Think Out Of The Box!

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Teeth have people attached to them! And it is never easy to break the news about an impending loss of a tooth, especially a front tooth, to our patients. The cause of tooth loss or the hopelessness of the situation not withstanding, the decision to sacrifice the natural tooth always seems very cruel to the patients. Moreover, if the loss is inevitable, every patient wants an immediate replacement to escape the social embarrassment of a ‘window’, in their smile. And as clinicians we are expected to meet patients’ expectations who seek a fixed, non-invasive, highly esthetic, non-metallic restoration, which should not also be expensive! All of us have faced this challenging situation many a times in our clinical practice.

Various conventional restorative options to replace missing teeth are: removable partial dentures; porcelain fused to metal or all ceramic fixed restorations; resin-bonded fixed partial dentures; or implant-supported prostheses. However, these restorative alternatives carry their own limitations such as:

- Lack of adequate bone support for abutment teeth or placing the implants
- Excessive removal of healthy tooth structure for abutment preparation, which is considered to be further mutilation by many patients
- Dependence or delay involved in the fabrication which is not acceptable to people who have an active social life. They will also need a provisional restoration
- Multiple appointments which is normal for the fabrication of indirect prostheses
- Repair is difficult and expensive in case of a failure.

Increased patient demands cause thus clinicians to seek materials and techniques that enable minimally-invasive approaches for chair-side applications. Adhesive dentistry permits dental treatment that were previously considered impossible with conventional techniques, opening new frontiers in modern dental restorations. Adhesion has undergone considerable maturation since its introduction to dentistry in the early 1950s by pioneers in the field. In the last decade only, however, our knowledge of adhesive materials has grown exponentially and consequently, there has been a significant increase in the role adhesives play in daily dental practice. With the advent of minimally-invasive dentistry, there has been a paradigm shift, moving away from metal restorations towards adhesive dentistry for the conservation of tooth structure. When minimal tooth structure is removed, bonded composite resins can be placed, which restore the tooth to 90-95% of its original strength and 100% of its original appearance.

The use of adhesive techniques and composite materials reinforced with fiber systems allows clinicians to respond to these demands. Fiber-reinforced materials have highly favorable mechanical properties, & their strength-to-weight ratios are superior to those of most alloys. When compared to metals they offer many other advantages as well, including noncorrosiveness, translucency, good bonding properties, and ease of repair. Since they also offer the potential for chair-side and laboratory fabrication, it is not surprising that fiber-reinforced composites have potential for use in many applications in dentistry. Polyethylene fibers improve the impact strength, modulus elasticity, and flexural strength of composite materials. Unlike carbon and Kevlar fibers, polyethylene fibers are almost invisible in a resinous matrix and for these reasons, seem to be the most appropriate and esthetic strengtheners of composite materials.

The case presented here illustrates an alternative solution to every day clinical problem in an attempt to meet rising demands of our patients.

**Case report**

A 58-year-old female patient reported to our practice with pain in the left lower lateral incisor (Fig. 1). On clinical examination the tooth had grade 4 mobility, was partially avulsed, and sensitive to palpation and percussion. Intra-oral peripical x-rays revealed severe bone loss and a periodontal abscess. The tooth had a hopeless prognosis and a mutual decision to extract it was taken. Nevertheless, the young patient was heartbroken and didn’t want to let go of her natural tooth. Idea of a RPD was devastating to her. Adjacent teeth didn’t fulfill requirements of ideal abutment so we couldn’t promise her a conventional tooth-retained FPD as well. Implant was an expensive option for her at that time, so we had to think out of the box! There are a number of reports in the literature vent the failures, which resulted in difficulty to clean, and collection of plaque, leading to further progression of periodontal disease. The challenge here was to place a thin, but strong natural looking restoration that was non-invasive. I’ve been using natural tooth as a pontic offers the benefits of being the right size, shape and color.

As part of the therapy, complete prophylaxis was carried out, the tooth in question was extracted (Fig. 2) and the site allowed to heal for two days. Complete isolation of the site free of oozing or any moisture is mandatory for bonding, so this delay was considered necessary. When the crown of the tooth is in good condition, it can be easily bonded temporarily to the adjacent teeth with light-cured restorative material. This technique has been used several times by us in the past producing satisfying results. Using the natural tooth as a pontic offers the benefits of being the right size, shape and color. Moreover, the positive psychological value to the patient by using his or her natural tooth is an added benefit. Extracted tooth to be used as pontic was first of all trimmed into the size as per the space available. The open root canal was sealed with composite and polished after being shaped into a modified ridge lap design as this design will meet both esthetic and hygiene requirements. It was decided that all remaining lower incisors would be splinted using Ribbond extending from one canine to the other canine as all the remaining mandibular incisors were also mobile due to periodontal disease.

Two days later patient reported back with a nicely healed site (Fig. 3). Teeth were thoroughly cleaned on the facial, lingual and interproximal surfaces with pumice paste, finishing strips and a prophylaxis cup to remove any traces of surface impurities, which could affect the adhesion adversely. Required length of the fiber was measured with the help of well adaptable soft tin foil provided modulus of the composite resins and hence resists cracking.

"Using the natural tooth as a pontic offers the benefits of being the right size, shape and color"
in the pack. At all times, plasma-treated polyethylene fiber should be handled with care to avoid contamination. It should be taken out of the pack with clean cotton pliers and cut with special Ribbond™ scissors. Another alternative to cut this tough fiber cleanly is using a wire-cutter. After wetting the fiber is wetted with adhesive resin, it should be covered to avoid light exposure till the time of use (Fig. 4).

All surfaces in the canine to canine region were etched for 30 seconds with a 32% phosphoric acid gel. Teeth were then rinsed with air-water spray and gently dried. The lower anterior area was isolated with cotton rolls and adhesive resin was applied with the help of a brush on all the etched surfaces. At this point LC block-out resin was used to block the gingival embrasures so that excess composite does not flow into the gingival embrasures. The unfilled adhesive resin applied on etched surfaces was cured at this point. After this, the extracted trimmed lateral incisor was placed and adjusted in its final position between central incisor and canine to stabilize it using few drops of flowable resin on its proximal sides. The resin was cured according to the manufacturer’s instructions (Fig. 5). Then, composite resin was placed on the middle one-third of the lingual surface from canine to canine. Fiber ribbon was embedded into the composite resin adapting it well onto the teeth surfaces with the help of a plastic filling instrument (Fig. 6). Excess resin was removed and then cured for 20 seconds at least for each tooth. The ribbon should remain completely covered with the resin during this process. Then, composite resin was shaped, finished and polished to achieve an esthetic restoration. To ensure long-lasting functional restoration, occlusion was checked to rule out any contact of the opposing teeth in function or at rest. The restoration done for the patient was found to be stable and functional even after five years.

**Conclusion**

Many a times there is a need for quick and direct replacement for a single lost anterior tooth. For such cases a fiber reinforced restoration not only meets the demands of the patient but also act as a splint for the adjacent mobile teeth. These restorations are esthetic, non-invasive, biocompatible and long-lasting if there is a judicious case selection and protocol of adhesive dentistry is followed. 

References available on request.

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**About the author**

Dr. Sujata Goyal is a professor and heads the department of prosthodontics at Luxmi Bai Institute of Dental Sciences, Patiala, India and also conducts courses on implantology. She is practicing since 1988 with special interest in the field of esthetic dentistry & implantology. She has published internationally on bone manipulation techniques and is a member of the editorial review board of International Journal of Clinical Implant Dentistry. She can be contacted at seth1964@gmail.com.