

## **Biomimetics an Ultraconservative Treatment for Crack Tooth- an Original Research**

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### **ABSTRACT:**

Biomimetics dentistry is typically applied to restorative and esthetic dentistry, but it can be applied to any dental discipline. It refers to the repair of affected dentition mimicking the characteristics of a natural tooth in terms of appearance, biomechanical, and functional competences. Among ultraconservative modalities, chemical treatments of discoloured, cracked and carious tooth represent the most biomimetics option due to the total conservation of remaining intact tooth. A simplified three increment technique is used in the current study. Composite were placed in increment and the ribbond was inserted a layer prior to the final layer of composite was placed. In the current study the tooth was crack present supragingival of a depth upto 5.5 mm which was effectively restored with the help of composite and ribbond. Soft start pulse curing was done to minimize polymerization shrinkage.

**Keywords:** dental biomaterials, endodontics, restorative dentistry, regenerative medicine.

### **Introduction**

Biomimetic dentistry is the practice of dentistry which applies the concept of Biomimetics. This treatment approach strives to preserve intact tooth structure and restore the function and biomechanics of natural teeth. Biomimetics dentistry is typically applied to restorative and esthetic dentistry, but it can be applied to any dental discipline. Biomimetic dentistry has been developing gradually over many decades, gaining momentum with advances in adhesive dentistry, dental materials, and cariology.

Adhesive dentistry has its beginnings in 1955 when Dr. Michael Buonocore published a ground-breaking paper on the acid-etch technique, in which he states: "A filling material capable of forming strong bonds to tooth structures would offer many advantages over present ones. With such a material, there would be no need for retention and resistance form in cavity preparation." These words would be the beginning of an "adhesive revolution" in which further advances in adhesive dentistry would gradually replace traditional techniques which require more removal and destruction of intact tooth structure.



Additional advancements in restorative materials and caries removal would contribute to techniques, which minimize tooth preparation and maximize pulp vitality.

In dental medicine the concept of Bio mimetic Material is an increasingly applicable word especially in restorative dentistry. The term biomimetics suggests imitation of nature in other words the material should be in some way reproducing one or more natural phenomenon within a biological situation. It also implies that the material will be biocompatible i.e., biologically acceptable to and not rejected by adjacent vital tissue following placement. Such a material may cause low transient, inflammatory response, but it will not release chemical irritants into the vicinity. The secondary meaning of biomimetics refers to mimicking or recovery of the original tooth both in form as well as function.

### **Methodology**

Among ultraconservative modalities, chemical treatments of discoloured, cracked and carious tooth represent the most biomimetics option due to the total conservation of remaining intact tooth [1]. A simplified three increment technique is used in the current study (Figures 1 and 2). Composite were placed in increment and the ribbon was inserted a layer prior to the final layer of composite was placed [2].



**Figure 1.** Preoperative Clinical Photograph



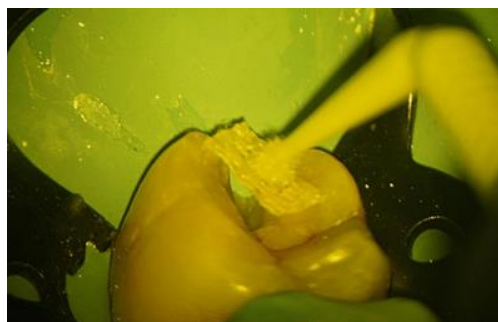
**Figure 2.** Checked For Denatured Collagen



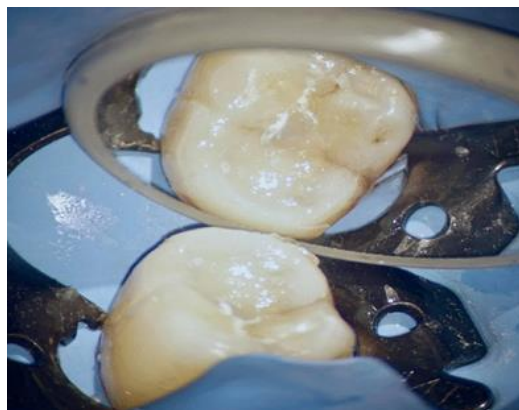
**Figure 3.** At 4mm Depth



**Figure 4.** Air Abrasion with Alumina



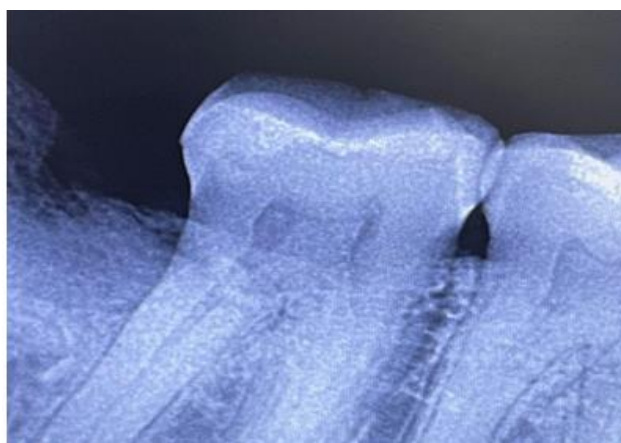
**Figure 5.** Ribbon In Ever X Flow Bed



**Figure 6.** Ever X and Abrasion



**Figure 7.** Occlusion Check



**Figure 8.** Final Iopar

### **Discussion and conclusion**

Ribbon is a combination of patented leno weave and flexible ultra-high molecular weight polyethylene fibers provide manageability. It does not unravel when placed against teeth. This allows placing fibers closely against the teeth and results in thin and comfortable prosthesis for patients (Figure 3).

Ribbon's patented crosslink lock stitch leno weave provides unsurpassed manageability

without compromising its multidirectional integrity and its ability to reinforce composite (Figure 4). The leno weave mechanically interlocks the thread together and prevents slippage of the fibers from unravelling when adapted and also provides fracture toughness by preventing crack propagation with resin matrix within the fibers (Figures 5-7). Thus, in the current study we have used ribbon for a biomimetics approach [3,4].

Cracked teeth are generally diagnosed by transillumination or microscopes [5-7]. The biomechanical and periodontal prognosis and the treatment requirement of a cracked tooth depends on what aspects of tooth are intersected if the stress plane completely fractured tooth stress plane may be completely supragingival and may or may not intersect the pulp chamber, a furcation, a sub gingival aspect of root surface various types of cracks – furcation, cuspal fracture, root fractures, gingival interface fracture or craze lines (Figure 8) [8].

In the current study the tooth was crack present supragingival of a depth upto 5.5 mm which was effectively restored with the help of composite and ribbon. Soft start pulse curing was done to minimize polymerization shrinkage.

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