Case Report: Esthetic Management of Fluorosis-Like Discolored Dentition in the Adolescent Patient


INTRODUCTION:
Dental fluorosis is a condition affecting teeth that is the result of ingesting water with a fluoride content greater than 1 part per million during the “maturation phase of tooth development” (1). The affected dentition has an “increased surface and subsurface porosity of the enamel” and an opaque white appearance possibly with areas of “yellow to dark-brown discoloration” (2). Esthetic management can include enamel microabrasion, air abrasion, in-office or home bleaching, composite resin restorations, composite or porcelain veneers, or a combination of these treatments. The following case report describes the esthetic management of discolored dentition resembling dental fluorosis of a thirteen year-old patient.

CASE HISTORY AND DIAGNOSIS:
A thirteen year-old female presented with permanent dentition that resembled full-mouth fluorosis. In addition, some teeth, especially #3, 8, 9,14, 19, 24, 25, and 30, had areas of brown discoloration (Photo 1).

A medical history revealed that the patient had received a vaccination when she was 3 months old, and developed a “lump” under her arm. The patient experienced high fevers, became dehydrated, was hospitalized for almost a month, and had the lump removed. It would have been at approximately this age when the patient’s permanent maxillary central incisors, mandibular central and lateral incisors, and maxillary and mandibular first molars began hard tissue formation (3). Because systemic influences on developing dentition can lead to enamel defects (4), this patient’s illness may have resulted in a disturbance in the development of some of her teeth, producing an altered enamel structure.

The medical history also revealed that other family members had discolored teeth similar to the patient’s. These family members all resided in the same area as the patient, San Luis, Mexico, and may have all consumed the same water supply. The level of fluoride that was present in the water supply in that area, however, is unknown. The patient lived in this area for approximately two years.

Although a definitive diagnosis has yet to be made, consultation with two oral pathologists led to the conclusion that the patient’s teeth most resemble full-mouth dental fluorosis.

TREATMENT OPTIONS:
There are a variety of esthetic and conservative treatments to be used in esthetically managing teeth with dental fluorosis or fluorosis-like discoloration. The first treatment that can be recommended is enamel microabrasion (5). Enamel microabrasion consists of a pumice and an acidic agent being applied to the tooth. By “mechanical and chemical removal of the surface layer of enamel”, these two agents help remove the discoloration and smooth the enamel surface (6). Sometimes this technique, alone or combined with bleaching, is all that is esthetically needed (7). Other times, however, the discoloration extends more deeply, and the use of composite resin restorations is indicated in addition to the microabrasion (8). Composite resins can also be used to even out the facial surface when surface irregularities are present after microabrasion (9). If the amount of tooth structure lost after microabrasion is extensive, or the discoloration extends very deeply, composite or porcelain veneers may be necessary (10).

For small surface fluorosis-like discolorations, air abrasion excavation combined with the use of composite resin can be pursued (11). If the discoloration is shallow, air abrasion alone may produce the esthetic results desired by the patient (12).

TREATMENT PLANNING:
Radiographs and impressions for diagnostic casts were taken, and a comprehensive oral head and neck exam was performed. The patient expressed an interest in removing or decreasing the discoloration of #8 and #9. However, neither the patient nor the patient’s parent expressed esthetic concerns with the rest of the discolored dentition. Taking this into consideration, then, along with the patient’s age, gingival maturity, and financial considerations, the esthetic treatment to be pursued would be air abrasion and composite veneers of the two maxillary central incisors only.

TREATMENT:
Pre-treatment photographs were taken. After completing
most other preventive and restorative treatment, restoration of teeth 
#8 and #9 began.

- Visit 1: A rubber dam was placed isolating #8 and #9, which
  were then air abraded with an air abrasion unit (Dentsply
  Midwest’s Air Touch Cavity Detection and Treatment System).
  Aluminum oxide particles 50 mm in size was used at 70psi.
  After air abrasion, additional restoration was needed to restore
  the facial contour and to lighten the deeper discoloration.

- Visit 2: The patient returned for post-air abrasion photographs
  (Photo 2), cosmetic mock-ups, and composite veneers. For the mock-
  up, a white opaque flowable hybrid composite (DentMats FloRestore
  Flowable Composite with Fluoride) similar in shade to the other
  teeth was applied to #8 and #9. The patient thought this made
  #8 and #9 look too white. Some of the opaquers was removed
  and then a layer of translucent compomer (Dentsply/Caulk’s
  DyractFlow Flowable Compomer Restorative Material), chosen by
  the operator for its translucency and ease of handling, was
  placed over the opaquer. Although this mock-up was not a uniform
  color, it blended better with the uneven white opaque appearance
  of the rest of dentition. The patient and her family were
  satisfied with this mock-up.

The composite and compomer were then removed, and the facial
surface was lightly prepared with a fine tapered diamond. Some areas
of dark discoloration on the distofacial surfaces were removed with
a carbide bur. The teeth were etched, primed and bonded. The
opaquer was applied, followed by application of the translucent
compomer. The teeth were finished and polished with finishing burs
and polishing points (Dentsply/Caulk’s Enhance points).

- Visit 3: The patient returned for additional translucent
  compomer to be added to better contour the facial surface. Due
to time limitations, only a brief polishing was given with polishing
cups and paste (Dentsply/Caulk’s Enhance cups and Prisma-Gloss),
and post-treatment photographs were taken (Photo 3).

- Visit 4: Approximately 11 weeks later, the patient returned to
  the clinic reporting that the restoration on one of the teeth had
  chipped. An instrument was used to evaluate the integrity of the
  facial surfaces of #8 and #9, and parts of both of the restorations
came off. Instead of repairing #8 and #9 with the original combination
  of composite and compomer, a hybrid resin-based composite was
  chosen as the restorative material for its strength. “This type of resin-
  based composite is highly filled with glass and silicon dioxide and has
  high strength, low expansion and contraction, low polymerization
  shrinkage and ease of finishing, but relatively high wear (or plucking)
  and surface roughness compared with microfills” (14). In order to
  achieve as white of a color as possible, it was decided that microabrasion
  would be performed on these teeth before placing the composite.

  Anesthesia was administered and a rubber dam with floss
  ligatures was placed. The old composite and compomer were
  removed. Microabrasion was performed on #8 and #9 using an
  abrasive slurry and rubber cups (Ultralithe’s Opalustre Enamel
  Microabrasion Slurry) on a latch-type slow-speed handpiece.
  Fluoride gel was then applied to #8 and #9. After the fluoride had
  been removed, the teeth were lightly abraded with a diamond bur,
  acid etched, and treated with a primer and bonding agent in one
  (Dentsply/Caulk’s Prime and Bond NT adhesive). A hybrid resin
  based composite was placed (3M Dental Products’ 3M Restorative
  Z100), and then floss ligatures and rubber dam were removed, and
  the teeth were finished and polished. This composite, however, did
  not match the whiteness of the opaquer, and the patient was not as
  pleased with these restorations as she was with the first restorations.
  Therefore, it was decided that the restorations would be redone, this time
  combining the whiteness of the opaque flowable composite with the strength
  and aesthetics of a translucent hybrid composite.

- Visit 5: The patient returned for another appointment, in
  which teeth #8 and #9 were rubber dam isolated. Some of the old
  composite was removed, and a cosmetic mock-up was performed.
The patient viewed the mock-up and approved. The mock-up was
  removed, and #8 and #9 were treated with acid etchant, and
  priming and bonding agent. Flowable opaquer and a microhybrid
  composite (Coltene/Whaledent’s Synergy Transparent composite)
  were placed. The teeth were then finished and polished. The
  patient viewed the restorations and said she liked them. The patient
  returned in sixteen days to have post-treatment photographs taken.

- Visit 6: Final post-treatment photographs were taken (Photo
  4).

DISCUSSION:
Treating this patient exposed the operator to the different
handling characteristics and esthetics among hybrid resin-based
composites, a flowable hybrid composite, and a compomer. Al-
though the translucency of the compomer used in the first restoration
was esthetically pleasing, this material was not the best choice
for a composite veneer. “The principal areas for the use of
compo systems are in minimal stress areas such as deciduous
and adult Class 3 and 5 cavities” (15). Perhaps too
much stress was placed on the first restorations, causing them to
fracture. The second restoration that was placed, a hybrid resin-
based composite, would probably have performed better for
the patient, but the esthetics were not satisfactory. With the third
restoration, the flowable composite opaquer was combined with
the translucent hybrid composite. This created a restoration in
which esthetics and strength were now combined to produce a
result with which both the patient and the dentist were pleased.

Ideally, enamel microabrasion of the entire dentition, followed
as necessary by bleaching and then composite resin restorations,
may have been the most esthetic management of this patient’s
dentition. However, the patient expressed esthetic concern for
teeth #8 and #9 only, and thus a more limited treatment was
pursued. Fortunately, the patient is young and can pursue addi-
tional esthetic treatment in the future if she so desires. Most
importantly, the patient is happy with the current restorations.
CONCLUSION AND CLINICAL RELEVANCE:
All of the various methods of managing dental fluorosis-like discolorations benefit the patient in many ways. To begin with, conservative techniques are available allowing for minimal removal of tooth structure (16). Also, patients can sometimes pursue other less expensive treatment options than porcelain veneers. Last of all, treatment options can be tailored to meet patients’ desires, esthetically restoring their dentition to a level at which they are pleased. This is rewarding to both the patient and the dentist as well.

REFERENCES:
2. Neville 47.
10. Rodd 409.


Dr. Mary Baechle was an AEGD resident at The University of Texas Houston Health Science Center Dental Branch at the time of patient treatment.

Dr. Richard Behermeyer is an Associate Professor in the Department of Restorative Dentistry and Biomaterials at The University of Texas Houston Health Science Center Dental Branch.

Dr. Sheila Koh is Assistant Professor and Assistant Director of the AEGD Program in the Department of Restorative Dentistry and Biomaterials at The University of Texas Houston Health Science Center Dental Branch.