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Drugs Used During Prosthetics Rehabilitation –A Review

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Abstract

The art and science of prosthodontics has become highly differentiated and more spectacular progress has been made in it than in any other dental specialty. Prosthodontics is that specialty of dentistry which deals with patients of all ages, hence making it more important to know about the local and systemic effects of drugs and their side effects. Drugs in prosthodontics act as a primary treatment modality as well as facilitator of dental procedures. Success or failure of a clinical procedure often hinges on the proper application of pharmacologic principles of locally acting drugs. Hence in this article a brief review of various drugs that are used in complete, partial , fixed and implant prosthesis are mentioned.

Keywords : Antibiotics, Analgesics, Prosthodontics, Implants

Introduction

Pharmacology can be defined as "The study of substances or drug's that interact with living systems through chemical processes, especially by binding to regulatory molecules and activating or inhibiting normal body processes".[1] "Nobody enjoys pain, physical or mental, and pain is by many ways associated with dentistry". Pain is the most common chief complaint in dental practice. One of the most common drug that is prescribed by a dentist is nonsteroidal anti-inflammatory analgesic.

The art and science of prosthodontics has become highly differentiated and more spectacular progress has been made in it than in any other dental specialty. [2]Prosthodontics is that specialty of dentistry which deals with patients of all ages, hence making it more important to know about the local and systemic effects of drugs and their side effects. Drugs in prosthodontics act as a primary treatment modality as well as facilitator of dental procedures.[3] Success or failure of a clinical procedure often hinges on the proper application of pharmacologic principles of locally acting drugs. Drugs that are used in prosthodontic treatment can be grouped into removable

complete and partial prosthesis, fixed prosthesis and implant prosthesis.

The drugs used in removable complete and partial prosthesis include antifungal drugs, sialagogues, anti-sialagogues, topical anaesthetics, antihistamines,sedatives, tranquilizers, denture cleansers, parasympatholytics and CNS depressants. The drugs used in fixed prosthesis include haemostatic agents, local anaesthetics, and astringents. The drugs used in implant prosthesis include antibiotics, nonsteroidal anti-inflammatory drugs, topical corticosteroids, and antianxiety drugs.

The two main divisions of pharmacology are pharmacokinetics and pharmacodynamics.

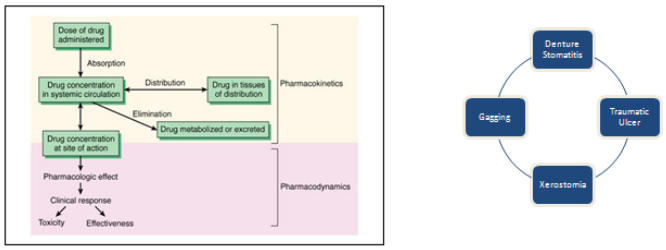

Fig 1: Schematic depiction of pharmacokinetics & pharmacodynamics process

Fig 2 :Pharmacology in Prosthodontics

Drugs Implicated In Removable Complete And Partial Prosthesis

Placement of removable prosthesis in the oral cavity produces profound changes of the oral environment that may have an adverse effect on the integrity of the oral tissues .[4]

The presence of different types of dental materials in the oral cavity may further accelerate the irritation process associated with wearing of dentures. Some of the direct & indirect sequelae caused by wearing removable complete or partial dentures

Denture stomatitis

Denture stomatitis or denture sore mouth or chronic atrophic candidiasis is a type of candidiasis in which the palatal mucosa in contact with the denture is affected and is chronically erythematous and oedematous. It is due to adherence of Candida albicans to the denture and production of pyruvates and acetates, which decrease the pH.[5] Newton (1962) classified denture sore mouth into three clinical types:

1. Localized simple inflammation ,
2. Generalized simple inflammation
3. Inflammatory papillary hyperplasia (involving hard palate and alveolar ridge)

Drugs used

Treatment should be continued for 4 weeks that includes avoid wearing the denture at night, wash the denture with soap and water, clean the denture with chlorhexidine gluconate 0.20% solution, alkaline peroxide solution, and hypochlorite solution, and antifungal therapy .[5]

Antifungal therapy may be topical or systemic

• Topical agents are available in various formulations, including oral rinses, mouth paint, tablets, troches, powders, and creams .[6]

Traumatic ulcer

Traumatic ulcers may be caused in the denture wearers due to friction between the tissue surface of the denture and mucosa.[7]Primary line of treatment includes discontinuation in wearing dentures and application of topical anaesthetic benzocaine 20% or lidocaine 2%.

Gagging

The gag reflex is a normal involuntary defence mechanism that prevents foreign bodies from entering the trachea, pharynx or larynx.[8] An exaggerated gag reflex is a known hindrance to dental procedures.

Pharmacological management

A.Locally acting-peripherally acting drugs/ local anaesthesia: They may be applied in the form of sprays, gels or lozenges or by injection. When mucosal surface is desensitized, the patient is less likely to gag. The deposition of LA around the posterior palatine foramen has been used for patient who gags. However, the administration of a local injection may not be possible and may itself provoke gagging. Furthermore, injection of LA solution may distend the tissue resulting in an inaccurate impression, which may compromise retention of prosthesis. A topical anesthetic containing benzocaine (14 %), butyl aminobenzoate (2%) and tetracaine hydrochloride (2%) can be sprayed on a gauze pad and placed on the back of the upper arch until the impression is obtained.

Topical	Systemic
•Nystatin •Clotrimazole •Miconazole	•Amphotericin B •Ketoconazole •Fluconazole •Itraconazole

B. **Centrally acting drugs**: Centrally acting drugs are only a short-term

solution for severe gagging problem and should not be used routinely.[9] They include:

a. Tranquilizers like chlorpromazine are useful in patient under strain/tension.
b. Semi-hypnotics, antihistamines, parasympatholytics.
c. General anaesthesia**:** A minority of patient does not respond to any form of sedation or behavioural therapy and dental treatment under general anaesthesia may be appropriate as a last resort.
d. Conscious sedation: Removal of anxiety may prevent gagging. The use of conscious sedation with inhalation, oral or intravenous agents may temporarily eliminate gagging during treatment while maintaining reflexes that protect the patient's airway.
e. Other pharmacological agents reported for their antigagging effect are:

i. Trimethobenzamide

ii. Granisetron an antiemetic given intravenously

Xerostomia

Xerostomia is a subjective sensation of dry mouth with objective evidence of decreased salivary flow, treatment includes

Salivary stimulation

Sialogogues that directly stimulate salivary glands are Pilocarpine, Cevimeline, Bethanecol, and Anethole trithone. Electrostimulation may increase the salivary flow in patients with Sjogren's syndrome.[10]

Topical agents

Lubricating agents in the form of gels, mouthwashes, lozenges, and toothpaste

Systemic agents

Cholinergic agonists i.e., pilocarpine and cevimeline, have been successfully used orally to increase salivary secretion. The optimal dosage of pilocarpine is 5 mg given 4 times daily or 10 mg given thrice daily. Cevimeline 30 mg thrice daily is used .Bethanecol 25 mg thrice daily orally increases both the unstimulated and stimulated salivary flow rates in patients with xerostomia secondary to radiation. Other drugs like carbacholine, anethole trithione, and pyridostigmine can also be used.

Corticosteroids

Corticosteroid irrigation (with prednisolone 2 mg/ml in normal saline) is clinically helpful by increasing the salivary flow.

Immunosuppressants

Cyclosporine, cyclophosphamide, and thalidomide-systemic administration

Salivary substitutes

luborant (which contains lactose peroxidase), saliva orthona (an oral spray containing porcine mucin), and biotene (contains components like polyglycerol methacrylate, lactoperoxidase, glucose oxidase), Salivix pastilles

Drugs Implicated In Fixed Prosthesis

The various drugs implicated in fixed prosthesis include, haemostatic agents, astringents, vasoconstrictors and local anaesthetics

Gingival Retraction or Displacement

Accurate marginal positioning of the restoration in the prepared finish line of the abutment is required for therapeutic, preventive and aesthetic purpose[11]

Great Britain Pharmacology Research Center explains these agents as follows:

a. Vasoconstrictive agents are not coagulated like epinephrine but act out constricting and reducing the blood vessels diameter

b. Hemostatic agents control severe bleeding from arterioles and cut vessels.

c. Astringent agents such as alum, aluminum chloride and zinc chloride.

A. Epinephrine and Sympathomimetic agents

Epinephrine dose in healthy ones is 0.2 mg and in patients with cardiovascular disease is 0.04 mg; Epinephrine is contraindicated in patients using ß-blocker and antihypertensive drugs. Epinephrine absorption can increase the blood glucose level in diabetic, other agents used are Ferrous sulfate, Ferric sub-sulfate (Monsel solution), Zinc chloride (bitartrate), Tannic Acid, NegatolSolution (mixture of 45% metacresol sulfonic acid and formaldehyde), Aluminum sulfate and aluminum potassium sulfate (alum), aluminium chloride.

Epinephrine or adrenaline and levonordefrin (neo-cobefrin) are the most commonly used vasoconstrictors in dentistry

Epinephrine is contraindicated in patients with:

1. Blood pressure over 200 systolic or 115 diastolic
2. Uncontrolled hyperthyroidism,
3. Severe cardiovascular disease including less than 6 months after a myocardial infarction or cerebrovascular accident
4. Daily episodes of angina pectoris or unstable angina
5. Cardiac dysrhythmias despite appropriate therapy
6. Medicated with ß-blocker, monoamine oxidase inhibitors, or tricyclic antidepressants; or general anesthesia with a halogenated anesthetic like halothane, methoxyflurane, or ethrane

B. Local Anesthetics

Benzocaine

Articaine

Lidocaine: Lidocaine or lignocaine or xylocaine is the most commonly used local anesthetic and antiarrhythmic drug

Drugs Implicated In Implant Prosthesis

The implant therapy is usually a two-stage procedure which involves the surgical and a maintenance phase. The various drugs implicated in the surgical stage include antibiotics, analgesics, glucocorticoids, and antianxiety agents

Antibiotics The following are the list of drugs used in endocarditis prophylaxis

Table 1:AHAregimens for infective endocarditis prophylaxis

Patient group	Antibiotic	Route	Dose		Timing before procedure
			Adults	Children	
Standard general prophylaxis for patients at risk	Amoxicillin	PO	2 g	50 mg/kg	1 hour
Unable to take oral medication	Ampicillin	IV or IM	2 g	50 mg/kg	Within 30 minutes
Allergic to penicillin/ amoxicillin/ampicillin	Clindamycin	PO	600 mg	20 mg/kg	1 hour
	Cephalexin or cephadroxil[a]	PO	2 g	50 mg/kg	1 hour
	Azithromycin or clarithromycin	PO	500 mg	15 mg/kg	1 hour
Allergic to penicillin/ amoxicillin/ampicillin and unable to take oral medications	Clindamycin	IV	600 mg	20 mg/kg	Within 30 minutes
	Cefazolin	IV	1 g	25 mg/kg	Within 30 minutes

Note: IV = intravenous; PO = oral.
[a]Cephalosporins should not be used with penicillin or ampicillin in those with a history of anaphylaxis, angioedema or urticaria.

Analgesics

Acetaminophen: Acetaminophen is indicated for mild to moderate pain Ibuprofen: Ibuprofen is used to treat mild to moderate pain and has been proven to significantly reduce postoperative dental pain Aspirin: Acetylsalicylic acid (ASA)- very significant antiplatelet effects Tramadol:

COX-2 inhibitors: celecoxib, etoricoxib, rofecoxib, valdecoxib, parecoxib

Glucocorticoids

These are classified as:

1. Short acting (<12 hours) e.g., hydrocorticosone, and cortisone
2. Intermediate acting (12 to 36 hours) e.g., prednisone, and prednisolone
3. Long-acting (>36 hours) e.g., dexamethasone

Glucocorticoids are contraindicated if the patient has:

History of tuberculosis, Active bacterial, viral or fungal infection, Ocular herpes simplex ,Peptic ulcer, Diabetes mellitus, Primary glaucoma , Acute psychosis, Cushing's Syndrome , Renal insufficiency, Uncontrolled hypertension, Pregnancy and lactation The selection of ideal synthetic glucocorticoid for implant therapy should maintain high anti-inflammatory potency with minimal corticosteroid effects. The glucocorticoid that best suits the requirements is the long-acting glucocorticoid dexamethasone.

Antianxiety Agents

Most commonly used drugs are Diazepam, midazolam, and triazolam are the most commonly used antianxiety drugs in implant therapy

Aintenance Phase

Chlorhexidine gluconate, at concentrations of 0.12%, has been approved for reduction of plaque accumulation, treatment of gingivitis, treatment of periodontal diseases, preventing alveolar osteitis, and improvement of tissue healing after extraction

Conclusion

Understanding the role of pharmacology in prosthodontics is imperative The pharmacological agents mentioned like antibiotics, analgesics,glucocorticoids, antianxiety drugs, local anesthesia, vasoconstrictors, denture cleansers are used either before commencement of the treatment, during thetreatment or at the post treatment duration. The practical application of this knowledge can expedite operative procedures, broaden expertise in pharmacotherapeutics, prevent the occurrence of drug interactions, and thus improve patient care and have a positive effect in the success of any prosthesis.

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