CASE REPORT
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Resin Infiltration: A Case of Successful Management of Mild Fluorosis

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Abstract

Dental fluorosis is a specific disturbance in enamel formation that leads to subsurface porosity during the late secretory and maturation phases due to excessive fluoride ingestion. The conventional management of teeth discolored by fluorosis involves performing vital tooth bleaching, microabrasion, placement of veneers or crowns, etc. The ultimate choice of treatment is based on the severity of the disease. This paper highlights a clinical case of generalized mild fluorosis treated using the resin infiltration technique, thus reviewing the mechanism of action and clinical procedure.

Keywords: Fluorosis, resin infiltration, white spot lesions

INTRODUCTION

White spot lesions occur due to preeruptive or posteruptive damage, namely during the stages of enamel development leading to fluorosis, traumatic hypocalcification, molar–incisor hypomineralization, etc., or as a result of carious subsurface demineralization, respectively.[1-3]

All of these conditions alter the chemical composition and optical characteristics of enamel, subsequently hampering esthetics.[4,5]

Management alternatives that have been proposed, repeatedly investigated, and commonly practiced for such clinical situations have been the local application of remineralizing agents, microabrasion, bleaching, restorative procedures, etc.

Resin infiltration is a minimally invasive technique available as a commercial product since 2010. The mechanism of action is based on infiltrating a low-viscosity light-curing resin having a high penetration coefficient within the microporosities of the lesion body. This is expected to arrest the carious/noncarious lesion and restore the surface esthetics.

Choosing the right treatment plan in the patient's best interest has always been a dilemma for the dental practitioner, with no "gold standard" protocol that has yet been proposed for treating white spot lesions.

This article presents the successful use of resin infiltration for the treatment of a case of generalized mild fluorosis.

CASE PRESENTATION

A female patient aged 23 years reported a chief complaint of whitish brown patches on the front teeth (Figure 1A). The patient gave a history of living her entire childhood in Agar Village, Akola, located in the Vidarbha region of Maharashtra, India.

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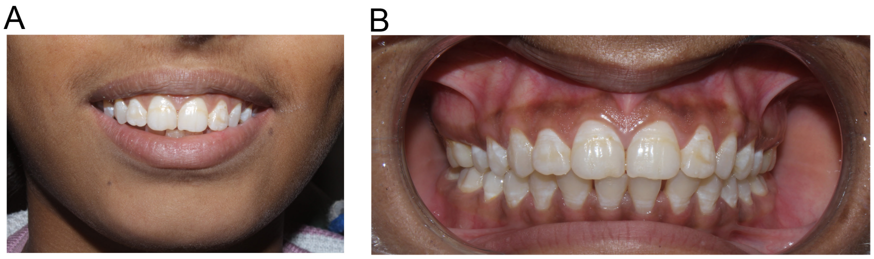

Figure 1. **(A) Preoperative smile. (B) Mild-to-moderate fluorosis of teeth prior to treatment.**

The patient's medical history was noncontributory. She presented with white, opaque, and several light-brown discolored areas on the facial aspect of her anterior teeth. The affected enamel mostly involved the middle and cervical thirds of the teeth (Figure 1B).

On intraoral examination, it was noted that more than 25% and less than 50% of each tooth was affected with the whitish brown staining with no pitting. The final diagnosis established was a mild form of generalized dental fluorosis, corresponding to scores 2 and 3 of Dean's Fluorosis Index.

The patient was explained about various treatment options, such as vital tooth bleaching, microabrasion, resin infiltration, and composite/porcelain laminate veneers. The patient insisted on a minimally invasive treatment plan with immediate esthetic results and no postoperative discomfort. Hence, the patient consented on undergoing the treatment plan of resin infiltration.

The currently available resin infiltration kit (Icon Resin Infiltrant—Smooth Surface, DMG, Hamburg, Germany) contains 3 components, namely:

Icon-Etch: 15% hydrochloric acid, pyrogenic silicic acid, and surface-active substances.

Icon-Dry: 99% ethanol.

Icon-Infiltrant: methacrylate-based resin matrix (TEGMA [Triethylene glycol methacrylate]), initiators.

Thorough oral prophylaxis was performed. The process of resin infiltration was carried out under rubber dam isolation in order to prevent salivary contamination and soft tissue damage due to exposure to hydrochloric acid in the etching phase (Figure 2A).

As the results obtained with resin infiltration depend on the depth and type of lesion, it was first performed on the right upper central and right upper lateral incisors to evaluate its effectiveness prior to infiltrating all teeth (Figure 2B).

A generous amount of the etchant was gently scrubbed onto the tooth surface and then allowed to sit for a period of 2 minutes, followed by a 30-second rinse with water (Figure 3A).

After rinsing with water, the white opacity of the fluorosed area of the tooth decreased (Figure 3B).

Icon-Dry was applied to see a preview of the final result. This provided a consensus on whether the etching step needed to be repeated if the discolored lesion remained.

The etching step in this case was repeated 2 more times after the first etch.

Icon-Dry in the second step of the procedure is applied for 30 seconds to remove the water within the subsurface porosities of the lesion (Figure 3C). This step ensures adequate adhesion of the low-viscosity resin within the lesion.

The Icon-Infiltration gel was applied to the lesions and left to sit for 3 minutes. Before light curing, the excess resin was cleaned from the interdental spaces with a microbrush and dental floss (Figure 3D).

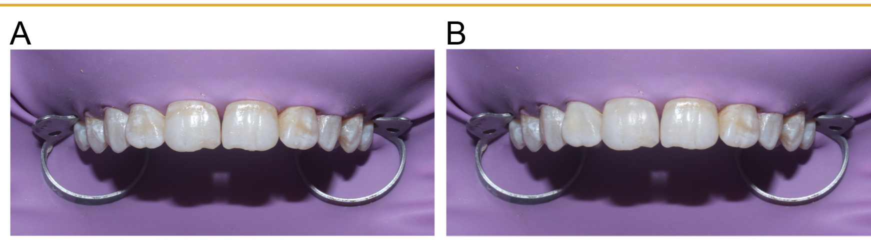

Figure 2. **(A) Rubber dam Isolation. (B) The resin infiltration technique was carried out on the right upper central and right upper lateral incisors.**

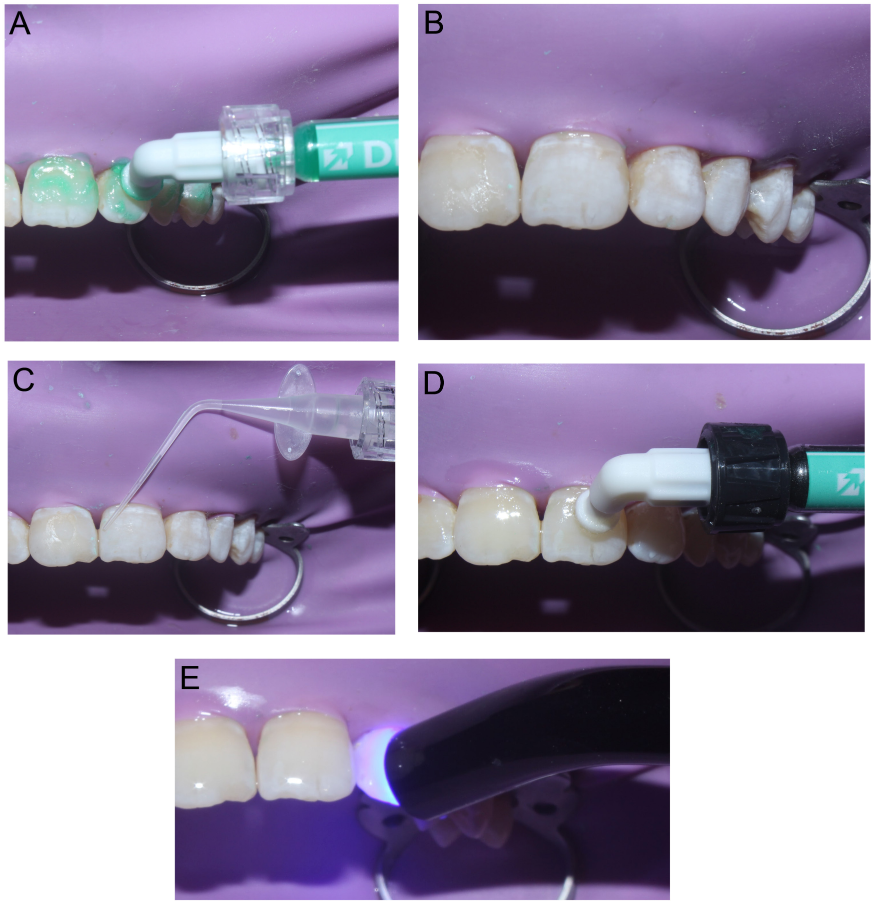

Figure 3. (A) Icon etching. (B) Postrinsing of the etchant. (C) Icon drying. (D) Icon Infiltration. (E) Light curing for 40 seconds.

Light curing was undertaken for 40 seconds, followed by the application of another layer of the infiltrant for 1 minute in order to compensate for the shrinkage during polymerization and to fill any voids (Figure 3E).

It was then rinsed thoroughly and polished using disks and silicone polishers (Figure 4A and 4B).

The esthetic outcome obtained in a single appointment satisfied the patient (Figure 5).

A follow-up was maintained at 1, 3, and 6 months, proving the stability of the results obtained (Figure 6A, B, and C).

DISCUSSION

The management protocol for dental fluorosis varies based on the type of fluorosis and its extent. In most cases of mild fluorosis, the first choice for management is vital tooth bleaching. However, it is important to warn patients about postoperative hypersensitivity and that the white marks may appear whiter and brighter post bleaching. Resin infiltration has proven to be a minimally invasive and convenient treatment plan.

There are several other advantages of using the resin infiltration technique. First, it is a microinvasive procedure where etching only erodes 30 to 40 μm of enamel, which is then infiltrated with resin.[6,7] This contrasts with the treatment of microabrasion, composite fillings, veneers, or crowns, which require a greater portion of the tooth structure to be removed. Secondly, the technique is relatively quick, pain-free, and does not depend on the patient's compliance as compared to other restorative procedures that may require local anesthesia and healing processes.[8]

Possible concerns associated with this technique are the staining and aging of the low-viscosity resin, which may hamper the durability of the esthetic results. Moreover, since differences exist in the depth and type of lesion, it may influence the outcome of cases, proving a lack of standardization in the technique. Clinical trials have reported the maintenance of esthetic results using resin infiltration even after a

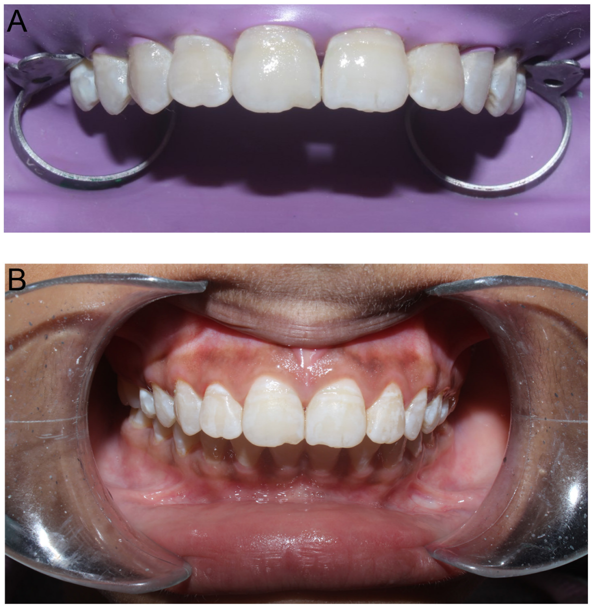

Figure 4. (A) Immediate postoperative following finishing and polishing. (B) Immediate postoperative photograph.

Figure 5. Postoperative smile.

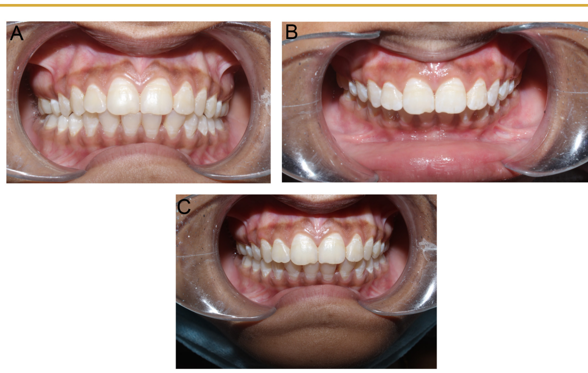

Figure 6. (A) 1-month follow-up. (B) 3-month follow-up. (C) 6-month follow-up.

recall period of up to 12 months for noncarious lesions and 24-45 months for carious lesions.[9-11]

There is a need to conduct more randomized controlled trials with longer recall periods to recommend this technique. However, it is noteworthy that the esthetic results obtained using resin infiltration are very promising, with partial, if not total, masking seen in most cases.
Resin infiltration has opened up a new avenue in a minimally invasive way for the management of anterior tooth discolorations of developmental and carious origin. Working on the mechanism of altering porous enamel having a refractive index of 1.00 or 1.33 to that closer to hydroxyapatite (1.62), it provides optical blending of the lesion with the healthy enamel.

It may be an easy, conservative, and reliable source for the dental practitioner, especially with young patients, serving as a perfect solution to achieve satisfactory esthetic results.

Informed Consent: Written informed consent was obtained from the patient who agreed to take part in the study.

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