PAIN PERCEPTION AND PAIN CONTROL

PAIN PERCEPTION

The nerve endings reach only for 20% of the tubules that in few microns of the pre-dentin. Therefore the odontoblastic cell body and their process having a roll in the sensation.

The most acceptable theory is the Hydro-dynamic theory, which depends on the capillary flow dynamics of the fluid filled dentinal tubules.

Normally there is constant outward slow fluid movement, as a result of stimulation there will be a rapid fluid movement, which will cause a displacement of the odontoblastic bodies, then the nerve endings in the pulp are deformed; a response that interrupted as a pain.

As the dentin near the pulp; the tubule diameter increase also the permeability increase thus increase volume and flow of the fluid leading to increase the sensitivity of the deeper dentin.

PAIN CONTROL

Any operative procedure cannot be performed properly without pain control. Pain enhances the chances of apprehension, nervousness, syncope and shock during treatment. A patient who is not in a calm state may interfere with treatment and is prone to injury during treatment. All these lead to decreased work output and poor quality of work.

 Usually pain control in a dental clinic can be obtained by the following methods.

1. The use of high speed and ultrahigh speed rotary instruments with sharp burs and coolants.
2. Local anesthesia
3. Analgesia
4. Hypnosis
5. General anesthesia
THE USE OF HIGH SPEED AND ULTRAHIGH SPEED ROTARY INSTRUMENTS WITH SHARP BURS AND COOLANTS

When new and sharp burs of appropriate sizes are used with high speed and ultrahigh speed with coolants the pain is almost eliminated during all operative procedures. Even lengthy and complicated procedures are performed very quickly without any discomfort to the patient.

LOCAL ANESTHESIA

Commonly local anesthesia is given parenterally. A very small amount is adequate for the various operative procedures. Before injection topical anesthetic solution is applied on the site where the injection is to be given to eliminate pain of injection. The solution should be at body temperature and sensitivity test must be done before injecting the required dose.

ANALGESIA

Inhalation sedation may be used for the patient who has a low threshold of pain and are very apprehensive. In these patients, nitrous oxide and oxygen increase threshold of pain. Inhalation sedation does not mean general anesthesia rather it is sometimes given along with local anesthetic injections to elevate threshold of pain. With this patient is conscious of surrounding activities.

HYPNOSIS

Hypnosis is also used to reduce or alleviate apprehension and pain. It is done through suggestion of relaxation. Dental surgeon should have knowledge about the patient having conditions associated with psychological, emotional and mental factors. Patient undergoing hypnosis feels relaxed and less fatigued at the end of dental treatment. During treatment, dental surgeon and patient remain in a more relaxed environment.

Cardiovascular System

Patient's heart rate, blood pressure (BP), and pulse rate should be evaluated. A patient having heart disease like valvular defect should be operated under antibiotic coverage. In conservative dentistry, endodontology or sub gingival caries

Large amount of anesthetic drugs may cause decreased blood pressure which leads to unconsciousness due to reduced oxygen supply to the brain. Generally, local anesthetic preparations contain 1:80,000 to 200,000 concentration of adrenaline and 2 percent local anesthetic salt, which have good safety margin. The increased concentration of adrenaline may cause increase in blood pressure, rise in heart rate and arrhythmia also. In cardiac patients local anesthetic solution without adrenaline should be used.

CENTRAL NERVOUS SYSTEM

Side effects of the local anesthesia are more common in central nervous system. Therapeutic dose generally may cause depression. Very high dose may cause tonic-clonic seizure, decreased blood pressure and respiratory arrest leading to death.

Allergy: Most dangerous complication is allergy, because it is life-threatening in most of the cases. Hence, proper history about allergy is mandatory before administering local anesthesia.

Pregnancy: It is better to use minimum amount of local anesthetic drug specially during pregnancy.

Hepatic dysfunction: In hepatic dysfunction, the biotransformation cannot take place properly. It causes high level of local anesthetic in the blood. Therefore, low doses of local anesthetic should be administered, or using material that not biotransformation in the lever.

Renal dysfunction: In patients with kidney diseases, local anesthetics do not cause any extra problem to the patient.

Thyroid diseases: Careful finding for uncontrolled hyperthyroidism is required because such patients exhibit increased response to the vasoconstrictor (adrenaline) present with local anesthetics. Therefore
solutions without adrenaline should be used.

**Age:** In very young and extremely old persons, less than the normal therapeutic dose should be given.

**Advantages of Local Anesthesia**
Following are the main advantages of local anesthesia during dental procedure.

1. **Better patient co-operation:** If the region or tooth is fully anesthetized patient does not feel pain. It removes fear and apprehension. Patient appears relaxed and gives better cooperation and dental procedure can be done in a calm environment

2. **Control of saliva:** Increased flow of saliva during dental procedure is the consequence of "touch" sensation to various parts of the oral cavity during treatment. Under local anesthesia, there is reduction of sensation which results in decreased salivary flow.

3. **Control of bleeding:** In the local anesthesia, a vasoconstrictor, usually epinephrine or adrenaline is added mainly for increasing the period of anesthesia by decreasing flow of blood at the site of injection. This temporary reduction in blood flow helps in controlling bleeding during any dental procedure.

4. **Operative efficiency:** By the use of local anesthesia, pain disappears, which is associated with reduced blood flow and apprehension. Under local anesthesia, the patient is most cooperative. Therefore, the confidence and work efficiency is increased.

**Steps in Administration of Local Anesthesia**

1. Patient should be in supine position. This is preferred because it favors good blood supply and pressure to brain.

2. **Syringe aspiration:** Before injecting the solution into the body, first a little aspiration in the syringe is done to avoid chances of injecting solution in the blood vessels and consequently preventing toxic effect of local anesthesia.

3. The local anesthetic solution should not be injected into the inflamed and infected tissues to prevent possible spread of infection. In inflamed areas, the local anesthetic solution does not work properly due to acidic medium of inflamed tissues.

4. In every patient, disposable needle and syringe should be used. The needle should be of proper gauge and length. Needle should remain covered with cap till its use.

5. Before loading syringe the temperature of the solution should be brought to body temperature to make injecting a painless procedure.

6. Before loading the solution in the syringe, it should be confirmed that anesthetic solution is fresh and not expired.

7. Before injecting the local anesthesia, the site of injection should be cleaned free of debris and saliva by a sterile cotton pellet.

8. Topical surface anesthetic solution or jelly may be applied before injecting the needle for painless penetration of needle.

9. Needle should be inserted at the junction of alveolar mucosa and vestibular mucosa and the angle of needle should not be parallel to the long axis of the tooth. Injection parallel to long axis causes more pain (Fig. 15.1).

10. Anesthetic solution is injected slowly not more than 1 ml per minute and in small increments to provide enough time for tissue diffusion of the solution. Needle should be continuously inserted inside till the periosteum or bone is felt by way of slight increase in resistance of the needle movement. The needle is slightly withdrawn and here the remaining solution is injected. 11: Two minutes after injection the effect of anesthesia is checked before starting operative procedure.

12. Patient should be carefully watched during and after local anesthesia for about half an hour for delayed reactions

13. After use, the needle and syringe should be discarded in a container. The container should be leak-proof and hard-walled.

Therefore for the control of discomfort and pain the use of sharp burs, coolants, hypnosis, analgesia and local anesthesia must be used to make operative procedures pleasant and acceptable to the patient.

**General anesthesia:** It is only required when all the above methods fail or the mouth opening is poor.
Incorrect entry point (junction of loose and fixed mucosa)

Correct entry point

Correct angle

Incorrect angle

Correct lip position

Incorrect lip position

Correct

Fig. 15.1: Correct angle of needle for injecting local anesthesia on the buccal side of upper premolar