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Antisialagogues: Role in Prosthodontics

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Abstract

The desirability of keeping the oral tissues relatively dry at the time of the various procedures is generally accepted. Salivary secretion is a viscid and watery extracellular fluid which is produced and secreted by salivary glands within the mouth. This secretion can be either produced in excess or deficient quantities: Hypersalivation or Hyposalivation respectively. Hypersalivation can complicate many dental procedures. A method found effective for controlling salivary secretion involves the use of an antisialogogue in combination with mouth rinses and gauze packs. Antisialogogues are drugs or substances that help to reduce the salivary flow. Anticholinergic drugs are effective antisialogogues which are being used for reducing normal salivation during intraoral procedures. To support the use of antisialogogues during dental procedures or to reduce chair time do not have any strong scientific evidence. The side effects of using antisialagogue for a nonmedical indication only for some particular dental procedures have not been examined. The potential of these classes of drugs in prosthodontic treatment has not been explored much. Hence, this study aims to review the role of antisialogogues in prosthodontics.

Keywords

Antisialogogue, Saliva, Hypersalivation, Prosthodontics.

Introduction

Saliva is a viscid and watery extracellular fluid which is produced and secreted by salivary glands within the mouth [1]. Human saliva contains 99.5% water and other contents include 0.5% electrolytes, mucus, white blood cells, epithelial cells, enzymes, antimicrobial agents [2,3]. Saliva has manifold functions in protecting the integrity of the oral mucosa by lubricating mouth and upper aerodigestive tract.

Salivary secretion dysfunction can be caused due to various reasons. Hyposalivation and hypersalivation (ptyalism) are such extreme dysfunction. Hypersalivation is excessive production of saliva. Hypersalivation can complicate dental procedures like lower arch surgery, bonding or orthodontic bracketing, bridge and crown cementation, laminate and veneers cementation, cord packing, impression taking mainly full mouth impressions, operative dental procedures, restoration procedures mainly filling class V cavities and sealants and radiographic procedures when a dry field is important [4]. When the mucus secretion from these glandular aggregates is not controlled adequately, the accuracy of the complete denture impression is affected markedly, as many impression materials are hydrophobic [5]. Zinc oxide and eugenol impression pastes, polysulfide, and synthetic rubber impression materials are more likely to be suffering from glandular secretions. The desirability of keeping the oral tissues relatively dry at the time of the various procedures is generally accepted. A method found effective for controlling salivary secretion involves the use of an antisialogogue in combination with mouth rinses and gauze packs [5].

Antisialogogues are drugs or substances that help to reduce the salivary flow. Their origin could also be both natural and artificial. They decrease the flow by altering the action of myoepithelial cells within the salivary glands, by blocking the response to acetylcholine at the effector organs innervated by postganglionic cholinergic fibres, thus producing a dry field [6]. Anticholinergic drugs are effective antisialogogues which are being used for reducing normal salivation during intraoral procedures. Atropine sulfate is the first anti-cholinergic which is marketed specifically for dentistry as it is indicated for reduction of salivation and bronchial secretions. Other antisialogogues used are scopolamine, glycopyrrolate, methantheline, propantheline, hyoscyamine. These drugs may produce side effects, like cycloplegia, mydriasis, and difficult urination, but intolerance is rare. Antisialogogues are contraindicated in patients with glaucoma, synechiae (adhesions between the iris and lens of the eye), pregnancy, asthma, prostate hypertrophy, myasthenia gravis, obstructive disease of GIT, allergy to drug, etc[6].

The use of Antisialogogues in reducing salivary flow has been reviewed for more than 30 years [7]. But it's use in dentistry in various fields have not been reviewed. Antisialogogues are used mainly as premedication in surgery and in orthodontics before bonding procedure. In prosthodontics use of antisialogogues can help in various procedures like impression making, cord packing, luting of fixed partial dentures mainly while cementing laminates and veneers, etc. It's role in prosthodontic has not been known. Hence, this study aims to review the role of antisialogogues in prosthodontics.

Review of Literature

The role of saliva is diverse and it plays a fundamental role in clearing the mouth of the food residues. It helps as a buffer to reduce the deleterious effects of strong acids and bases and provides the ions needed to remineralize the teeth. Additionally, it possesses antibacterial, antifungal and antiviral capacity [8,9]. The components of saliva facilitate the motor functions of chewing, swallowing and speaking also as sensory and chemosensory functions within the mouth [10]. Salivary secretion plays a central role within the maintenance of oral homeostasis. The patients who have reduced salivary flow are in danger for serious oral complications like increase in oral infections like candidiasis, burning mouth, abnormal taste sensations, caries and difficulty with speech [11].

Hypersalivation is also a salivary secretion dysfunction which can be due to anxiety, or conditions like rabies, pellagra, pancreatitis, liver disease, pregnancy, Sjogren syndrome, etc. Medications which can cause hypersalivation are aripiprazole, clozapine, pilocarpine, ketamine, potassium chlorate, risperidone, pyridostigmine, etc. Substances that can cause hypersalivation include mercury, copper, organophosphates (insecticide), arsenic, nicotine, thallium, etc[12]. Hypersalivation can also be due to some infections which decrease clearance of saliva such as tonsillitis, retropharyngeal and peritonsillar abscesses, epiglottitis and mumps, fracture or dislocation of the jaw, neurologic disorders such as amyotrophic lateral sclerosis, myasthenia gravis, parkinson's disease, multiple system atrophy, bulbar paralysis, bilateral facial nerve palsy, and hypoglossal nerve palsy [13,14].

The anticholinergic drugs (the most commonly used type of antisialogogues) that have been recognized by the American Dental Association (ADA) for salivation control and are used in dentistry for that purpose are atropine, hyoscyamine, scopolamine, glycopyrrolate and propantheline as well as methantheline. These agents are known to decrease salivary secretion by cholinergic antagonist action. They decrease salivary secretion by inhibiting the action of myo-epithelial cells within the salivary glands thus producing a dry field. Anticholinergic drugs also cause bronchodilation and a decrease in bronchial secretion, rate of respiration could also be increased, reduce the tone of lower esophageal sphincter, gastric secretions are inhibited and gastric emptying is delayed. In therapeutic doses, mild vagal excitatory effects are noticed and in higher doses, prominent manifestations are restlessness, delirium, disorientation and hallucination, these are seen as a result of central nervous system excitation. This is often followed by generalized CNS depression. Physostigmine, 15 to 60 µg/kg intravenously is the specific treatment for anticholinergic overdose [15]. Anticholinergic are the most commonly used antisialogogues in dentistry.

Many dental procedures need dry mouth to yield better results. Lucia [16] said that the mouth should be dry during the impression making procedure and suggested premeditating the patient with atropine sulfate or banthine. Atropine is usually used to treat nerve problems, bradycardia , poisoning, and as a premedication for surgeries [17]. Atropine and glycopyrrolate block muscarinic receptors showing vagolytic activity, but they have no activity on nicotinic receptors. Atropine sulfate or scopolamine is usually used to control secretion from salivary glands when taking impressions or cementing inlays and crowns, it's given from l/300 to l/150 grain of either atropine sulfate or scopolamine. intravenously, rarely more, and during

the procedure the patient's mouth is dry and stays so for a few hours [18].

The mode of administration of antisialogogues is typically intravenously or intramuscularly [17]. Oral absorption of anticholinergic drugs isn't sufficiently predictable to warrant its use as antisialogogue, absorption with intramuscular approach is prompt. Atropine and scopolamine can easily penetrate the blood brain barrier as they are lipid-soluble tertiary amines and hence they have more side effects. Required intramuscular dose of atropine for reliable antisialagogueeffect ranges from 10-20 microgram/kg weight. Oral dryness and blurred vision are seen within 10 to fifteen minutes after intramuscular administration of 0.4 to 0.6 mg of Atropine. It shouldn't be administered within 2 to 3 hours of ingestion of antacids or absorbent antidiarrheal drugs, as they impair absorption of atropine. Copen reported on the addition of atropine to dental local anesthetics.

Banthine and Pro-Banthine drugs are recommended as commonly used antisialogogues. Lucia[16] has recommended oral administration of 50 mg of Banthine and 15 mg of phenobarbital 1 hour before appointment and the second dose just before starting the dental procedure [5,19]. Side effects shown by these drugs are mydriasis, cycloplegia, difficulty in urination, intolerance to those drugs is rare. Atropine shows more side effects than Banthine. Pro-Banthine seems to be the drug of choice for salivary suppression during impression making procedures because it is a stronger drug than Banthine, and also has minimal side effects, rare intolerance, and simple oral administration [5]. Pro-Banthine 15 mg tablets which should tend half-hour before commencing the medical procedure. Most of the antisialogogues have its duration of action from 4 to 6 hours [5]. Neither Banthine nor Pro-Banthine should be administered to patients with glaucoma, prostatic hypertrophy, or cardiac conditions during which any increase within the pulse is contraindicated [19].

Bernstein et al. [20] found that oral administration of glycopyrrolate had limited role in salivary and gastric secretion, but intramuscular glycopyrrolate significantly decreased salivary secretion, but didn't affect gastric secretion. In his study intravenous administration of glycopyrrolate on the opposite hand significantly decreased both salivary and gastric secretion due to higher peak level in plasma which wasn't achieved by intramuscular route. Forantisialagogue effect the required intramuscular dose of glycopyrrolate is 5-8 microgram/kg weight [21]. Bernstein et al. [20] used 0.2 mg glycopyrrolate and 0.6 mg Atropine Sulphate as antisialogogue, both the drugs showed significant reduction in salivary secretion 30 min after intramuscular administration. Glycopyrrolate crosses the barrier to a minimal degree compared to atropine sulphate as glycopyrrolate may be a poorly lipid-soluble quaternary ammonium compound. Glycopyrrolate produced a more stable pulse rate with reduced frequency of tachycardia and arrhythmia. As Glycopyrrolate has a stable cardiac rate, it is considered superior to atropine sulphate as an antisialogogue[21].

Methantheline and Propantheline (synthetic atropine derivatives) are few samples of antisialogogues. De Bré[22] used methanline bromide given orally as antisialogogues in dentistry, the various systemic actions of atropine would appear to preclude its general use for this purpose. Methantheline bromide, however, is somewhat less potent than the natural alkaloid in suppressing parasympathetically innervated secretions and also induce fewer side effects [15]. De Bre[22] found that use of 50-100 mg methanline is required orally to regulate salivation, but it's use suppressed gastric

secretion and motility. It's use in dentistry through oral administration proved unsatisfactory. First evidence of the onset of this suppression may be a thickening of the saliva. Thus, the anticholinergic blockade appears to inhibit the serous gland units before the mucous secretory unit [15]. Propantheline has shown to be 5 times stronger than methanline[15]. Clonidine (0.2mg) an antihypertensive and methantheline (50 mg) have shown almost the same results as an antisialogogue[23]. For the specified reduction in salivary flow, the oral administration of atropine, scopolamine, or methantheline and propantheline should precede the clinical procedure by 1 to 2 h, half to 1 h, or one-half an hour, respectively. Medications with anti sialogogic effects include probanthine (7.5 to 15mg), robinul (1 to 2 mg), saltropine (0.4 mg) and antipasbentyl (10 to 20mg). Anticholinergic drugs are contraindicated in patients with glaucoma, myasthenia, prostatic hypertrophy, various gastrointestinal disorders like ulcerative colitis, obstructive disease, intestinal atony [24].

Antisialogogues used in dentistry is not a new phenomenon as it exists in the literature since the last 30 years. There are many studies and review articles which have shown its use in favour of many dental procedures mainly in prosthodontics and orthodontics, but all studies indicated that antisialogogues were useful in reducing salivary flow to facilitate dental treatment, even though they have no consensus for use in dentistry and proper indications or guidelines for its use in dentistry [25–27]. Antisialogogue helps in reduction of salivary flow but does it help in reducing chairside time or improves the quality of impression or restorations like improving the integrity, longevity, improving bonding protocol,etc all these parameters have not been evaluated. Another important factor is patient satisfaction, this was evaluated only in one study using a questionnaire and the results showed that the patient had better experience of dental treatment when antisialogogue was administered. Use of antisialogogue can help the dentist aid better results of some tedious procedures and can also help by having better patient co-operation. Further comparative studies should be done to prove if use of antisialogogue is beneficial for yielding better results.

Conclusion

Antisialogogues have shown promising results in reduction of salivary flow, mainly the anticholinergic drugs. To support the use of antisialogogues during dental procedures or to reduce chair time do not have any strong scientific evidence. The side effects of using antisialagogue for a nonmedical indication only for some particular dental procedures have not been examined.

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