Silver Nitrate and Sodium Fluoride on Enamel Caries

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EARLIER reports (Miller, 1950, 1951) have described how no reduction in the incidence of dental caries resulted from the biannual treatments of oral hygiene, silver nitrate, or sodium fluoride.

It was decided, in 1950, to study whether a more frequent application of silver nitrate or sodium fluoride could prevent dental caries in a pit of fissure in the first permanent molars, and to study concurrently the effect of each of them on the initiation and on the progress of carious lesions in the approximal surfaces of deciduous molars.

Prime (1937) advocated the application of silver nitrate as a method for the detection of early carious lesions and, when combined with some degree of rendering the area self-cleansing, as a method of caries control. His study did not distinguish the separate value of rendering the cavity self-cleansing; thus in the present series a study was also attempted of the effect of silver nitrate on the progress of dental caries when the cavity is not rendered self-cleansing.

In the previous studies, the failures to prevent caries in pits and fissures by topical application had been observed. This failure was considered to result from one or more of three possible causes:

(1) The treatment may not reach the surface of the enamel to be protected, i.e. the base of the fissure or the approximal area; and therefore could not exert its preventive effect where it was necessary.

(2) The chemical used for the treatment may have had no caries-preventive properties or the caries-preventive properties were not sufficiently active to overcome the power of the caries attack.

(3) The nature of the caries attack did not permit prevention by any topical measure; it had been observed that caries could commence in a fissure before the tooth was fully erupted.

Before carrying out further tests of topical treatments it was decided to study whether the treatments reached the base of the fissure. Experiments *in vitro* using methylene blue or silver nitrate showed that the topical application should penetrate to the base of a fissure and in many cases penetrate the enamel. The evidence *in vitro* justified clinical studies, and fissures were treated with silver nitrate prior to removal of the teeth for orthodontic reasons. Sections were made of teeth which had received a series of six two-monthly applications of silver nitrate; heavy deposits of silver could be seen at the base of the fissures. Fig. 1 shows a transversely-

FIG. 1.—T.S. of a fissure showing silver staining of enamel around the fissure. × 13.

ground section through the base of a fissure and a heavy deposit of silver can be seen outlining the fissure; in higher magnification (fig. 2), the silver could be seen outlining the prisms. There also appeared to be penetration into the dentine to some degree, with no evidence of dentine caries.

In a group of 140 children the effects of treatments of silver nitrate and sodium fluoride were studied for:

(1) the effect on the initiation of caries in
  (*a*) pits and fissures in first permanent molars,
  (*b*) approximal lesions in deciduous molars,
(2) The effect on the progress of caries in non-self-cleansing approximal lesions in deciduous molars.

The children were divided into balanced groups for age and caries experience as shown in Table I. In the majority of children the first permanent molars were expected to erupt soon after the study commenced; the remaining