

Preventive Dentistry

Topical Fluoride

Lec.8

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D- Restorative Materials Containing Fluoride

Fluorides releasing dental restorative material provide site specific protection. In general, the rate of fluoride release from such materials is not constant but exhibits a relatively rapid initial rate, which decreases with time. When compared with non-fluoride releasing materials, fluoride releasing materials may feature:

- Greater longevity,
- A reduced incidence of marginal failure,
- An elevated concentration of fluoride in contingent plaque, together with
- An antibacterial action.

The purpose of adding fluoride to restorative material is to capture its anticariogenic property. The fluoride ions are slowly released from the materials. One difficulty with these materials is controlling the rate of fluoride release. Fluoride may be released from dental restorative materials as part of the setting reaction, or it may be added to the formulation with the specific intention of fluoride release. Fluoride has also been added to amalgam in an attempt to reduce the risk of recurrent caries at restoration margins.

Fluoride containing restorative materials includes:

- Glass ionomer cements
- Resin modified glass ionomer cements,
- Polyacid modified resin composites (compomers),
- Resin composites,
- Fissure sealants and
- Dental amalgam.

Fluoride releasing components have included fluoroaluminosilicate glasses (FAG), stannous fluoride (SnF_2) and organic amine fluorides (CAFH) etc.

F. Fluoride Containing Devices (Slow Release)

As a constant supply of low levels of fluoride, especially at the biofilm/saliva/dental interface, being of the most benefit in preventing dental caries, it is reasonable to expect a positive effect on caries prevalence of a treatment able to raise intraoral F concentrations at constant rates, without relying on patient compliance.

Considering that intraoral levels of F play a key role in the dynamics of dental caries, it has been suggested that the use of controlled and sustained delivery systems can be considered as a means of controlling dental caries incidence in high-risk individuals. Thereafter, a topical system of slow and constant F release was considered.

There are three types of slow-release F devices: the copolymer membrane type, the glass bead, and recently, a third type, which consists in a mixture of sodium fluoride (NaF) and hydroxyapatite.

Fluoride Ingestion and Toxicity of Professionally Applied Topical Fluoride:

Fluoride applications must be carefully monitored because the potential for over ingestion and toxicity exist. Fluoride is rapidly absorbed in the gastrointestinal tract and young children are particularly vulnerable.

The exposure to and retention of fluoride foam by the patient may be significantly less compared with APF gel application. Fluoride varnish has a high fluoride concentration, but its safety is acceptable. Varnish is fast setting, fluoride is slowly released, and a small amount is needed for the complete dentition. Measurements of fluoride after topical treatments with varnish show levels below those considered toxic. Consequently, varnishes may be a better alternative to fluoride gels, especially for young children. Topical fluoride application is not a risk factor for dental fluorosis 1. When used at 6 months intervals, and 2. If precautions are taken to minimize ingestion.

Self-applied fluorides

Self-application of fluoride is usually carried out with groups of persons, usually children at one time, under only general supervision, in contrast to professionally applied fluoride treatments which are expensive because they depend upon one professionally trained person treating one person at a time, with expensive equipment or supplies.

Requisites for self applied fluoride agents:

1. Should be completely safe.
2. Should be effective for preventing caries.
3. Method should be suitable for use by large groups and at a reasonably low cost.
4. Should be acceptable to participants.
5. Should be easy to use to ensure compliance.
6. Should require few professional personnel.
7. Should be able to be supervised by non-dental personnel after short periods of in-service training.

Fluoride dentifrices

Investigation in to effectiveness of adding fluoride to toothpaste has been carried out since 1945 and covers a wide range of active ingredients in various abrasive formulations.

Fluoride compounds that have been tested for caries-inhibitory properties include

- sodium fluoride,
- acidulated phosphate fluoride,
- stannous fluoride,
- sodium monofluorophosphate and
- amine fluoride.

Most toothpaste nowadays contain sodium fluoride or sodium monofluorophosphate or combination of both as active ingredient,

Usually in concentration of 1000-1500 mg F/g.

Toothpaste is the most readily available form of fluoride, and tooth brushing is a convenient and accepted habit in most cultures.

The general functions of toothpaste are:

- 1- Physico-mechanical function: by action of the abrasive materials and toothbrush.
- 2- Chemical function: by reaction of fluoride with outer enamel surface and antimicrobial effect.

Fluoride Concentration in Toothpaste

The caries preventive effect of low fluoride toothpastes intended for children (< 1000 ppm) is inferior compared with the adult products (which is 1500 ppm). Consequently, the benefits of caries prevention must be balanced with the risk of fluorosis for children under 6 years old. So use only a pea-sized amount for children under six years old also should be supervised in the use of toothpaste to prevent swallowing.

High fluoride toothpastes with 2500–5000 ppm fluoride are available in some countries and intended for:

- Caries-active individuals over 16 years of age
- For patients with special needs
- For weak elderly people may promote root caries arrest.
- Caries-active adolescents to reduce progression of approximal caries.

The content of fluoride in dentifrices will decrease with increase in the time of storage i.e 6 month or more.

Following brushing there will be retention of fluoride in the oral fluid and dental plaque. Fluoride ions released gradually in the saliva and there by maintains a degree of protections against caries. The increase in the frequency of brushing will increase the benefits of fluoride. The reduction of dental caries was 24%–25%.

Fluoride mouthrinses

Frequent use of low concentration of fluoride is more cariostatic than less frequent use of higher concentration of fluoride for topical application. In areas where water fluoridation is not possible or not implemented, the fluoride mouthrinses found to be an effective tool in prevention of dental caries. For reasons of lowest expense, convenience in handling as well avoidance of unpleasant taste, NaF became the most widely used of these tested products in public health programs.

Indications

- Patients who, because of the use of medication, surgery, radiotherapy, have reduced salivation and increased caries formation.
- Patients with orthodontic appliances or removable prostheses, which act as traps for plaque accumulation.
- Patients unable to achieve acceptable oral hygiene.
- Patients with extensive oral rehabilitation and multiple restorative margins, which represent sites of high caries risk.

- Patients needing fluoride in their home care but cannot tolerate a custom-fitted tray.
- Patients with gingival recession and susceptibility to root caries.
- Patients with rampant caries.

Daily rinses should be recommended rather than a weekly regimen; as:

1. the daily procedure appear to be slightly more effective and also
2. as a practical consideration, it is easier for patients to remember and comply with a daily procedure.

In all these instances, the rinses should not be used in place of any of the other modalities of fluoride use but as part of a comprehensive, preventive program that should also comprise plaque control, frequent fluoride topical applications, the home use of a fluoride dentifrice, and diet control.

In communities with fluoridated water supplies or with natural occurring optimum fluoride level in drinking water, mouth rinsing programs would give a super added benefit.

Recommendations:

Mouth rinses designed to be 10 ml rinse and spit out, ***0.2 % of NaF solutions are recommended (900 ppm F -) for weekly fortnightly use, while 0.05 % (225 ppm F -) for daily use.*** Due to the risk of swallowing, fluoride rinsing is not advocated to children below 6 years of age. The caries reduction is about 26%-30%.

Fluoride Gels for Home Use

During the past 15 years, a number of fluoride gels have become available as additional measures that may be used to help achieve caries control. These procedures contain

- 1- 0.4% stannous fluoride (1,000 ppm fluoride)
- 2- 1.0% sodium fluoride (5,000 ppm) and are formulated in a non aqueous gel base that does not contain an abrasive system.

Recommendation

The usage involves tooth brushing with gel (similar to using a dentifrice), allowing the gel to remain in the oral cavity for 1 minute, and then expectorating thoroughly. They may be considered as an alternative to the use of fluoride rinses and an adjunct to the use of professional, topical fluoride applications and fluoride dentifrices as a collective means of achieving caries control in patients who are especially prone to caries

formation (e.g. patient with rampant caries). Like fluoride rinses, the use of F gels is generally restricted to the period required to achieve caries control. It should be stressed that fluoride gels should not be used in place of fluoride dentifrices. Proper use of these preparations in combination with professional topical fluoride applications and the home use of fluoride dentifrices may be expected to help achieve caries control in caries-active patients.