

FIBER OPTIC TRANSILLUMINATION OF POSTERIOR CARIES

A Clinical Case Study



ABOUT THE AUTHOR



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TRANSILLUMINATION

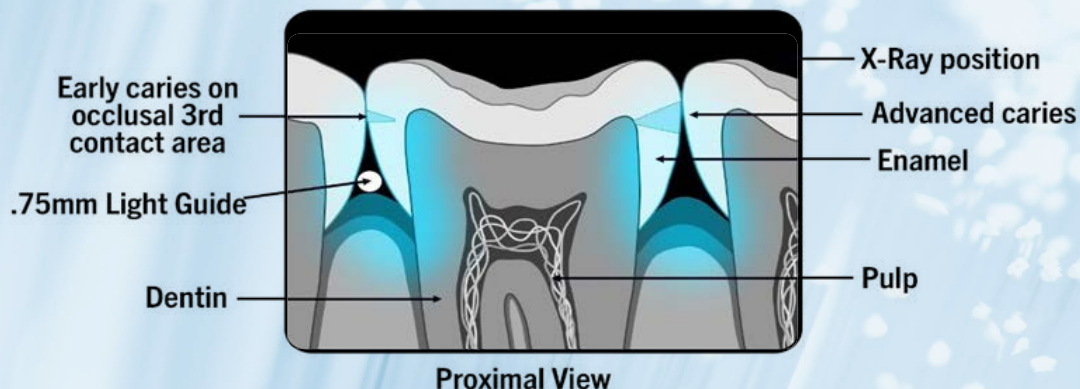
has been used in the medical field for almost one hundred years¹. In the dental field, it was used for over 60 years to visualize tooth cracks, calculus, and dental caries on anterior teeth. In 1970, an article by Friedman & Marcus² showed the first use of Fiber Optic transillumination (FOTI) for diagnosing caries on posterior teeth. This technique works because of the different ability of light transmission between tooth structure, restorative materials, and dental caries. A fiber optic light source provides a small, focused beam of visible light that can pass through teeth and oral structures, (fig 1(c)). A big advantage to FOTI is that it does not produce ionizing radiation

and is therefore preferable to X-rays for children and women who are pregnant. FOTI is designed to be used in concert with radiographs. Studies have shown good correlation between FOTI and bite wing radiographs³⁻⁷. However, there are many situations where FOTI can show the bucco-lingual spread of a caries lesions which cannot be seen on an X-ray. This condition exists because the buccal-lingual caries penetration is not seen in the anterior-posterior viewing plane as with X-rays. Other applications for FOTI not covered in this article, include cracks, periodontal abscess, periapical abscess, and the location of a root canal orifice.



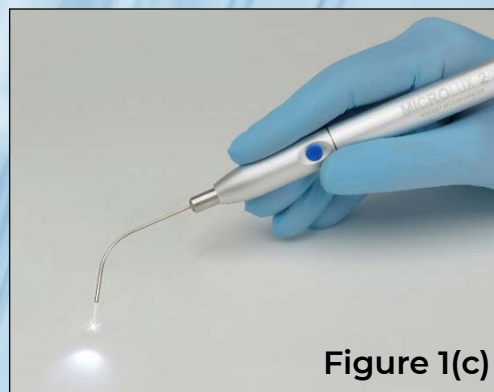
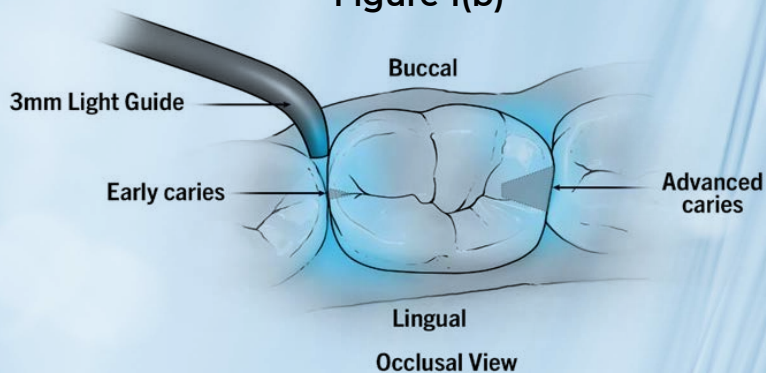
The technique for showing caries with FOTI is shown in figure 1. There are two ways to examine posterior teeth for approximal caries as follows:

Figure 1(a)



1. Place the light guide in the cervical proximal region. Move the light guide apically and occlusally and view the caries as a shadow on the occlusal surface. A small lesion appears as a small triangle. A large lesion takes on a trapezoidal shape. See Figure 1(a)

Figure 1(b)



2. Use a .75 mm Proximal Fiber light guide with a Microlux Transilluminator (AdDent, Inc. Danbury, CT.). The location of this small fiber in the interproximal space creates a light source directly under the contact area. This technique can produce a sharper caries image than the technique described in (1) above. See Figure 1(b) and 1(c).

In the following clinical case study, technique (2) was used with the photographic results shown.

CLINICAL CASE STUDY

Dental caries is the most prevalent chronic disease worldwide. When initial lesions are taken into account into the clinical assessment, only few individuals are truly unaffected. In most industrialized countries 60-90% of school-aged children are affected and nearly 100% of the adult population is affected.⁸ Traditional methods combined with more sensitive methods may improve the caries diagnosis and also help the clinician in monitoring non-operative treatments.

Early detection of caries is crucial for the preservation of teeth. X-rays were taken of a young patient with good oral hygiene during a recall session (Fig 2). An initial lesion was visible in the interspace of the upper right premolars. To verify the diagnosis, the teeth were checked using the FOTI technique.

For optimal use of the light source to illuminate the interdental spaces, it is advisable to apply a rubber dam (Fig 3)

Two light sources have been used to detect these lesions. It's important to try different illumination angles to get a better contrast. Figure 4 used an 3 mm glass light guide. Figure 5 used a 0.75 mm proximal fiber light guide (Adent. Inc). The 0.75 mm light giude paced in the interproximal space as shown in Figure 1(a) was a little more effective in visualizing this clinical situation.

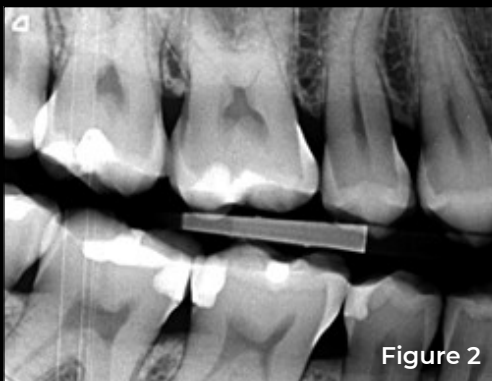


Figure 2

Bite-wing



Figure 3

Rubber Dam in Place



Figure 4

Using 3 mm light guide



Figure 5

Using 0.75 mm proximal light guide

CLINICAL CASE STUDY

The preparation was performed using a small diameter round diamond bur. The carious lesions on both teeth are visible. (Fig 6.) To finalize the preparation the caries was removed completely using rotary instruments. The margins of the preparation were beveled with an interdental strip to achieve a better marginal seal of the adhesive restoration (Fig 7). A curved matrix band was adapted with a wooden wedge to achieve an anatomical contour of the restoration (Fig 8).

In this case, a total-etch technique was used (Fig 9). A wide variety of filling techniques are available and can be used according to individual preferences and abilities. Further details have therefore been omitted in this short report. A sufficiently powerful polymerization lamp with at least 600 mW/cm² should be used in every practice (Fig 10).



Figure 6

Opening of the caries lesions using a small diameter diamond bur



Figure 7

Final preparation of the cavity



Figure 8

Curved matrix band adapted with a wedge



Figure 9

Total etch technique used in this case for bonding

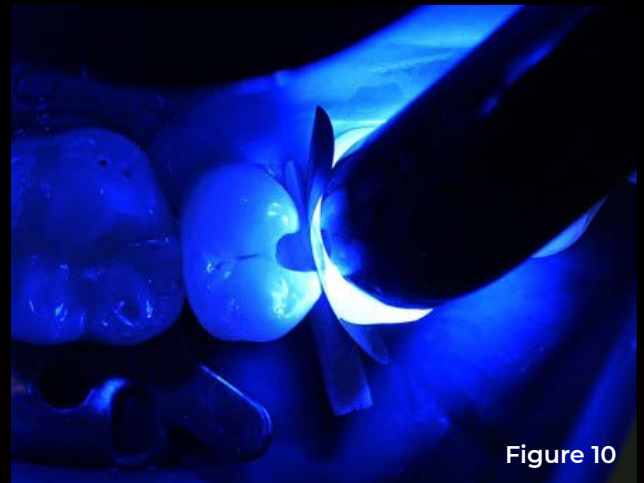


Figure 10

Polymerization lamp with at least 600mW/cm²

CLINICAL CASE STUDY

The composite is applied to the cavity. I used preheated composite in a Calset and dispensed with a Comax applicator. I am keeping the composites heated during the composite application into the cavity (Fig 11). The advantages of this protocol have been described in various articles. Excess material is still removed under a rubber dam (Fig 12). The transillumination image shows the optical integration of the composite fillings in the surrounding tissues (Fig 13).

Immediately after removal of the rubber dam the final restorations are checked and polished giving an overall satisfactory result for the patient (Fig 14)



Figure 11

Composite applied with CoMax dispenser



Figure 12

Final restorations before removing the rubber dam

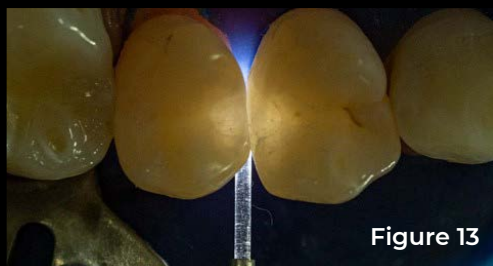


Figure 13

Transillumination of finished restorations



Figure 14

Final result immediately after removal of the rubber dam

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