USE AND ABUSE OF ANTIBIOTICS IN DENTAL TREATMENT

by

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INTRODUCTION

Antibiotics are of importance adjunct in the management of infection in the oral cavity and the prevention of complications following surgical operations involving the oral cavity. The normal flora of oral cavity include morphologically and bio-chemically distinct bacterial groups of species. Under normal conditions a wide variety of both aerobic and anaerobic micro-organisms grow in the regions of the tongue, Gingival crevice, oropharynx, dental pulp and plaque . Although the quality and quantity of flora vary in different areas, the Anaerobics equal or out number the Aerobics at all sites. These micro-organisms are nonpathogenic and part of the normal oral flora until there is a breach in the Host Defence mechanisms. When these mechanisms break down there is need to either kill the offending organisms or prevent them from proliferating . THIS IS ACCOMPLISHED THROUGH THE USE OF ANTIBIOTICS DEBRIDEMENT OR BOTH.

The concept and even the attempt to use antibiotics are almost as old as the science of microbiology. Indeed, the application of antibiotics therapy without recognition of it as such, is considerably older. The Chinese were aware, over 2500 years ago, of the therapeutic properties of mouldy curd of soyabean applied to carbuncles, boils and similar infections and used this material as standard treatment in such disorders. The modern era of chemotherapy of infection started with the clinical use of sulfanilamide in 1936. *The 'Golden Age' of antimicrobial therapy began with the production of penicillin in 1941, when this compound, first discovered in 1929 was ,mass produced and made available for limited clinical trial for the first time.* The number of antibiotics now extends into hundreds and over 60 have been developed to a stage where they are of value in the therapy of infectious disease. They differ markedly in the physical, chemical and pharmacological properties, antibacterial spectra and mechanism of action. Most have been chemically identified and some have been synthesised . It is not unlikely that successful chemotherapy of viral diseases and cancer may result from a planned approach directed towards purely synthetic drgus as more is learned about viral replications and malignant cells. By complementing surgical judgement with proper antimicrobial therapy, most infections of oral cavity can be controlled or eradicated. This forward step in the elimination of severe morbidity and mortality due to dental infections takes on added significance when one realises that the development of cavernous sinus thrombosis secondary to dental infections is fortunately a rarity in present day practice. Today, it is uncommon for any one to die from odentogenic infection. This is due to the scientific approach of the practitioner of dentistry in the prevention, diagnosis and treatment of odentogenic infection. The antimicrobial have played a major role in the dental profession to control the ravages of infections of the oral cavity and continuous structures. But the present total consumptions of antibiotics in relation to known incidence of infections is very much in excess, indicating that antibiotics are many times misused. A certain degree of abuse of antibiotics is unavoidable in dental treatment. However it is a consequence of three factors.

(a) *Availability of wide selection of drugs.*

(b) *The limitation on Dentist's time.*

(c) *The demand from the patient who cannot fully appreciate the dangerous consequences of antibiotic use.*

The Dentist is constantly under pressure to prescribe those wonder drugs and unnecessary use follows. Indiscriminate use can result in serious complications. With the myriad agents available today, it is important that modern practitioners of Dentistry use a scientific approach and sound rationale in selecting and prescribing antimicrobial agents. Antibiotics should be used with caution. An exact diagnosis permits the use of specific agent instead of a 'Wide spectrum' therapeutic agent which the precribing doctor hopes will bring down the target he cannot see. The risk involved in the use of therapeutic agent should be weighed against the seriousness of the disease to be treated and possibility of treating the conditions with another agent which is less potentially toxic should be considered. The Dentist must at all times be alert to the possible occurrence of an adverse reaction.

Microflora of oral cavity and bacterial informations related to Dental infection: An important milestone to city of Antibiotics:

The oral cavity is essentially sterile at birth. However it can retain nutritional components such as carbohydrates, proteins rapids and amino acids. Species of streptococcus, Staphylococcus, Neisseria and Veillonella appear within few

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days of birth. - Species not present at this time are obligate anaerobic bacteria and appears as teeth erupt secondary to gingival crevice formation and development of plaque that supports, anaerobics. As teeth erupt, Actinomyces, Bacteriodes, Fusobacterium and lipototrichia become normal components. In addition spirochceates, fusiform bacilli ad vibro increases in number. Bacteroides melaninogenicus and spirocheates take up permanent status in oral cavity during puberity, harmonal changes is considered responsible. Streptococcus mutans and streptococcus sanguis arrive with the teeth and are capable of attaching directly to enamel and other hard surface. Approximately 300 species of Bacteria in the oral cavity exist in isolation.Codependence and independence are essential in many cases for survival and pathologic conditions such as infection to occur. So bacterial inflammation on infective agents as they relate to odentogenic infections can be concluded as follows:-

1. *Normal flora of the oral cavity are the usual causative agent in odentogenic infections.*
2. *Odentogenic infections are caused mainly by multiple bacteria. Rarely is one bacteria responsible for infection and laboratory reports may reveal as many as five species present in an infection.*
3. *Usual bacteria involved are aerobic gram positive cocii, Anaerobic gram positive cocii and anaerobic gram negative rods.*
4. *Laboratory result identify predominance of anaerobic although as many as 60% of infections are mixed.*
5. The mix of anaerobic gram positive and gram negative species is estimated as

(a) AEROBIC	: Streptococcus 70% Staphylococcus 6%
(b) ANAEROBIC	: Peptostreptococcus 33%
(c) GRAM POSITIVE RODS	: 15%
(d) GRAM NEGATIVE RODS	: Bacteriode group about 34% Fusobacterium 13%

CARIOUS TOOTH/PERIODONTAL POCKET-AS MAIN PORTALS FOR ODONTOGENIC INFECTION:

The indigenous microbial flora of mouth bacteria are almost always the causative agents for the odontogenic infections. They gain access to underlying tissues enlarge numbers by two main portals - a carious tooth with necrotic pulp or a deep periodontal pocket that becomes sealed at the Gingival margin preventing normal drainage. The most common diseases of the mouth are dental Caries and periodontitis which affect all age groups patients throughout life. Untreated caries eventually reaches the pulp of the tooth and results in pulpitis. Inflammation within the rigid confines of pulp chamber culminates in pulp necrosis and inflammation around the tooth apex (periapical) and eventually forms an access or Granuloma or occasionally a cyst. The periodontal diseases are essentially, connective tissue disorders. Bacterial plaque is the primary causative agent and the stimulated pathologic process result in the destruction of epithelium, connective tissue and ultimately the alveolar bone, which together constitute the attachment of tooth to the body. Several other disease may influence the course of periodontal destruction or are themselves capable of destroying the investing structure of the dentition. *HIV positive patients may exhibit uncharacteristically aggressive periodontist. Patients with chediak-Higashi and Papillon-Levfevre syndromes also exhibit generalized periodontal destruction.*

Dental plaque is primarily composed of gram positive, non-motile, facultative anaerobes. As plaque continue to accumulate on tooth surfaces, the morphotypes change to more gram negative, anaerobic motile forms. Spirocheates also appear in greater number in mature plaque. The plaque by releasing endotoxins, collagenase and other mediaters of inflammation, cause marginal Gingivitis. The established lesion may remain for an indefinite period of time or progress to periodontitis. Treatment mainly comprises of an improved oral Hygiene. *Antibiotics started at an early stage will limit the amount of tissue destruction. Failure to treat adequately may predispose to Recurrence and in malnourished or immunocompromised individuals may predispose to a more widespread destruction.*

HOST DEFENCE MECHANISM - A WAR AGAINST BACTERIA FAVOURABLE FOR ANTIBIOTICS TO ACT:

It is important to appreciate fully the fundamental concept that the host is primarily responsible for curing the infections. Surgical and antimicrobial therapy are merely aids to help the patient and of the two surgery is more important. Each patient has many defences against infection. In the normal course of events they prevent infection from occurring, even when moderate number of bacteria gain access to tissues and blood. It is only when overwhelmingly large number of bacteria are present or when one or most of these host defence become compromised then an infection occur.

(1) **Local Defence:** Several local factors act to prevent ingress of bacteria when they can cause infections. These local factors are effective as the first line of defence. If these are altered or compromised, systemic defences will be called into action. The most obvious defence (local) against bacteria is skin and mucosa. Their very existence prevents bacterial access to deeper tissues. In addition to mucosa itself, mucosal surface produce secretions that aid in bacterial defence in several ways. *First; It physically washes away the bacteria, preventing accumulation of large number of surface bacteria. Second; these secretions contain immune antibodies, which actively combat bacteria.* The immunoglobulins act by neutralization of toxins and by

preventing attachment of bacteria to the mucosal surface. In the usual balanced state many different bacteria populate the skin and mucosa. All live in harmony in their particular setting. These colonizing bacteria cause essentially no infection. *In a given anatomic site only a certain amount of space and nutrient are available. If these are consumed by colonizing host bacteria, other potentially pathogenic bacteria cannot colonize or cause infection.* The host bacteria can be altered, leading to opportunities for infection. A simple Example seen by dentist is the occurrences of candidiasis or Thrush.

(2) **Systemic defence** : Once the bacteria have earned access to deeper underlying tissues, systemic defence are activated. The first group of these are the so-called Humoral defences. Humoral defences can be divided into

(a) IMMUNOGLOBULINS (b) COMPLEMENT

The second main group, cellular defence can be divided into

(a*) PHAGOCYTES (b*) LYMPHOCYTES

The main role of the humoral defences are to attract phagocytes to the bacteria and to aid in their phagocytosis and lysis. In addition the humoral, Cellular components play a major role in the host defence. Once attracted to the area of invasion by complement mediators, the cellular members kill the bacteria.

MODES OF ACTION OF ANTIMICROBIAL AGENTS- AN IMPORTANT GUIDE FOR SELECTION OF ANTIBIOTICS BY A DENTIST - (Shown in fig No.1)

Pharmaceutical market today is growing at a rapid pace and has seen the launch of numerous antibiotics worldwide. The action of antibiotics are highly selective, acting specially against aspect of bacterial metabolism by usually not against those of tissue cells. Antibiotics are most effective in patient with intact immune system. Control of micro-organisms occur when the micro-organisms have been decreased to a level at which immune system can be effective. Let us have a Glimpse of mode of action of antimicrobial agents which always enable us to select antibiotics.

(1) **Inhibiting bacterial cell wall** : The bacteria have a rigid cell wall, which is essential to protect the bacterial cell which has a high internal osmotic (about 3 to 5 times greater than environmental osmotic pressure in gram positive and gram negative bacteria). Inhibition of bacterial cell wall synthesis or injury to the cell wall diminishes this protection. Without the protection, in the hypotonic environment of the body such bacterial cells would explode. *Antibiotics which interfere with the cell wall synthesis include pencillin, cephalosporins, cycloserine, bacitracin and vancomycin.*

2. **Inhibition of cytoplasmic membrane function** : The cytoplasmic membrane which encloses cell functions as a very selective and active filter to keep certain proteins and nucleotides within the cell, and allow other substances to enter the cell for metabolism. Increased permeability of cytoplasmic membrane result in the rapid release of small molecules from the interior of the bacterium, leading to disorganization of membrane function *examples are polymyxins, Novobiocin, Nystatin etc.*

3. **Inhibition of Nucleic acid synthesis**: Bacterial multiplication and subsequent survival is dependent upon the replication of DNA, since the latter carries encoded information essential to cellular function. Several antibiotics and anticancer drugs interfere with Nucleic acid synthesis.

4. **Inhibition of Protein Synthesis** : Synthesis of bacterial proteins occur on the ribosomes by interaction of transfer RNA and messenger RNA. Several antibacterial compound act by disturbing this protein synthesis *e.g. Teracycline, Aminoglycosides, chloramhenicol, Erythromycin etc.*

5. **Control of Microbial Enzymes** : The formation of Nucleoptides within the bacterial cells is controlled by certain cofactors for which folinic acid is essential . *The formation of Folinic acid from Folic acid is controlled by enzyme activity which can be inhibited by sulfonamide and Trimethoprim.*

6. **Substrate Competition with Essential Metabolite:** *Sulfunamide compete with natural substrate paraaminobenzoic acid (PABA) which is essential metabolite for the synthesis of folic acid in certain bacteria.* The sulfonamide prevent this synthesis by substrate competition. The bacteriostatic action of sulfonamide can be reverted by the excess of PABA.

CLASSIFICATION OF ANTIMICROBIAL DRUGS: GUIDE FOR FAIR SELECTION OF ANTIBIOTIC BY DENTIST.

The antimicrobial agents can be classified in several ways according to their (i) chemical structure (ii) Mechanism of action and (iii) Antimicrobial spectrum. From clinical stand point and its functional utility, they may be classified according to their antimicrobial activity as under.

1. **Narrow spectrum drugs (effective against gram positive cocii and bacilli)**: Penicillin G, the semisynthetic penicillinase resistant penicillins the macrolides, the lincomycins vancomycins and Bacitracins.

2. **Narrow spectrum drugs (Primarily effective against the aerobic gram negative bacilli)**
The Aminoglycosides and polymyxins.

3. **Broad spectrum drugs (effective against both gram positive and gram negative bacteria and chlamydiae**

and rickettsiae): The broad spectrum penicillins (Ampicillin and carbenicillin) Cephalosporins, the tetracyclines, chloramphenicol, Trimethoprim and Sulfonamide.

There are certain important exceptions in this classification, but it does help the clinician to remember the antibacterial spectrum of each drug. Classification depending upon the chemical structure and mechanism of action have been shown in Table No. 1-a, Table No. 1-b and Fig. No. 1 respectively.

ANTIBIOTICS IN DENTAL TREATMENT: The two indications for the use of antimicrobial agents in dentistry are control and eradication of infection of the oral cavity and Prophylaxis to prevent complication following surgical operation. Once the fact that a patient has an infection has been established by such signs and symptoms as pain, swelling, Erythema of overlying tissues, and elevated temperature, treatment consists of three pronged approach.

First and most important is *surgical intervention* to drain the abcess, remove the bacteria and relieve the tension in tissues.

Second, *The state of patient's host defence must be bolstered.* This include proper hydration, nutrition and pain relief so that patient can resist.

CLASSIFICATION OF ANTI-INFECTIVE DRUGS CHEMICAL STRUCTURE

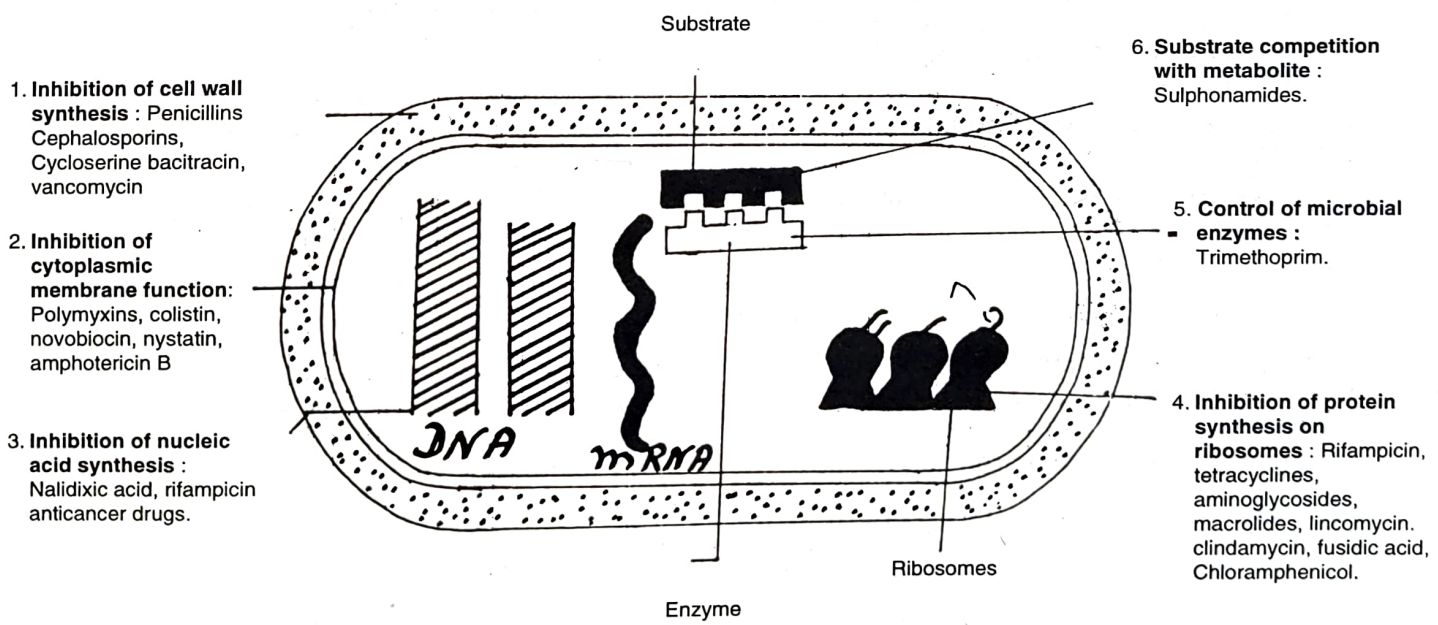
Table No. 1-a

1. **Sulphonamides and related drugs** : Sulfadiazine and others, sulfones - Dapsone (DDS), Paraamino Salicyclic acid (PAS)
2. **Diaminopyrimidines** : Trimethoprim, Pyrimethamine
3. **β- Lactam antibiotics** : Penicillins, Cephalosporins
4. **Tetracyclines** : Oxytetracycline, Doxycycline etc.
5. **Nitrobenzene Derivatives** : Chloramphenicol
6. **Aminoglycosides** : Streptomycin, Gentamycin, Neomycin etc.
7. **Macro Antibiotic** : Eryhromycin, Oleandomycin.

Table No. 1-b

8. **Polypeptide Antibiotics** : Polymyxin B, Colistin, bacitracin, Tyrothricin.
9. **Nitrofuran Derivatives** : Nitrofurantoin, Furazolidone.
10. **Nitroimidazoles** : Metronidazole, Tinidazole.
11. **4-Quinolones** : Nalidixic acid, Cinoxacin Rosoxacin.
12. **Nicotinic Acid Derivatives** : Isoni, Pyrazinamide, Ethionamide.
13. **Polyene Antibiotics** : Nystatin, Amphoterians, Hamycin.
14. **Imiderzole Derivatives** : Miconazole, Ketoconazole, Clotrimazole.
15. **Others** : Riafampicin, Clindamycin, Spectinomycin, Vancomycin, Lincomycin, Sod. fu, Cycloserine, Viomycin, Ethanbutol, Thiacetazone, Clofazimine, Griseofulvin.

Figure No. 1



The modes of action of some anti-infective & anticancer agents.

Third and Last, *antimicrobial therapy* may be necessary to help the patient's defences eliminate the bacteria and resolve the Infection, making diagnosis of the causative organisms become the next task. Initial of empirical therapy can be started based on initial diagnosis. Definitive determination of the bacteria and Definitive therapy required specific Laboratory diagnosis of the specific organism causing infection.

INDICATION/CONTRAINDICATIONS IN DENTAL TREATMENT:

Brief mention of several indications and contraindications for the use of therapeutic antibiotics in dentistry are as follows:-

In General they should be reserved for those situations with clearly established infections with systemic manifestations such as fever, malaise, pain and swelling. Acute dentoalveolar cellulitis and abcess, Acute pericoronitis with trismus, candidiasis, osteomyelitis, actinomycosis, and compound fracture of the jaw and alveolar process all usually require antibiotic therapy.

On the other hand some situations do not require antibiotics, mild pericoronitis without systemic signs can be treated with Irrigation or by removal of an extruded third molar. Chronic well localised dentoalveolar abcess, where adequate surgical treatment can be achieved, do not require antibiotic. The patient who has a painful tooth but who has no swelling or fever probably has an acute, possibly reversible pulpitis. Treatment should be directed towards treating the tooth mechanically and providing analgesics for pain relief. Finally patients with dry sockets need not receive any antibiotic therapy. Treatment should be to irrigate the socket and place a sedative dressing.

USE OF PROPHYLACTIC ANTIBIOTICS IN DENTAL TREATMENT:

It will be necessary to separate two types of prophylactic antibiotic usage.

1. *For the prevention of wound infection.*
2. *For the prevention of metastatic infection.*

Few important guides for the prevention of world infection are as follows:-

- In a clean surgery on uncompromised patients antibiotics are not useful.
- Dental surgery procedures where the area of incision cannot be properly scrubbed, operations expected to last longer, should probably have antibiotics given during the procedures.
- All patients with compromised defence mechanism should receive prophylaxis.

Few important guides for the prevention of metastatic infections

Bactermias following oral surgery such as tooth extraction, in certain conditions results in establishment of infection in a site distant from the site of surgery, that is metastatic spread.

The site that becomes infected has locally compromised defence against bacterial invasion.

The main indication for the prophylactic use of antibiotics is to protect the patients who have certain systemic diseases. In particular the person with Rheumatic heart disease, congenital heart disease, or valvular heart disease must be protected against possible bactermias following surgical operations within the oral cavity, bactermia in those patients could lead to an acute or sub acute bacterial endocarditis. *The American Heart Association and Council on Dental Therapeutics of American Dental Association recommend prophylactic coverage for all Dental procedures in curing bleeding (such as deep scaling) or surgery for the following categories:*

- Prosthetic cardiac valves (including biosynthetics)
- Most cardiac malformations of congenital origin.
- Systemic pulmonary shunt surgery.
- Rheumatic and other acquired valvulas dysfunction.
- Idiopathic Hypertrophic subaortic stenosis.
- History of bacterial endocarditis.
- Mitral valve prolapse or insufficiency.

These bodies also specify situation where antibiotic coverage is not recommended namely for patients having.

- Isolated atrial septal defects.
- Repaired septal defects without patches six months plus earlier.
- Post operative to coronary artery bypass graft surgery. Controlled diabetes, people receiving cortisone therapy or who have adrenal insufficiency, people with agranulocytosis, people with malglobulin states e.g. multiple myeloma or hypogammaglobulinemia, should be covered with prophylactic antibiotics prior to any procedure that might produce bactermia.

CHOICE OF ANTIBIOTIC IN DENTAL TREATMENT

For most of patients with an odontogenic infection who are treated on an ambulatory basis in an office setting culturing and antibiotic sensitivity testing are unnecessary, as empiria antibiotic therapy and surgery management are adequate. *But there are certain situations*

where culturing should be considered e.g. if the patient does not respond within 3-4 days to empiric therapy, in Recurrent infections, in actinomycosis (suspected by history and clinical judgement) In osteomyelitis, In compromised host defence, in post operative infections etc. After the causative bacteria has been identified either empirically or definitively and antibiotic susceptibility determined one must make choice of a variety of available drugs. Their selection should be done, only after weighing several factors.

(1) **Narrow-Spectrum Drugs:**

For most odontogenic infections we know a great deal, even if only an empiric basis about the causative organism(s) and their antimicrobial susceptibility. Broad spectrum antibiotics have short coming that make them undesirable-their potential for developing antibiotic resistance. For the dentist treating odontogenic infections, using narrow spectrum antibiotics means using drugs like Penicillin V, Erythromycin, Clindamycin and metronidazole rather than drugs like Amoxycillin, Cephlexin, Cefaclox, and Trimethoprim-Sulfmethoxazole.

(2) **Drugs that cause fewest adverse reactions:-**

Antibiotic of choice should be effective and that cause least problems for the patient. Problem in this sense include side effects, allergic reactions and toxicity reactions.

(3) **The well established but still effective Antibiotic.**

A small number of important antibiotics have been, and remain, quite effective in the management of odontogenic infections. It is unwise to use a new, unproven drugs, when an effective well known drug with a low incidence of adverse reactions exist. By keeping newer drugs in reserve the inevitable growth of resitant bacteria is delayed.

(4) **Bactericidal rather than Bacteriostatic Drugs.**

Patients with a localized infection who do not have depressed host defences benefit from either the cidal or static drugs. However, the patient with an overwhelming infection or one who has depressed defences should be treated with a bactericidal drug.

Bactericidal drugs are most effective during the long phase of bacterial growth. If the growth is slowed or brought to stop,-cidal drugs have a greatly diminished effect. As a result, in those situations where combination drug therapy is to be used-cidal and static drugs should not be used in combination.

(5) **The less expensive antibiotics**

If one has a choice of antibiotic that have an effective spectrum and similar toxicities, the less expensive should be considered first. OLDER, ESTABLISHED MEDICATIONS TEND TO BE LESS EXPENSIVE.

ABUSES-A GLIMPSE ON CAUSES:

Antibiotics are the most useful life saving agents in therapeutics. But they are potentially harmful. Misuse of antimicrobial drugs occur as follows.

(1) **Treatment of untreatable infection.**

A common misuse of these agents is in the infection that have been proved by experimental and clinical observation to be untreatable. NONE OF THE DISEASES DUE TO THE TRUE VIRUSES will respond to any of the presently available anti infective compound. Thus the antimicrobial therapy of such infection is totally ineffective.

(2) **Therapy of fever of undetermined origin:**

Various types of cancer, metabolic disorders, asymptomatic regional enteritis, a typical rheumatoid arthritis, and a number of other noninfectious disorders may present themselves as cases of fever of unknown etiology.

(3) **Improper Dosage:**

Erroneous dosage of antimicrobial agent is of two types: administration of excessive amount and use of suboptimal quantites.

(4) **Improper duration of therapy:**

Lot of problems may arise from failure to administer antimicrobial drug for a sufficiently long period.

(5) **Reliance on Chemotherapy with ommission of surgical drainage.**

As a Generalization, it may be said that, when an appreciable quantity of pus or necrotic tissues or a foreign body is a problem, the most effective treatment is a comibation of antimicrobial agent in adequate dose plus a properly performed surgical procedure.

(6) **Lack of adequate bacteriological information**

Antimicrobial drug therapy must be individualized on the basis of the clinical situation, microbiological information and pharmacological consideration.

DANGERS OF ABUSE OF ANTIBIOTICS IN DENTAL TREATMENT.

Dangers of antibiotic administration in Dental treatment can be summarised as follows.

1. **Discoloration of Teeth-A serious concern in Dental profession.**

The Tetracycline, (tetracycline, oxytetracycline and cheortetracycline) when administered during tooth formation period may deposit in tooth substance thereby causing discoloration which in many instances can be observed clinically. The observed discoloration varies in quality and intensity and ranges from a light yellow, yellow or tan to darker shades of gray yellow or brown.

The deposition of the drug in teeth is probably due to its chelating property and formation of tetracycline-calciumorothophosphate complex.

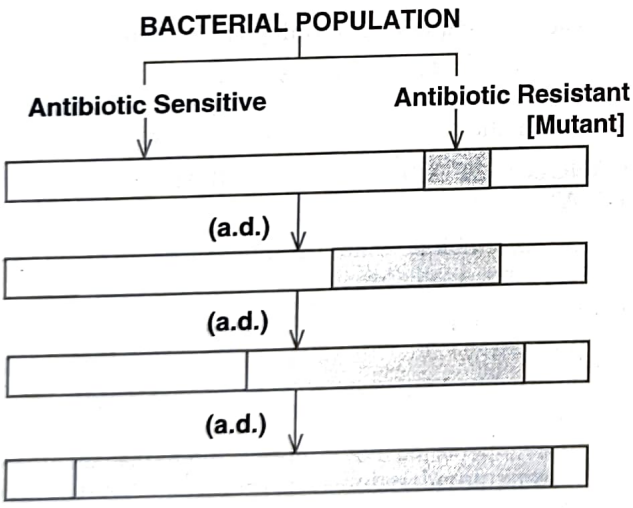
Early characteristic of this defect is yellow-flourescence of the dental pigment, which has an ultraviolet spectrum with an absorption peak at 270mu. As the time progress, yellow flourescence is replaced by a non-flourescent brown colour that may represent an oxidation product of antibiotic-the formation of which hastened by light. This discoloration is permanent.

Treatment of pregnant patients with tetracycline may produce discoloration of teeth in their offspring. *The period of greatest danger to teeth is from mid pregnancy to about 4 to 6 months of postnatal period and from 6 months to 5 years of age for the permanent teeth children upto 7 years old may be susceptible to this complication of tetracycline therapy.*

2. **Bacteria with antibiotic resistance-A serious clinical problem.**

Bacterial resistance is a major medical problem, because it seriously limits the usefulness of many antibiotics and, often necessiates the substitution of more toxic and less potent agents, as the most acceptable agents are found to be ineffective development of bacterial resistance also makes it essential to periodically revise the drug of choice according to antimicrobial sensitivity determined from time to time during the course of infection when chemotherapy gives a poor response. The most common mechanism is through 'mutation'. Resistance may also be acquired by Micro-organisms through adoptation or through development as a result of (multiple) drug resistance as a result of transfer of Genetic material from one bacterium to other by transformation, transduction, or conjugation as shown in Fig. no.2.

Figure No. 2



Scheme showing how repeated exposure to an antibacterial drug (a.d.) progressively reduces the sensitive organisms in the population, due to selective force provided by the drug, until the resistant mutants dominate the population.

3. **Super infection:**

Super infection can be defined as the new infection that occurs during the chemotherapy of a primary infection. Super infection are manifested by new clinical symptomatology usually related to intestinal, renal, respiratory tract or the blood stream. Super infections are usually related to dose and duration of antibiotic therapy. Further they occur more frequently when large doses of two antibiotics are given simultaneously. *The most common example of this seen by dentist is CANDIDIASIS.*

4. **Toxicity:**

Antibiotics are drugs that interfere with bacterial cell function than with mammlian cell function. Such damage to the host tissue is called drug toxicity. The most common toxicities are Neural, Renal, Hepatic and Haematological injury.

5. **Side Effects:**

The dentist should be aware of the common side effects and inform his patients.

6. **Vitamin Deficiency:**

Since, certain nonpathogen in the intestinal tract are known to synthetize certain vitamins like Folic acid and vitamin K, destruction of normal flora may cause deficiency of these vitamins.

7. **Damage to Foetus:**

Certain antibiotics may cross the placental barrier and may produce damage to foetus.

8. **False security to both patient and dentist:**

Use of antibiotic may give false security to both patient and the doctor and necessity of correct diagnosis and treatment may be neglected in case of Dental Surgeon, asepsis may be neglected in otherwise clean surgery.

PRINCIPLES OF ANTIBIOTIC THERAPY IN DENTAL TREATMENT.

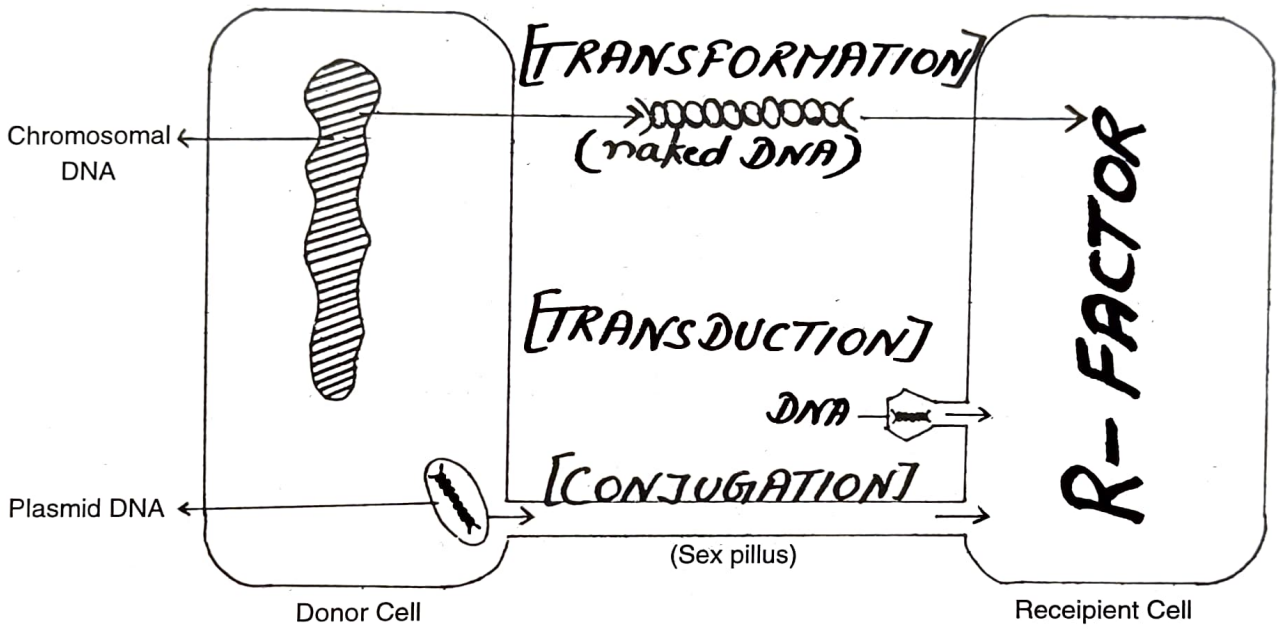
To conclude we can say that use of these drugs is not without inherent dangers, and it behooves the practitioner to become thoroughly familiar with their action and use. Let us in the end review the principles of antibiotic therapy in dental treatment.

1. Antibiotics are more effective against acute than chronic infections.
2. Penicillin family is the antibiotic of first choice in Dentistry. Use adequate dosage for adequate duration.
3. Clindamycin or Erythromycin is the antibiotic of the second choice, especially in patients allergic to penicillin.
4. Depending upon the organism, its site, and severity of infection, systemic administration is preferred to topical;

oral administration is preferred to injection except in severe infection.

5. A clinical response should be noted in less than 48 hours.
6. If possible cultures should be taken before begining antibiotic therapy.
7. Multiple antibiotic therapy should be avoided.
8. Antibiotics are not effective against Viruses and Fungii.
9. Broad spectrum antibiotics may be indicated.

Figure No. 3



Diagramatic representation of the modes of genetic transfer [Transformation, Transduction, Conjugation) of R factors between bacterial cells. In Transduction the DNA is carried in bacteriophage

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