



## Complete Resolution of Dental Fluorosis Stains Using Microabrasion and In-Office Vital Bleaching: A Case Report

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### Abstract

Dental fluorosis is a developmental enamel defect caused by chronic ingestion of excess fluoride during tooth formation, manifesting clinically as white opacities, brown discolorations, or pitting.<sup>1,2</sup> Management of aesthetic concerns in fluorosis-affected dentitions remains aclinical challenged due to the intrinsic nature of the staining. This case report describes the successful management of dental fluorosis (Dean's Index Grade 3)<sup>1</sup> in an 18-year-old male patient presenting with brown banding across the maxillary anterior teeth (13 to 23). A two-phase minimally invasive treatment protocol was employed: microabrasion using 6.6% hydrochloric acid with silicon carbide (Opalustre®) in the first appointment,<sup>3,4</sup> followed by two sessions of in-office vital bleaching using 35% hydrogen peroxide with UV light activation (Pola Office®) at 15-day intervals.<sup>5,6</sup> Each appointment was supplemented with GC Tooth Mousse® to manage post-operative sensitivity.<sup>7</sup> The brown fluorotic bands resolved completely, with clinically satisfactory and aesthetically pleasing results. The patient has been regularly followed up since September 2025 with stable outcomes. This case highlights the efficacy of a combined microabrasion and vital bleaching approach in managing moderate dental fluorosis without resorting to invasive restorative procedures.

**Keywords:** dental fluorosis, microabrasion, vital bleaching, Opalustre, Pola Office, tooth whitening, Dean's Index, enamel discoloration, hydrogen peroxide, CPP-ACP

### Introduction

Dental fluorosis is a chronic, dose-dependent condition resulting from prolonged ingestion of elevated levels of fluoride (>1 ppm) during the pre-eruptive mineralization phase of tooth development.<sup>1,2</sup> The condition leads to hypomineralization of enamel, with clinical manifestations ranging from subtle white streaking to widespread brown discoloration, opacification, and surface pitting, depending on the severity of fluoride exposure.<sup>9</sup> It is classified using Dean's Fluorosis Index, which grades severity from 0 (normal) to 4

(severe), with Grade 3 (moderate fluorosis) characterized by brown staining covering less than half of the tooth surface along with noticeable attrition.<sup>1</sup>

The prevalence of dental fluorosis has been reported to be particularly high in regions with naturally elevated fluoride content in groundwater, including several parts of the Indian subcontinent.<sup>9</sup> Although the condition is not associated with pain or functional compromise, the aesthetic implications—especially in

the maxillary anterior teeth—can have a significant psychosocial impact on patients, affecting self-esteem and quality of life.

Management options for fluorosis-related discoloration range from conservative microabrasion and bleaching to more invasive approaches such as composite veneers and full ceramic restorations.<sup>3,11</sup> The minimally invasive paradigm in contemporary dentistry advocates exhausting conservative options before undertaking irreversible tooth preparation.<sup>12</sup> Microabrasion using acidic abrasive compounds removes a thin layer of superficial enamel and effectively eliminates superficial stains.<sup>3,4</sup> When the discoloration extends deeper, vital bleaching using hydrogen peroxide serves as an adjunct to achieve further lightening.<sup>6,13</sup> The combination of these two modalities has shown clinical promise in addressing moderate fluorosis aesthetics.

Several case reports have documented the successful use of vital bleaching techniques—including both in-office and at-home protocols—for management of tooth discoloration arising from various etiologies including fluorosis, tetracycline staining, and age-related discoloration.<sup>13,14,15,16</sup> In-office bleaching with high-concentration hydrogen peroxide (35-38%) under light or UV activation offers the advantage of rapid results under controlled clinical conditions.<sup>5,6,17</sup> This case report presents the successful combined use of Opalustre® (Ultradent) for microabrasion and Pola Office® (SDI, Australia) 35% hydrogen peroxide for in-office vital bleaching with UV light activation in a young male patient with moderate dental fluorosis, resulting in complete resolution of brown banding with stable outcomes.

## 2. Case Report

### 2.1 Patient Presentation

An 18-year-old male patient reported to the Department of Conservative Dentistry and Endodontics with a chief complaint of brown discoloration of the upper front teeth since childhood. The patient was aesthetically concerned and sought treatment to improve the appearance of his smile. There was no history of trauma, caries, or prior dental treatment to the affected teeth. The patient's medical history was non-contributory.

On clinical examination, generalized brown banding was observed across the labial surfaces of the maxillary anterior teeth from the right canine to the left canine (teeth 13, 12, 11, 21, 22, and 23). The stains were intrinsic in nature, distributed across the middle and cervical thirds of the crowns, and were not removable by routine scaling and polishing. No pitting, surface cavitation, or attrition was noted. Dean's Fluorosis Index was assessed, and the case was classified as Grade 3 (Moderate Fluorosis), characterized by widespread brown staining on the affected teeth.<sup>1</sup> Periapical radiographs of the involved teeth confirmed vital teeth with no periapical pathology, adequate pulp chambers, and no signs of internal resorption.

After a thorough clinical examination, the treatment objectives were discussed with the patient. The proposed minimally invasive approach—comprising microabrasion followed by in-office bleaching—was explained, including expected outcomes, potential sensitivity, and the need for follow-up.<sup>11,12</sup> Informed consent was obtained prior to initiating treatment.

**Figure 1. Pre-treatment frontal view showing generalized brown fluorotic banding across the maxillary anterior teeth (13–23).**



Figure 2,3. Pre-treatment lateral views: (a) right lateral and (b) left lateral, showing extent of brown fluorotic staining.



## 2.2 Treatment Protocol

Treatment was carried out over three appointments at 15-day intervals, preceded by a professional prophylaxis appointment.

### Preparatory Appointment - Professional Prophylaxis

Prior to any bleaching procedure, a thorough supragingival prophylaxis was performed using a rubber cup and prophylaxis paste to remove all plaque, calculus, and extrinsic stains. This ensured a clean tooth surface for subsequent treatment and allowed accurate assessment of intrinsic staining.<sup>6</sup>

### Appointment 1 - Microabrasion with Opalustre®

Opalustre® (Ultradent), a microabrasion compound containing 6.6% hydrochloric acid in a water-soluble paste with silicon carbide microparticles,<sup>3,4</sup> was used in the first treatment appointment. Soft tissue was protected using a gingival barrier. The compound was applied to the labial surfaces of teeth 13-23 using a slow-speed handpiece with a rubber polishing cup at a consistent, low-pressure rotary motion. Two applications were performed per session, each lasting approximately 60 seconds, followed by rinsing with copious water. The tooth surfaces were evaluated after each application. Following completion, the area was thoroughly rinsed and the surfaces were polished.

As the patient reported mild post-operative sensitivity, GC Tooth Mousse® (GC Corporation, Japan)—a

topical creme containing Recaldent™ (CPP-ACP: casein phosphopeptide-amorphous calcium phosphate)<sup>7</sup>—was applied to the treated surfaces at

the end of the appointment. The patient was instructed to apply GCTooth Mousse® at home twicedaily using a finger or a soft brush.

**Figure 4,5. Microabrasion views following two applications of Opalustre® showing initial reduction in brown banding.**



### **Appointment 2 - In-Office Vital Bleaching (First Session)**

The second appointment was scheduled 15 days after microabrasion. Pola Office® (SDI, Australia), a 35% hydrogen peroxide in-office bleaching agent<sup>5,6</sup> was used. The gingival tissue was protected using a light-cured gingival barrier (Pola Dam®). The bleaching gel was applied to the labial surfaces of the maxillary anterior teeth (13-23) in a uniform layer and light-activated using a UV curing light for three cycles of 8 minutes each (total active application time: 24 minutes per session), as per the manufacturer's protocol.<sup>17</sup> UV light activation was employed to enhance the decomposition of hydrogen peroxide and accelerate the release of free radicals, thereby optimizing the bleaching efficacy.<sup>17,18</sup> Between each cycle, the gel was gently removed and reapplied followed by UV activation. On completion, the gel and barrier were removed, and the teeth were rinsed thoroughly. GC Tooth Mousse® was applied in-office<sup>7</sup> and the patient was instructed to continue home application for sensitivity management.

**Figure 6,7. Clinical photographs showing the first in-office Pola Office® bleaching session with UV light activation.**



**Figure 8. Clinical photograph after the first in-office Pola Office® bleaching session demonstrating progressive lightening.**



**Appointment 3 - In-Office Vital Bleaching (Second Session)**

The third and final treatment appointment was conducted 15 days after the second. The same Pola Office® protocol was repeated: three cycles of 8 minutes each with UV light activation, 5,17 under gingival protection. The patient was reviewed for sensitivity, which was reported as mild and transient. GC Tooth Mousse® was applied at the conclusion of the appointment.

**Figure 9. Clinical appearance after the second in-office Pola Office® bleaching session showing complete resolution.**



**Figure 10,11. Final post-treatment outcome: (a) right lateral and (b) left lateral views demonstrating complete resolution of brown fluorotic banding with uniform tooth color.**



### Treatment Outcome

Following the completion of all three treatment appointments, the brown fluorotic banding that had been present across teeth 13-23 was completely resolved. The labial surfaces appeared uniformly lighter and aesthetically pleasing, with no residual brown discoloration visible clinically. The patient expressed high satisfaction with the treatment outcome. No adverse effects such as gingival irritation, enamel pitting, or exacerbation of surface defects were noted.

Sensitivity, which was reported as mild throughout the treatment, subsided completely within the follow-up period with the continued use of GC Tooth Mousse®.<sup>7</sup> The patient has been placed on regular recall appointments since the completion of treatment in September 2025, with stable aesthetic results observed at all follow-up visits to date.

### Discussion

Dental fluorosis, particularly in its moderate form (Dean's Index Grade 3), presents a management dilemma in daily clinical practice.<sup>1,9</sup> While the brown discolorations are purely aesthetic and do not compromise tooth vitality or function, they carry significant psychosocial consequences—especially in adolescents and young adults—due to their visibility in the smile zone. The irreversible nature of conventional restorative interventions (veneers, crowns) makes conservative alternatives highly desirable in young patients with otherwise intact tooth structure.<sup>11,12</sup>

Microabrasion is a well-established technique for the removal of superficial intrinsic stains by combining the acid-dissolution and mechanical abrasion of a thin outer enamel layer.<sup>3,4</sup> Opalustre® employs 6.6% hydrochloric acid combined with silicon carbide abrasive particles, which act synergistically to abrade superficial discoloration while leaving deeper enamel intact. The technique is particularly effective for stains confined to the outer 200-300 µm of enamel.<sup>3</sup> In the present case, the brown fluorotic bands were present in the superficial layers of enamel, rendering microabrasion an appropriate initial intervention.

In cases where the discoloration extends beyond what microabrasion can address alone, vital bleaching with hydrogen peroxide serves as a powerful adjunctive modality.<sup>6,13</sup> Pola Office® 35% H<sub>2</sub>O<sub>2</sub> is a high-concentration, chairside bleaching system that acts through the oxidative degradation of chromogenic compounds within the enamel and dentinal tubules.<sup>5,6</sup> The free radicals generated from hydrogen peroxide break down conjugated double bonds in pigmented organic molecules, resulting in a perceptible lightening of tooth color.<sup>8</sup> In the present case, UV light activation was employed alongside the gel application to potentiate the decomposition of hydrogen peroxide, enhancing the generation of reactive oxygen species and thereby improving bleaching efficiency.<sup>17,18</sup> The three cycles of 8-minute application used in the present case are consistent with the recommended protocol, ensuring adequate contact time and efficacy while minimizing the risk of pulpal irritation.<sup>5</sup>

Several published case reports corroborate the effectiveness of in-office vital bleaching in managing intrinsic tooth discoloration. Haywood and Heymann<sup>13</sup> first described nightguard vital bleaching as a viable conservative option for intrinsic staining. More recently, reports by Demarco *et al.*<sup>14</sup> and Joiner<sup>15</sup> have documented the successful use of in-office hydrogen peroxide bleaching for fluorosis-related and generalized intrinsic discoloration, highlighting the importance of patient selection and shade monitoring. Al-Qunaiyan<sup>16</sup> reported satisfactory outcomes with a combined microabrasion and bleaching protocol specifically in fluorosis cases, consistent with the findings of the present report. Furthermore, Tavares *et al.*<sup>17</sup> demonstrated that light augmentation of peroxide-based bleaching significantly enhances whitening outcomes, supporting the UV-activated protocol employed in this case.

The use of GC Tooth Mousse® in this case was a pragmatic choice given the patient's reported sensitivity. CPP-ACP has been demonstrated to facilitate remineralization of bleaching-induced demineralized enamel, reduce post-operative sensitivity, and help maintain the structural integrity of the treated enamel surface.<sup>7,10</sup> Its application both in-office and at home allowed effective symptom management without interrupting the treatment timeline.

The 15-day interval between appointments allowed adequate recovery and remineralization of the enamel. This gap is consistent with the recommendations for high-concentration in-office bleaching to avoid cumulative dehydration, sensitivity, and pulpal insult.<sup>6,18</sup> The combination of microabrasion followed by bleaching in sequential appointments has been advocated in the literature as a conservative, synergistic approach for moderate-to-severe fluorosis management, with outcomes often superior to either modality used in isolation.<sup>11,16</sup>

The complete resolution of brown banding in this case underscores the efficacy of this combined protocol in carefully selected patients. The stable follow-up results observed since September 2025 suggest that the treatment outcome is durable. However, patients with fluorosis should be counselled regarding the possibility of recurrence or unmasking of deeper staining over time, necessitating periodic recall.<sup>9,11</sup>

The absence of restorative intervention preserves maximum tooth structure, which is of particular importance in an 18-year-old patient with a long dental lifespan ahead.

Limitations of this report include the lack of a quantitative shade measurement using a spectrophotometer or standardized VITA shade guide documentation, which would have provided an objective measure of treatment efficacy.<sup>15</sup> Additionally, longer follow-up data would strengthen the evidence for treatment durability. Future prospective studies with standardized outcome measures are warranted to validate this combined approach in larger fluorosis cohorts.

## Conclusion

This case report demonstrates that a sequential, minimally invasive combination of microabrasion using Opalustre® and in-office vital bleaching with Pola Office® 35% H<sub>2</sub>O<sub>2</sub> with UV light activation can achieve complete aesthetic resolution of moderate dental fluorosis (Dean's Index Grade 3)<sup>1</sup> in a young patient. The protocol was well-tolerated, with sensitivity effectively managed using GC Tooth Mousse®.<sup>7</sup> The results were clinically satisfactory and have remained stable on follow-up. This approach offers clinicians a conservative, tooth-structure-preserving alternative to restorative rehabilitation for fluorosis-related discoloration,<sup>11,12</sup> particularly in young patients where irreversible interventions should be deferred wherever possible.

## Patient Consent Statement

Written informed consent was obtained from the patient for publication of this case report and any accompanying clinical photographs. The patient was informed of the educational and scientific purpose of the publication.

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