

## **Chapter 5 Implant-related drugs (Basic management of medication)**

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### **I. Basic approach to medication**

There are a number of drugs that can be used in implant treatment, but first it is necessary to understand basic pharmacology. The value of drug treatment lies in helping the living body to regain homeostasis. However, it is also important to emphasize that the patient needs to take responsibility for his/her own treatment.

### **II. Objectives of pharmacological therapy**

Drugs are normally administered to treat the cause of a problem, symptomatically, or as a preventative measure. For implant surgery, a variety of drugs are used with the intention of specific therapy, symptomatic treatment, and prevention.

#### **A. Causal therapy**

This describes administration of antimicrobial drugs such as antibiotics and chemotherapeutic agents for preventing the occurrence of postoperative infections.

#### **B. Symptomatic treatment**

This describes drug administration to improve disease symptoms, not treatment of the disease itself, as in A. above. In implant surgery, analgesic drugs are used for post-surgical pain, and anti-inflammatory drugs are typically used to treat inflammation. Pain management is clearly an essential component of implant surgery. Antihypertensive drugs that are used for intra-operative blood pressure control and emergency medicines given for unanticipated symptoms are also included in this category.

#### **C. Preventive treatment**

This describes administration of drugs to prevent onset of a disease. Generally speaking, it denotes the use of disinfectants and antibiotics for infection control, and is often used for postoperative management in implant surgery. Although not strictly speaking a drug treatment per say, local anesthesia is nevertheless an indispensable component of a smoothly conducted operation. Tranquilizers and intravenous anesthetics are given for intravenous sedation, and nitrous oxide and oxygen are administered for inhalational sedation, for the same reason.

### **III. Routes of administration**

Drugs are administered by several routes. Drugs that use the digestive tract and tongue to reach the body are known as enteral medicines, and are given orally or sublingually. Administrations of drugs by intravenous, subcutaneous, intrathecal, and intramuscular routes into the body are generally termed injectable drugs. Application of drugs onto the skin, sprayed onto the digestive tract, or as eye drops or nasal sprays are termed topical medicines. Inhaled oxygen and nitrous oxide are also classed broadly as external medicines.

#### **A. Enteral drug administration**

Administration via this route is simple and repetitive administration is possible, and the degree of pain

felt by the patient is relatively low. This route of administration is the one most typically used for implant surgery. A disadvantage of using this route is that an immediate effect cannot be expected. The rate of absorption is largely dependent on digestive tract function. Factors such as ingestion of food or malfunctioning of the digestive organs can delay the entry of pharmacological agents into the blood circulation. The drug might also be digested and become degraded along with food. Therefore it is possible for the desired effect not to occur.

## **B. Injection**

The effects of these drugs can manifest much faster and a pharmacological effect can be obtained with a much lower dose than with enteral medicines. Using continuous intravenous infusion, a stable blood concentration can be maintained for a fixed period of time. Conversely, onset can be sudden, leading to toxic levels. It is impossible to avoid the substantial pain caused by needles used in administering medication by injection, and the instruments must be sterilized prior to use. Furthermore, injection has the potential to result in infection, bleeding and tissue damage in the area of the needle. For implant surgery, antimicrobials, intramuscular analgesics (IM), analgesics, minor tranquilizers, and anesthetics are common drugs that are used intravenously. Technical skill is required for venous puncture.

## **C. External administration**

Unlike injection, the major advantage of this method is freedom from pain. The medicinal effect is continuous, yet the treatment can be stopped if required, as undesirable effects appear. However, this route of administration cannot be used for those that require immediate treatment, and in some areas it is difficult to predict when effects will be seen.

To obtain an analgesic effect from nitrous oxide/oxygen, an inhalation kit must be prepared, and this requires extra effort.

Each route of administration clearly has both advantages and disadvantages, and it is therefore vital to use these approaches with reference to the therapeutic objectives. The rate at which a drug enters the blood circulation is an important factor for its effectiveness. The intravenous route results in fastest onset and because blood concentration can be controlled, is most reliable. This reliability is respectively less with drugs given by the intramuscular, subcutaneous, and oral routes. Rapid onset, however, can result in acute, severe onset of side effects and harmful effects, and therefore great caution must be taken.

## **IV. Pharmacological action**

### **A. Local action**

This describes the use of drugs that act at a specific location within the body. In implant surgery, drugs that are applied locally for disinfection and sterilization, those used for conduction anesthesia, and hemostatic material used to control bleeding, are all classified under this category.

### **B. Systemic action**

This is where the drug is absorbed from the site of application, and enters the circulation in order to exert its effect on the tissues of the body. In implant surgery, antimicrobials, anti-inflammatory drugs, nitrous

oxide and tranquilizers used for sedation come into this category.

It should be noted that these two actions are not separate, and that they act synergistically. A drug that was administered for its local effects can also affect distant parts of the body, and the opposite is true. For example, administration of a type of disinfectant can result in anaphylactic shock, and anti-inflammatories can cause a stomach ulcer. Bearing these considerations in mind, all of the effects of each drug have to be acknowledged and drugs should be administered with due caution.

## **V. Pharmacokinetics**

The time it takes for a blood concentration to decrease by half is known as the elimination half-life of a drug. If this period is lengthened, the effect of the drug is prolonged; in contrast, if this period is shortened, the effect becomes shorter. There are several factors that influence drug half-life. Obesity, hepatic disease, renal impairment and low cardiac output are factors that extend the elimination half-life. As the excretory function in infants is not yet fully developed, they are therefore more sensitive to the effects of drugs. In pregnancy, factors such as renal blood flow, cardiac output and blood plasma volumes are raised, resulting in faster elimination of the drug from the blood circulation. In addition, many drugs are able to pass through the placenta and thus reach the fetus. In the elderly, bodily functions such as cardiac output, lung capacity, renal blood flow, and hepatic blood flow to name a few, become less efficient leading to lengthening of the elimination half-life, consequently prolonging the pharmacological effect of drugs.

It is not simple to assess each individual in order to predict the effect that a particular drug will have. However, in implant surgery, it is important to evaluate the results of blood tests and the physical examination, so as to be able to administer adequate doses with the correct frequency, for each particular patient.

## **VI. Drug side effects**

All drugs have a main effect (used to treat a particular problem) and side effects (other effects). The frequency of manifestation of the symptoms of side effects varies widely with factors such as, age, sex, the physique of the patient, and the administered dose of the drug or concomitant use of other drugs. In implant surgery, side effects that involve the digestive system are common, due to postoperative administration of oral drugs.

## **VII. Medicines management**

Under the Pharmaceutical Affairs Law, drugs are classed into poisons, dangerous drugs, and common drugs, and their means of storage and management are specified. Furthermore, narcotics and psychotropics are strictly controlled by the Narcotics and Psychotropics Control Act. The drugs used in implant surgery should be stored and managed in accordance with their specific class. Management should not only be according to the storage location, but also specifics such as the storage temperature, container, and whether the drug should be protected from light, as stated in the package insert.

## References

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