

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