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Astringents in Dentistry: A Review

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Abstract

Astringents are substances that cause constriction of soft tissues. They have a massive use in bleeding control in various dental procedures such as impression making in fixed prosthodontics, class V restorations and root surface restorations, etc. Besides it, these also increase gingival resistance against infection. This manuscript overview various types of astringents and their indications for use in dentistry.

Keywords: *Astringents, Gingival Retraction, Root Surface Restoration.*

Introduction

Periodontium and restoration are interrelated to each other. For the success of dental procedures such as fixed partial dentures, class V and root restorations, the health of the periodontal structures should be maintained. Harmony between the prosthesis and periodontal structures can be maintained by having a good marginal fit to prevent food lodgement that can lead to gingival inflammation and ultimately failure of the prosthesis. This can be prevented during impression making with gingival

retraction **(1)**. Gingival retraction can be classified into mechanical, chemo-mechanical, and surgical methods **(2)**. The chemo-mechanical method uses astringents to maintain hemostasis.

Definition

Astringents are defined as a drug that reacts chemically with cellular proteins producing limited coagulation which is accompanied by shrinkage of body tissues. Astringents are derived from the Latin word *"Adstringere"* which means *"to bind fast"*. These toughened the surface by making it mechanically stronger and decrease exudation. In dentistry, astringents are used during gingival retraction as well as in the management of periodontal disease cases. Besides this, while doing Stage-II to expose dental implants these can be used to control bleeding.

Classifications: These are classified into three groups according to their mode of action:

1. Chemicals decrease the blood supply by constricting the small blood vessels.
2. By removal of water from the tissue.
3. By coagulation, the superficial tissue layers into a crust.

Natural Astringents

Sources: Raw fruits and vegetables such as lemon, cranberry, legumes, peas, cauliflowers, turnips, and beans. Besides this green tea, wine is also having a property know as astringency.

Mechanism of Action

These act by precipitating the proteins. They act as a protective layer that covers the surface of the cell or tissue. Hence, it protects from external irritation and tissue remains impermeable to the passage of fluid in either direction and hence diminishes the excretion or exudation of superficial cells. Since it is a surface phenomenon it does not usually destroy host tissue. It stimulates the growth of new tissues when they are applied topically or in small quantity and produces irritation or corrosive effect when in concentrated solutions to remove undesirable tissue growth.

Use of astringent results in:

- Constriction of capillaries and small blood vessels in stopping of blood by coagulation.
- Anti-inflammatory action decreases the supply of blood to tissues.

- Antiperspirant action by reducing the pore size of the skin.
- Antimicrobial action by protein precipitation mechanism.

Types of Astringents

1.Chemical Astringents: Aluminium sulfate, Alum (3): It is one of the most commonly used astringents. A 10-minute application is usually sufficient.

Disadvantage: Shown to disturb the setting of PVS impression materials.

Mechanism of Action:

Upon application of aluminum sulphate, these come in contact with the protein present within the tissue. This leads to precipitation of tissue protein which causes decrease capillary movement of plasma protein and ultimately arrests capillary bleeding.

2.Ferric sulphate

It is generally used in the concentration of 13% to 20%. The recommended packing time for the cord is 1 to 3 minutes. After careful preparation of the cervical margins in an intra-crevicular position, hemorrhage is controlled using a specifically designed **Dento-infusorTM** with a ferric sulfate medicament **(4)**.

Disadvantages

Stains gingival tissues a yellow-**brown to black color** due to iron content in it**5**. This may compromise esthetics since it has been shown to produce internalized discoloration of the tooth structure. The acidity of the commonly used gingival retraction medicaments ranges from 1 to 3. This results in the removal of the smear layer and can decrease the bonding mechanism of the self-etch dentin bonding systems.

3.Zinc Chloride

Available in different percentages of concentrated solutions that vary between 8%-40%. Retraction of gingiva is as effective as epinephrine **(6)**. This major disadvantage of using this material is its high concentration that is 8% can result in necrosis of tissue that takes more than 60 days to heal whereas 40% is used for the cautery agent.

4.Ferric Subsulphate

Commonly known as Monsel's solution. It is more effective than epinephrine and results in tissue recovery within 3 minutes. The major disadvantage of using this material leads to black-blue discoloration of soft tissue and enamel **(7)**.

5.Tannic acid

It has an excellent tissue recovery but is recommended to apply for a period of 10 minutes **(8)**. Its astringent effectiveness is minimal.

6.Negatol solution

It consists of metacresol sulfonic acid and formaldehyde. Being highly acidic, it decalcifies teeth easily. It provides better retraction than epinephrine but its tissue recovery is poor **(9)**.

Disadvantages of Chemical Astringents

1. Occurrence of rebound hyperemia.

2. Inflammatory reaction induced by these chemicals.

Least irritating: Aluminium chloride 25%

Most effective: Aluminium chloride & Aluminium potassium sulphate

7.Gum Astringent

Gum paints are a combination of antiseptics and tanning agents that also act by precipitating proteins and affect only the superficial layer making it mechanically stronger and decreases exudation. They have different properties such as germicidal, fungicidal, anesthetic and healing properties. When applied, they provide an astringent effect.

- Dentakind-L gum astringent works by destroying bacteria that reduces gum inflammation or swelling and other microorganisms. By creating a sensation of numbness at the site of application, it also relieves pain and hence discomfort of the patient. It is reapplied every 3-4 hours.
- 'Sensorok' gum astringent with zinc sulfate is used for gum massage 2-3 times daily**10**. Other commonly available brands in the market are Gumex and Pyastringent, Payogum and Pyosan.

8.Herbal Astringents

1. **Sage:** Anti-inflammatory, mild antiseptic. It also has anti-bacterial properties which prevent plaque formation and prevent tooth decay.

   Dosage: 2 tablespoons in 1 cup of boiling water, steam for 15 mins.

Duration: Used maximum for 7 days, twice a day.

Indications: In patients with a mouth sore and for tightening the gums.

2. **Rhatany:** Antiseptic and anti-inflammatory. Applied with cotton pellet on the gingiva before scaling for a soothing effect. Used maximum for seven days.

3. **Aloe vera:** It is a medicinal herb that comes from the family "Asphodelaceae" genuine "Aloe". It has good antiseptic and anti-inflammatory properties used in the treatment of gingivitis and periodontitis. Its mouth rinses and dentifrices showed a remarkable reduction in plaque accumulation **(11)**.

   Indications:

   - In case of gingivitis and periodontitis
   - Indenture stomatitis patients due to its anti-fungal properties
   - To reduce gingival pocket depth and gingival bleeding.

4. **Salt water (12):**

Indicated in wound healing by increasing blood flow at the affected site.

5. **Citric acid**

Indicated:

- In cases to enhance gingival reattachment after flap surgery
- Cleaning implants
- Repair tissue defects.

6. **Myrrh:** this ancient herb is known for ages and has a lot of medical properties. Myrrh oil is used as a mouth rinse by adding to warm water is effective to maintain good oral hygiene.

Indicated in cases such as:

- Mouth ulcers
- Healing of gingival gums
- In the treatment of tooth decay and gingival diseases.

Uses of Astringents in Dental Procedures: -

1. **Role of astringents in Fixed Prosthodontics**

These work during displacement of gingiva known as a gingival retraction to maintain hemostasis during accurately recording the gingival finish line. Astringents may be administered by retraction cords already impregnated with the agent or by applying them to cotton pellets. Some of the examples are an alum, aluminium chloride, zinc chloride (8-20%) and tannic acid. Styptics are the concentrated form of astringents. They cause superficial and local coagulation. Some of the examples are ferric chloride and ferric sulfate. Aluminum chloride and Ferrous sulfate are preferred astringents amongst prosthodontists because they cause minimum tissue damage.

2. **Role of astringents in Complete denture patients**

Studies have also suggested that the use of astringent gums for massage tends to increase keratinization of palatal mucosa and denture-bearing mucosa in completely edentulous patients **(13,14)**. They are also used in obtaining maxillary impressions. Mouth wash with astringents helps in the removal of excess mucous secretions in the oral cavity and thus minimizing the effects due to mucosal secretions **(15)**.

3. **Role of astringents in Periodontology**

On a broad scale, astringents do not deal with periodontal diseases. They tend to reduce symptoms as well as bleeding. Their main mode of application is to reduce gingival bleeding by tissue improvement rather than constriction of the vessels. It is mainly indicated in hyperaemic, bleeding tissue.

4. **Role of Astringents in Restorative Dentistry**

Though used in small amounts they are helpful in class V or root surface restoration by applying on gingival tissues before making an impression.

Conclusion

For intraoral applications, astringent materials comprise active ingredients which immediately react with the tissue upon contact. In general, astringents do not deal with periodontal problems. However, they decrease symptoms. But in certain instances, it is necessary to have a strong astringent remedy to proceed further with the patient treatment. In a case with extreme hyperaemic tissue, the use of astringent herbs is indicated. Hence, astringents help a dentist in obtaining good gingival health without affecting the quality of their work and help in creating blood and moisture-free field when required.

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