

# **Sri Aurobindo College of Dentistry**

**Indore, Madhya Pradesh**  
**INDIA**



# MODULE PLAN

- TOPIC :SYSTEMIC COMPLICATION OF L.A
- SUBJECT:ORAL SURGERY
- TARGET GROUP: UNDERGRADUATE DENTISTRY
- MODE: POWERPOINT – WEBINAR
- PLATFORM: INSTITUTIONAL LMS
- PRESENTER: DR.TEJAS MOTIWALE

# INTRODUCTION

- An anesthetic complication may be defined as any deviation from the normally expected pattern during or after the securing of regional analgesia.



Complications may be classified as follows:

1. Primary or secondary.

2. Mild or severe

3. Transient or permanent

■ Complications may be further divided into 2 groups:

1. Those attributed to the solutions used

2. Those attributed to the insertion of the needle.

## Those attributed to the insertion of the needle.

1. Syncope
2. Muscle trismus
3. Pain or hyperalgesia
4. Edema
5. Infections
6. Broken needles
7. Persistent anesthesia or paraesthesia
8. Hematoma
9. Sloughing
10. Bizarre neurological symptoms

# Those attributed to the solutions used

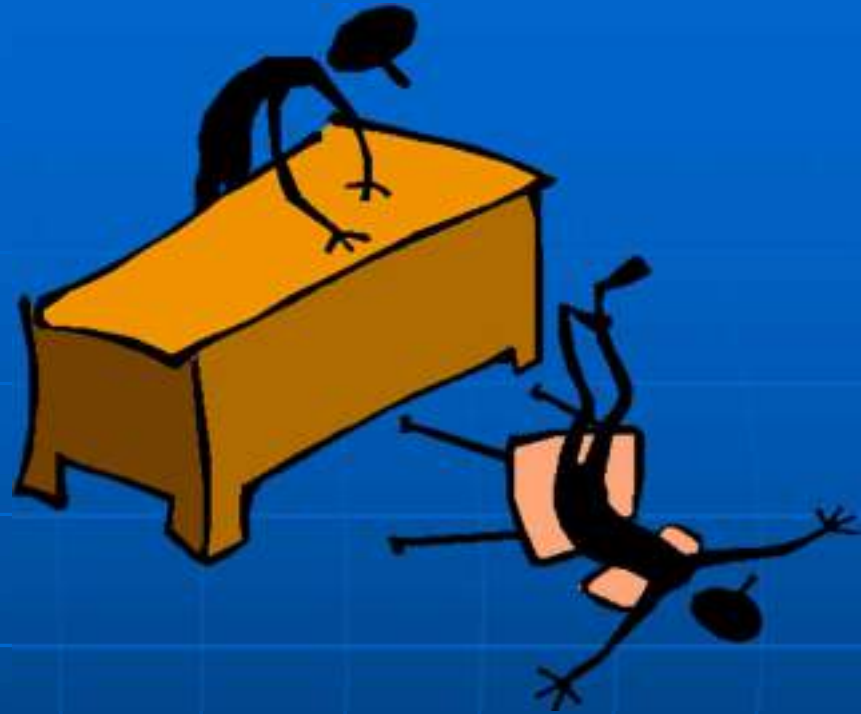
1. Toxicity
2. Idiosyncrasy
3. Allergy
4. Anaphylactoid reactions
5. Infections caused by contaminated solutions.
6. Local irritations or tissue reactions caused by solutions.



**Those attributed to the  
insertion of the needle.**



# SYNCOPE



- Syncope or fainting is the most frequent complication associated with local anesthesia.



# Syncope Signs and Symptoms

- In most instances it is possible to detect a change in the patient's appearance.

*Dizziness, Weakness, Nausea.*

*Skin is pale, cold and sweaty.*

*Predisposing factors: Anxiety , fear, pain and sight of blood*

# Syncope management

- The operator should discontinue any procedures in progress and lower the chair back while the patient's legs are slightly elevated, thus placing the patient in a semireclining position .
- This position aids venous return from the lower portions of the body while preventing venous congestion in the upper body, as with the conventional Trendelenburg (head down) position.

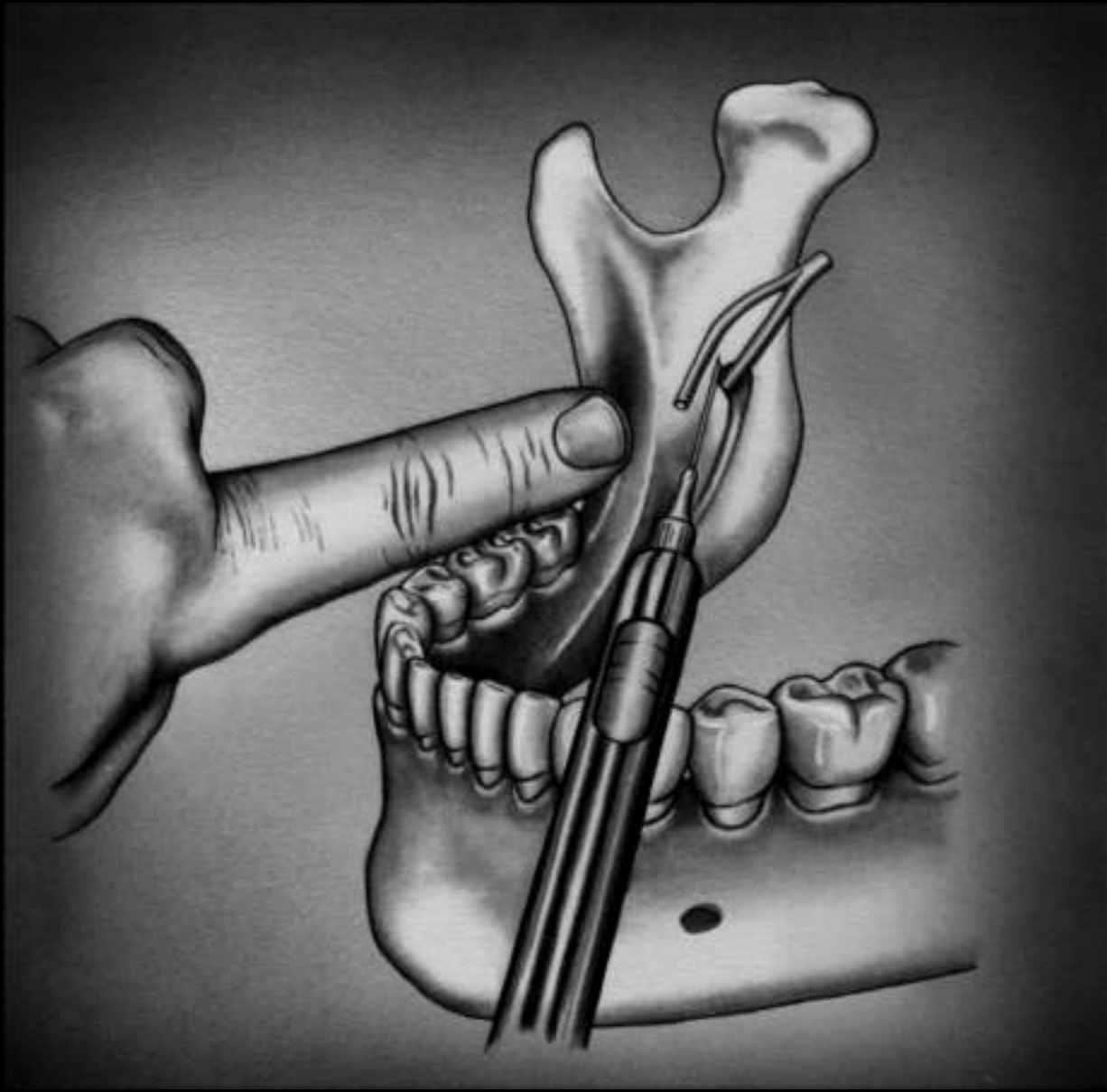


# TRISMUS



# Muscle Trismus

- Muscle trismus is a fairly common complication of regional analgesia or anesthesia, particularly after blocks of the inferior alveolar nerve
- The most common cause of trismus is trauma to a muscle during the insertion of the needle. Irritating solutions, hemorrhage, or low-grade infection within the muscle may also cause varying degrees of trismus.





# Muscle Trismus management

- The treatment should depend on the cause of the trismus. If the condition arises as the result of trauma, slight exercises and drug therapy may be necessary to relieve pain, if sufficiently severe.
- Centrally acting muscle relaxants such as diazepam (Valium) 2.5 to 5.0 mg four times per day coupled with the application of warm moist compresses for 15 to 20 minutes per hour will usually relieve the symptoms in several days.

# Muscle Trismus management

- Mild analgesics may also be used for discomfort.
- Physiotherapy consisting of opening and closing the mouth as well as movement from side to side for 5 to 10 minutes every 3 or 4 hours will also assist recovery

## Muscle Trismus prevention

- Trismus may be prevented by the use of sharp, sterile needles so that the trauma of insertion and any subsequent low-grade infections are prevented.
- The area of insertion should be cleansed and painted with a suitable antiseptic solution.
- Care should be exercised also so that the needle is inserted atraumatically and no muscles are penetrated.

# Pain or hyperesthesia



- Pain during or after the administration of a regional anesthetic is very common. Mainly caused by carelessness or indifference.

## Pain or hyperesthesia

- Only sharp needles should be used, and the area of penetration should be anesthetized with a topical anesthetic.
- The insertion of the needle should be slow and as atraumatic as possible.
- Multiple insertions in the same area should be avoided.
- Solutions should be sterile and compatible with the tissue.

## Pain or hyperesthesia

- They should also be forced into the tissue very slowly and with as little pressure as possible. Excessive volumes in constricted areas should be avoided. Rational concentrations of vasoconstrictors should be used.



# Pain or hyperesthesia



- Infections, low grade or otherwise, are a common cause of pain after the use of regional anesthesia or analgesia. Extreme care should be exercised in maintaining aseptic conditions. There is no excuse for careless contamination or for failure to appreciate the importance of asepsis



# EDEMA



# Edema

- Edema, or swelling of the tissues, is usually a symptom and rarely an entity in itself.
- Trauma, infection, allergy, hemorrhage, and other factors can produce edema.
- Each cause of edema should be considered under own classification in regard to prevention and treatment

# Infection

- Infection as a factor in producing pain needs little or no discussion, since it is so obvious. Dentists should constantly apply all means at their command to prevent infections.



# Infection

- All areas, instruments, needles, and solutions should be as aseptic as possible, The operator's hands should be scrupulously cleansed before working on each patient. All areas should be cleansed with a suitable antiseptic before needle insertion is performed. Care should be exercised to avoid passing the needle through infected areas.







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**Hands That Heal**

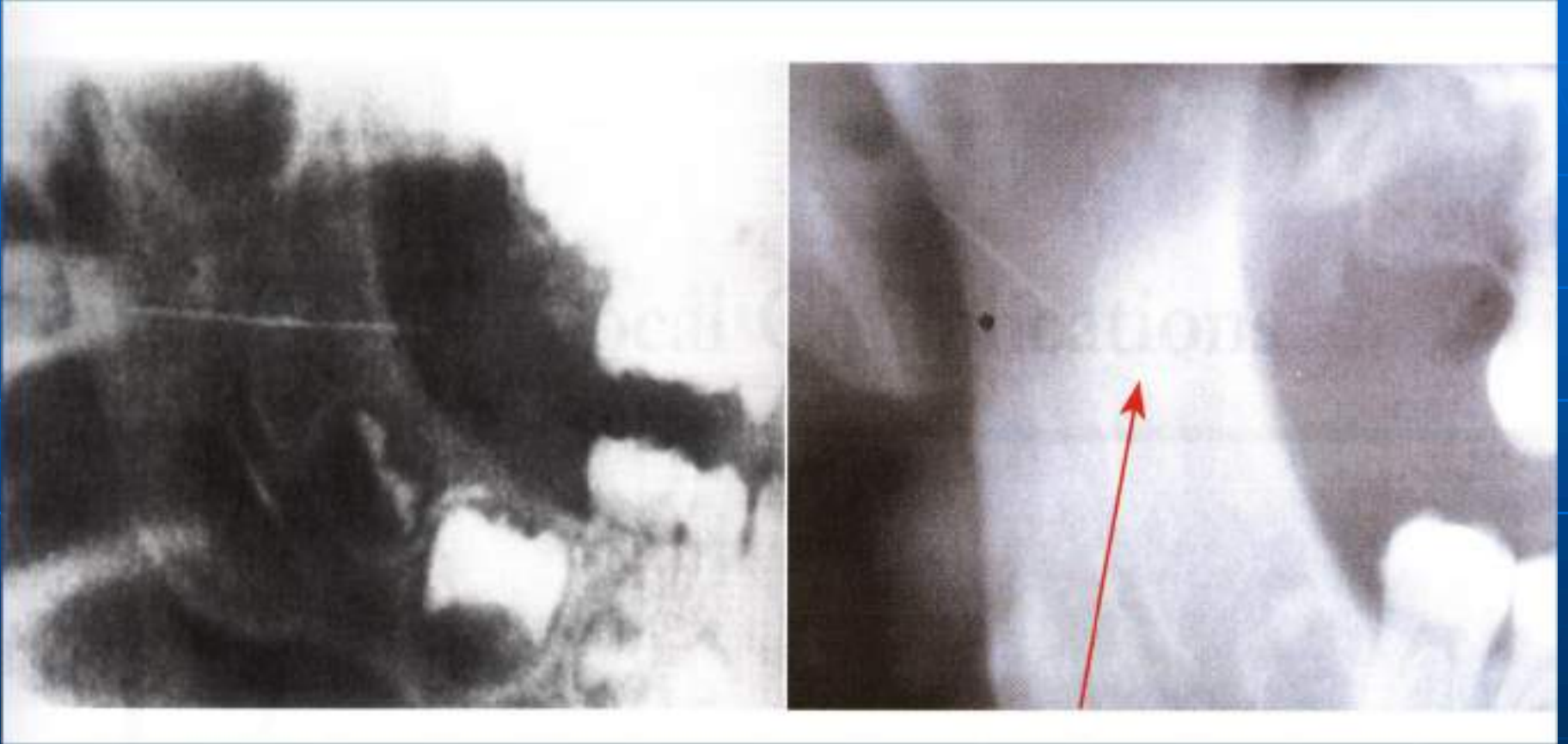


**Hands That Kill**

*Which hands are yours?*

# Broken Needles

- Breakage of needles is one of the most annoying and depressing complications of regional anesthesia.
- dentists should not violate fundamental principles when using them.
- The following principles should be observed to prevent the possibility of a broken needle:



# Broken Needles

- 1. Do not attempt to force a needle against resistance.
- 2. Do not attempt to change the direction of the needle while it is embedded in the tissue.
- 3. Do not use a needle of too fine a gauge.
- 4. Do not use resterilizable needles.
- 5. Do not attempt injections if you are uncertain about the anatomy of the area of the techniques employed

# Broken Needles

- 6. Do not insert the needle so far as it is out of sight in tissue.
- 7. Do not surprise the patient with a sudden unexpected needle insertion. The informed patient is always the best patient and is much more cooperative.

# Persistent anesthesia or paraesthesia

- Most cases of prolonged anesthesia are caused by solutions contaminated by alcohol or other sterilizing media.
- The most likely cause associated with the needle insertion is hemorrhage into the neural sheath caused by the mild trauma of a needle bumping into the nerve, which creates pressure and subsequent anesthesia.



# HEMATOMA





# Hematoma

- Hematoma is a common complication of intraoral regional analgesia.
- Is most commonly associated with the posterior superior alveolar and infraorbital nerve blocks.
- Hematoma is an effusion of blood into the surrounding tissue as the result of a torn blood vessel. As a rule, the atraumatic puncture of a vein will not produce a hematoma.

# Hematoma

- Most hematomas are the result of improper technique.
- As a rule, hematomas after needle insertion have no severe consequence other than that of inconvenience to the patient and embarrassment to the dentist. They all absorb in due time, with little residual effect other than a discoloration of the skin that may persist for a few days.

# Hematoma

a

- No attempt should be made to aspirate or to interfere with the normal absorption of the blood in the tissues. The patient should be told what happened and put at ease by an explanation of the condition's lack of severity

# Bizarre neurological symptoms

- On rare occasions unexplained neurological symptoms may occur following the insertion of a needle and the injection of a solution in a given area.
- Patients may exhibit facial paralysis, crossed eyes, muscular weakness, temporary blindness, and many other unexpected complications.
- They are rare and are usually caused by inadvertent anesthesia to nerves in the area.

The 7th cranial nerve exits the skull at the stylomastoid foramen, passes through the parotid gland, and subdivides into 5 branches that supply the facial muscles. Paralysis of the nerve may occur without any known cause. Bell's palsy is thought to be caused by swelling of the nerve within the facial (fallopian) canal.







## Bizarre neurological symptoms

- The best method of preventing these complications is to follow closely the accepted techniques and to adhere to all the basic concepts of accepted procedure.

Thank you  
for your attention !



# SYSTEMIC COMPLICATIONS



# TECHNICAL COMPLICATIONS ASSOCIATED WITH L A ADMINISTRATION



# Causes of adverse drug reactions

- Toxicity caused by direct extension of the usual pharmacological effects of the drug
- Toxicity caused by the alteration in the recipient of the drug
- Toxicity caused by allergic response to the drug

# COMPLICATIONS CAUSED BY THE ANESTHETIC SOLUTION

## Toxicity

- The term toxicity, or toxic overdose, refers to the symptoms manifested as the result of over dosage or excessive administration of a drug
- This complication depends on a sufficient concentration of the drug in the blood stream to adversely affect the CNS,RS,CVS.



# Toxicity

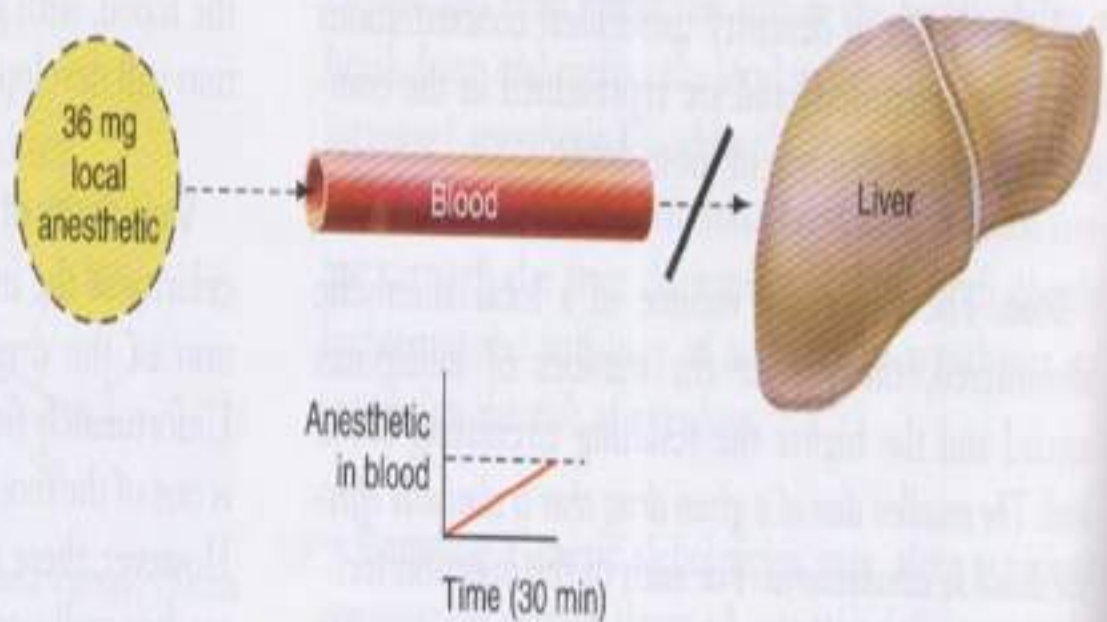
Blood level high enough to cause the symptoms of toxic overdose may come about in one or more of the following ways:

1. Too large total dose of local anesthetic drug
2. Unusually rapid absorption of the drug
3. Inadvertent intravascular injection
4. Unusually slow biotransformation
5. Slow elimination or redistribution

**Figure 18-4.** Even in a patient with normal liver function, a large dose of local anesthetic may be absorbed into the cardiovascular system more rapidly than the liver can remove it. This produces a relatively rapid elevation of the blood anesthetic level.



**Figure 18-3.** In patients with significant liver dysfunction, removal of a local anesthetic agent from the blood may be slower than its absorption into the blood, leading to a slow but steady rise in the blood anesthetic level.



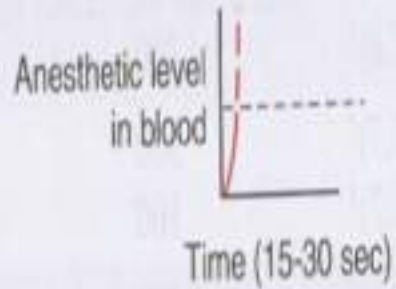
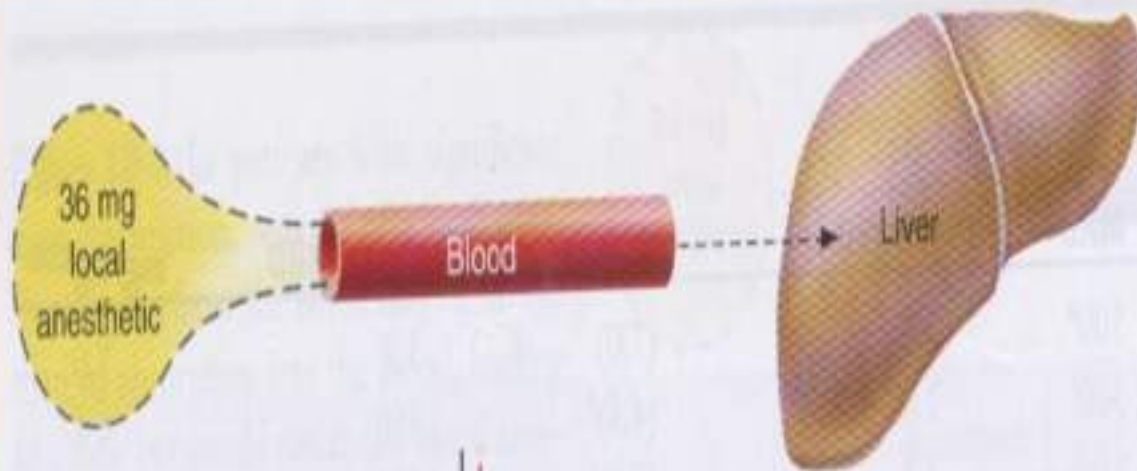


Figure 18-6. Direct intravascular administration of one cartridge of local anesthetic produces marked elevation of the blood anesthetic level in a very short time.

# Toxicity

The blood level necessary to create a toxic overdose is variable and depends on a variety of factors.

## Patient Factors.

- Age
- Weight
- Other drugs
- Sex
- Presence of disease
- Genetics
- Mental attitude & environment

# Toxicity

## Drug Factors

- Vasoactivity
- Concentration
- Dose
- Route of administration
- Rate of injection
- Vascularity of the injection site
- Presence of vasoconstrictors.



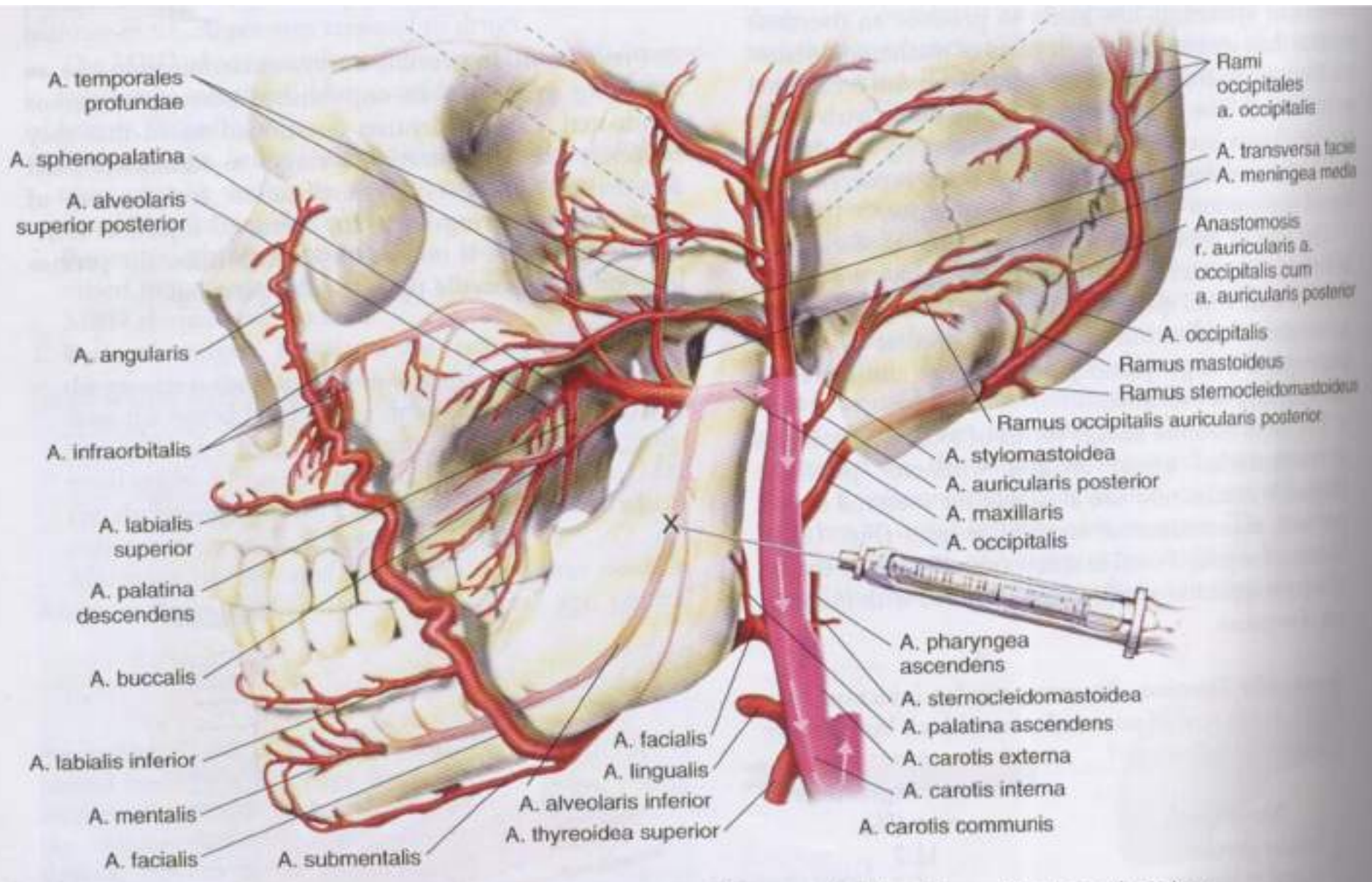


Figure 18-7. Reverse carotid blood flow. Rapid intraarterial deposition of local anesthetic into the inferior alveolar artery (X) produces an overdose reaction. Blood flow in the arteries is reversed because of the high pressure produced by the rate of injection. Arrows indicate the path of the solution into the cerebral circulation.



# CLINICAL MANIFESTATIONS

- MINIMAL TO MODERATE OVERDOSE LEVELS:
- Symptoms

Light headedness and dizziness

Restlessness

Nervousness

Numbness

Sensation of twitching before actual twitching is observed

Metallic taste

Visual disturbances

Auditory disturbances

Drowsiness and disorientation

Loss of consciousness

## MINIMAL TO MODERATE OVERDOSE LEVELS signs

Talkativeness

Apprehension

Excitability

Slurred speech

Generalized stutter,  
Leading to muscular  
twitching and tremor  
in the face and distal  
extremities

Euphoria

Dysarthria

Nystagmus

Sweating

Vomiting

Failure to follow  
commands or be  
reasoned with

Disorientation

Loss of response to  
painful stimuli

Elevated B.P

Elevated heart rate

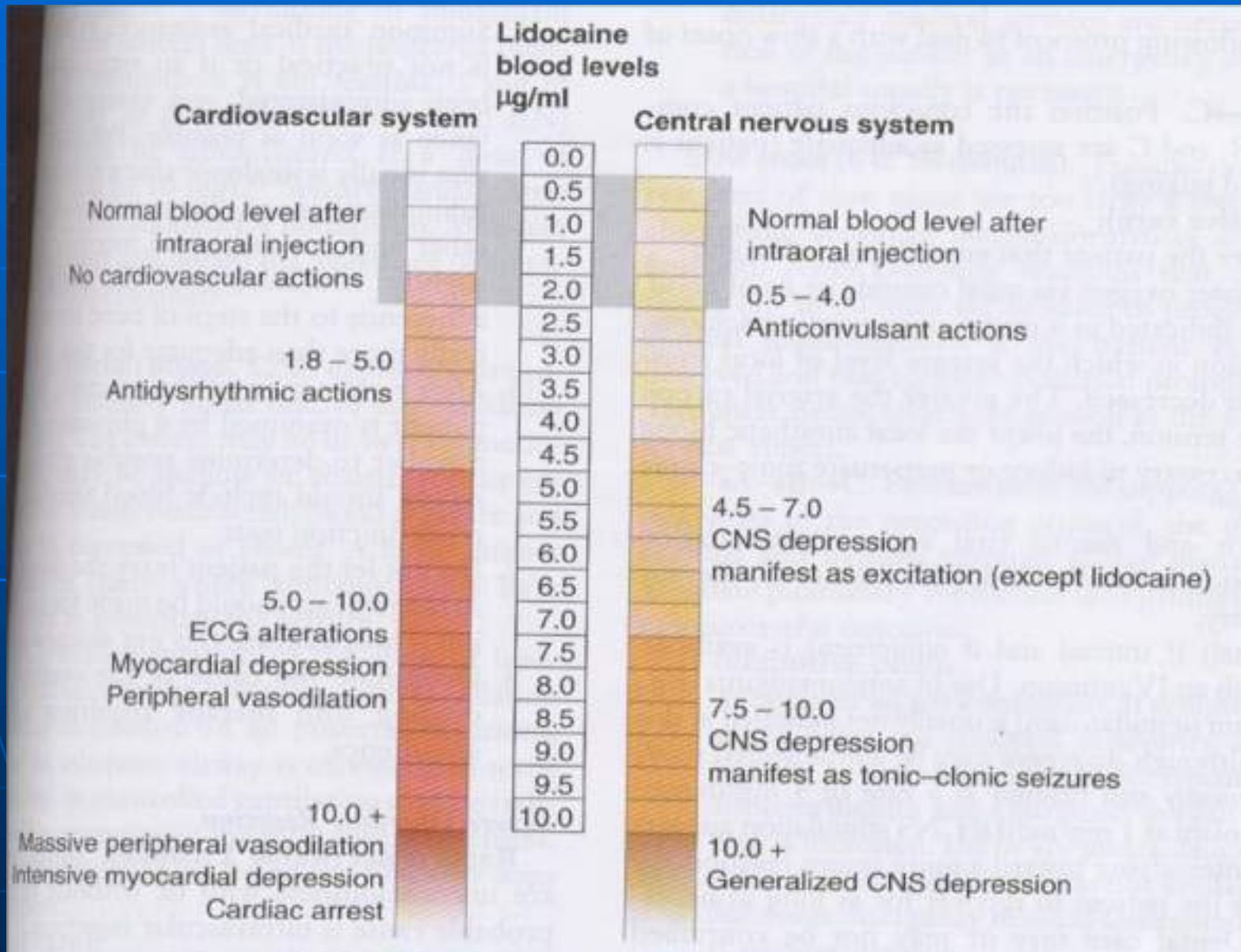
Elevated respiratory rate

## MODERATE TO HIGH OVERDOSE LEVELS SIGNS

Tonic clonic seizures activity followed  
by generalized CNS depression

Depressed BP, HR, RR

# PATHOPHYSIOLOGY



# Toxicity

- SYMPTOMS.

- Usually early central nervous system stimulation followed by a proportionate degree of depression. (On occasion central nervous system depression may appear as the first sign of toxicity.)

1. Cerebral cortical stimulation

- a. Talkativeness
- b. Restlessness
- c. Apprehension
- d. Excitement

# Toxicity

- 2. Cerebral cortical depression
  - a. Lethargy
  - b. Sleepiness
  - c. Unconsciousness

# Toxicity

- After mild cortical stimulation there may be little or no cortical depression. However, convulsions are usually followed by severe cortical depression and unconsciousness.
- 3. Medullary stimulation
  - a. increased blood pressure
  - b. Increased pulse rate
  - c. Increased respirations
  - d. Possible nausea and vomiting



# Toxicity

- 4. Medullary depression will usually occur in proportion to the amount of medullary stimulation.
  - a. Blood pressure may remain normal in mild cases or drop to zero in severe cases.
  - b. Pulse may range from normal to weak, thready, or absent.
  - c. Respiratory changes may be slight, or the patient may become apneic in severe cases.

# Signs and symptoms of epinephrine or vasopressor overdose

## ■ SIGNS

Sharp elevation in the BP

Elevated HR

Possible cardiac dysrhythmias

## ■ SYMPTOMS

Fear ,anxiety

Tenseness

Restlessness

Throbbing headache

Tremor

Perspiration

Weakness

Dizziness

Pallor

Respiratory

# TREATMENT.

# Toxicity

- Treatment should be directed toward alleviating symptoms; early recognition and early treatment are imperative.
  1. Mildly stimulated patients should require no treatment other than the discontinuing of further administration of the anesthetic drug
  2. Moderately stimulated patients should be given pentobarbital sodium or secobarbital intravenously very slowly until they are calmed, plus inhalations of oxygen.

# Toxicity

3. Convulsive patients should receive 20 to 40 mg of succylcholine chloride intravenous or double the dose intramuscularly to control the convulsions. Adequate ventilation must be maintained
4. Treatment of central nervous system depression should be directed toward supporting respiration with artificial ventilation and maintaining adequate cardiovascular system function through positional changes and vasopressors, if required.

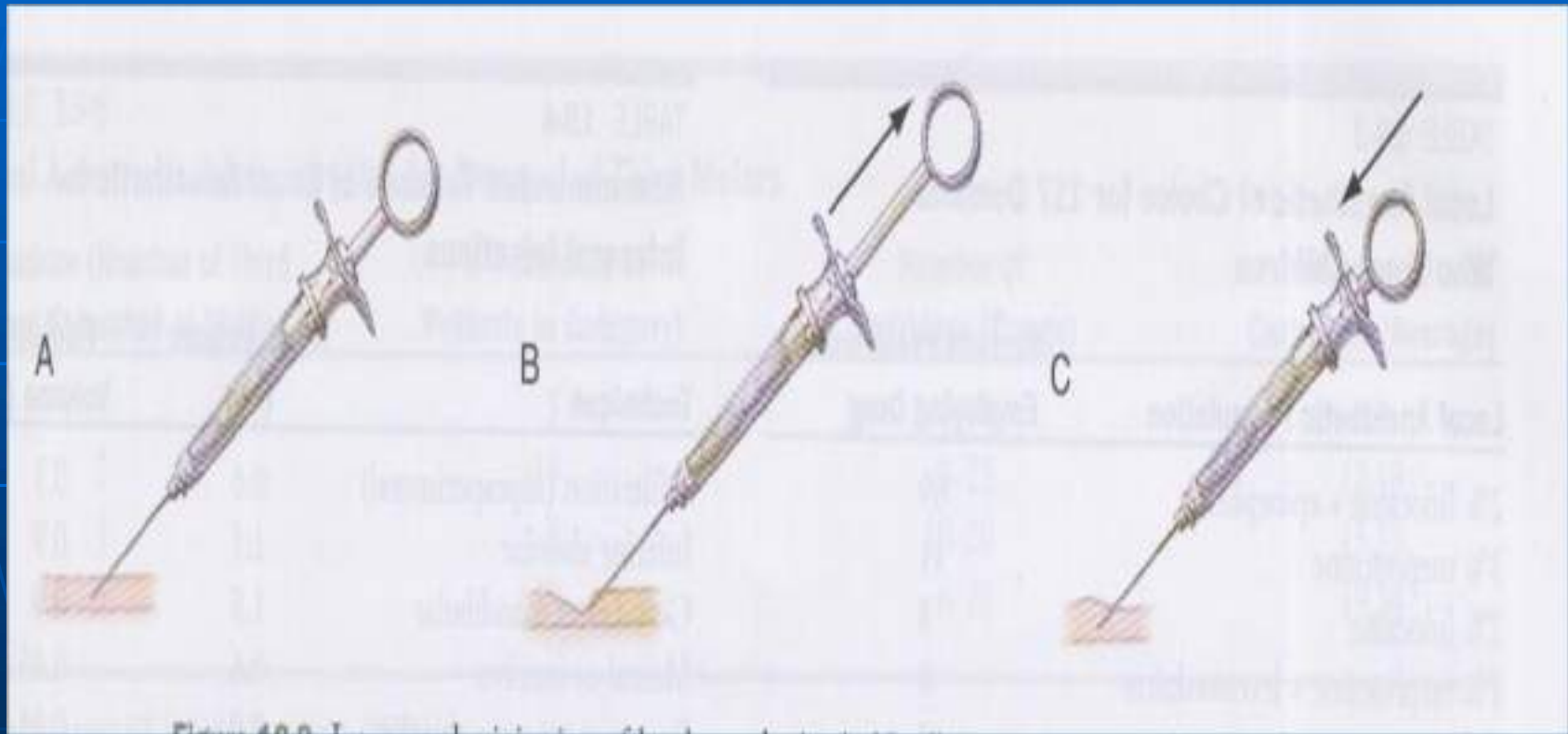
# PREVENTION

## Toxicity

1. Aspiration must be performed before injecting.
2. The smallest possible volume of drug should be used to secure satisfactory anesthesia.
3. The weakest efficient percentage strength of the drug should be used.
4. The anesthetic drug should be injected slowly.
5. A vasoconstrictor should be employed in local anesthetic if not contraindicated

# ASPIRATION TEST

## Toxicity Prevention



# IDIOSYNCRASY

- The term idiosyncrasy is often assigned to a bizarre type of reaction that cannot be classified as toxic or allergic.
- Qualitative drug intolerance other than immune mechanism that cannot be explained by any known pharmacologic or biochemical mechanism.





# ALLERGIC REACTIONS

- Allergy is a hypersensitive state , acquired through exposure to a particular allergen, re exposure to which produces a hightened capacity to react.
- CAUSE:

The primary cause of allergic reactions is a specific antigen antibody reaction in a patient who has previously been sensitized to a particular drug or chemical derivative thereof.

# ALLERGIC REACTIONS

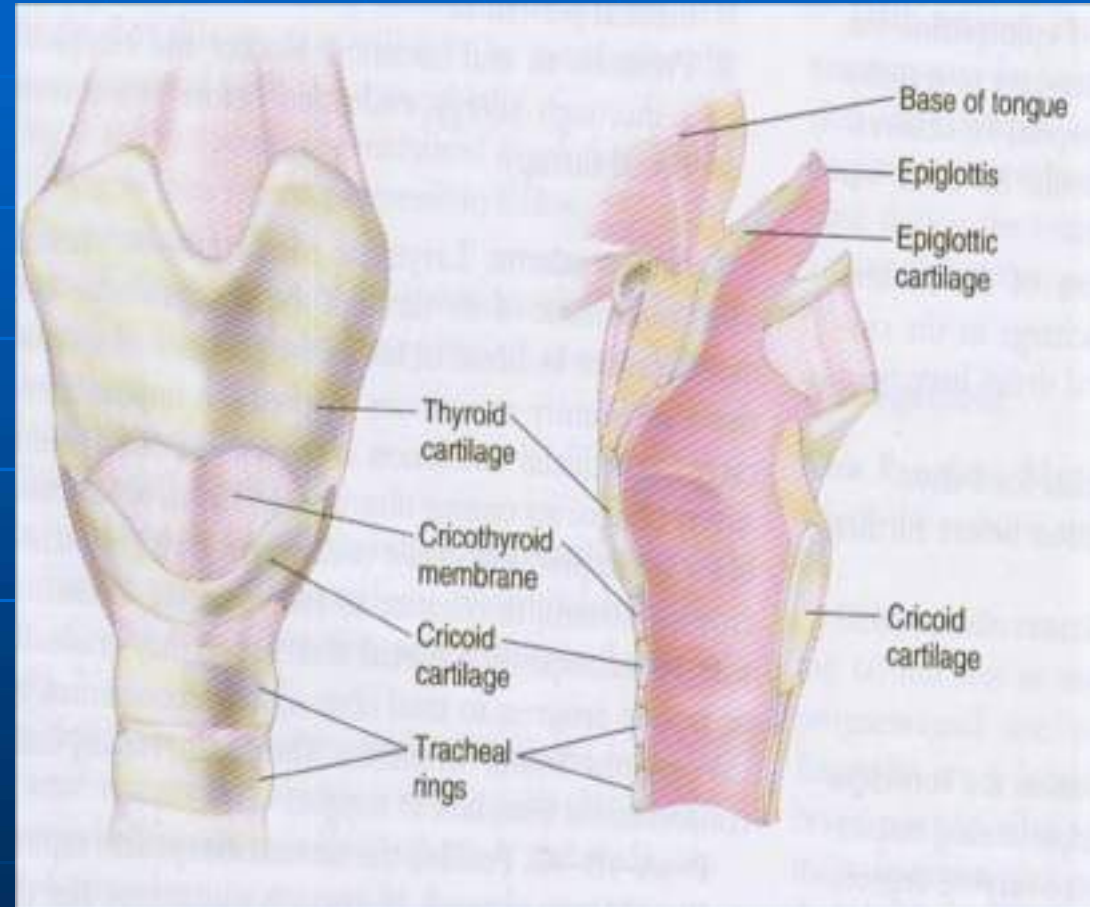
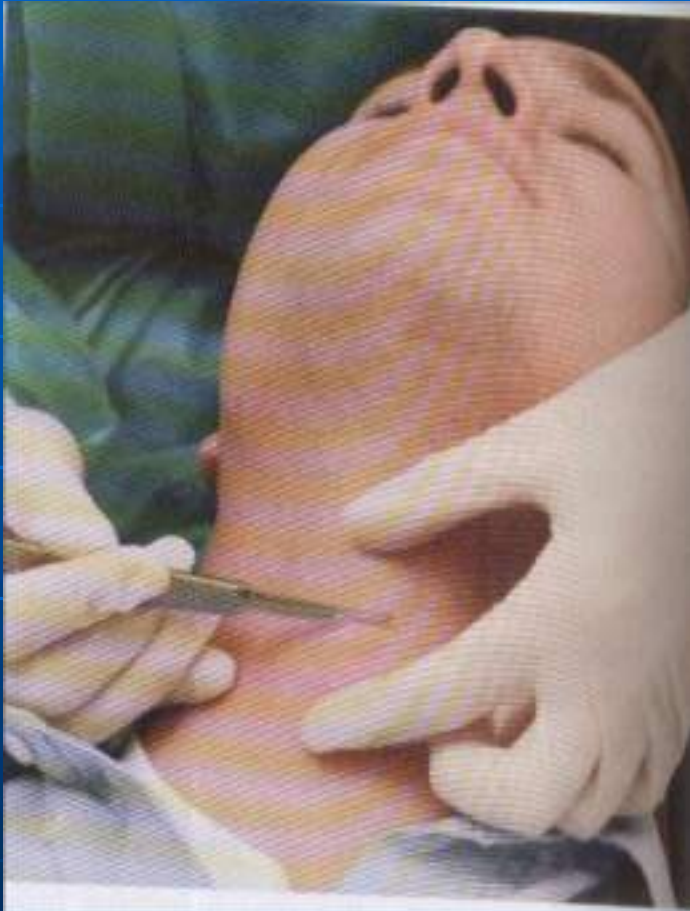
- SYMPTOMS. Reaction affects a particular shock organ, most likely the skin, mucous membrane, or blood vessels.
  1. Rashes
  2. Urticaria
  3. Angioneurotic edema
  4. Mucous membrane congestion
    - a. Rhinitis
    - b. Asthmatic symptoms

# ALLERGIC REACTIONS

## ■ TREATMENT

1. Epinephrine 0.3mg( 0.15mg for children)
2. IM Histamine blockers: 50mg  
Diphenhydramine(25mg for child) /  
10mg Chlorphenaramine(5mg child)
3. medical consultation with the physician
4. Observe the pt for min of 60 mins
5. Prescribe oral histamine blockers for 3 days
6. Complete evaluation of the pt
7. In bronchospasm along with epinephrine,  
bronchodilators via aerosol inhalers can be used  
every 10-15 mins

# Laryngeal edema- Cricothyrotomy



# ALLERGIC REACTIONS

## ■ PREVENTION

1. Adequate preanesthetic evaluation must be done.
2. No drug or drugs should be used if the patient previous allergic reaction to them.
3. No patient should be tested to attempt to disprove his allergic history.

# BASIC LIFE SUPPORT





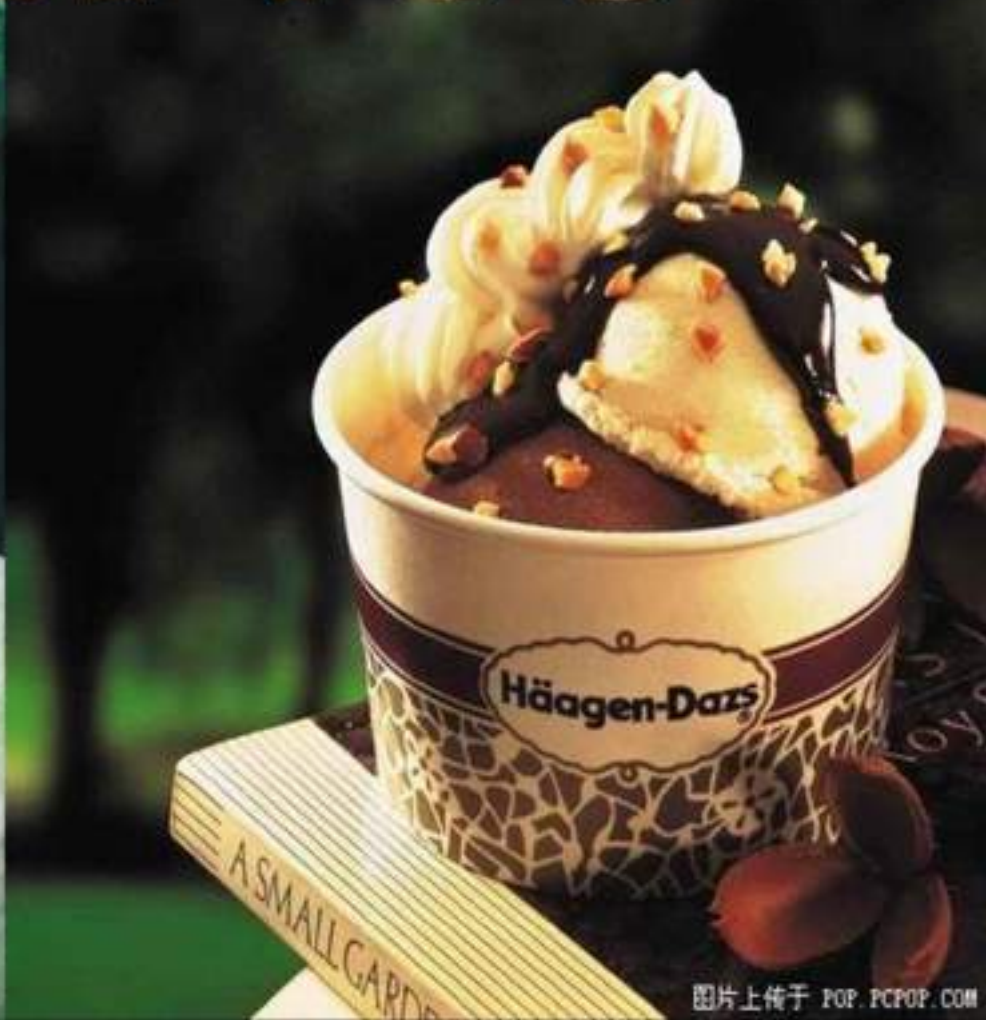
**Table 8-1.** Drugs for anesthetic emergencies

<b>Drug</b>	<b>Dosage</b>	<b>Administration</b>	<b>Indication</b>
Oxygen	Sufficient quantity	Inhalation	Respiratory or cardiovascular
Pentobarbital sodium (Nembutal)	As indicated	Intravenously Intramuscularly	Toxic overdose Idiosyncrasy
Secobarbital sodium	Same as Nembutal	Same as Nembutal	Same as Nembutal
Diphenhydramine (Benadryl)	20 to 50 mg	Intravenously	Allergic reactions
Epinephrine (Adrenalin)	0.3 to 0.5 mg	Intramuscularly	Allergic reactions
Aminophylline	3.5 to 7 gr	Intravenously	Asthmatic attacks
Isoproterenol HCl	0.5% (1:200)	5 to 15 deep inhalations via nebulizer	Bronchial spasm
Decadron	4 to 12 mg	Intravenously	Adrenal insufficiency Allergic emergencies Shock
Mephentermine sulfate (Wyamine sulfate)	1 ml (15 mg) 0.5 ml (7.5 mg)	Intramuscularly Intravenously	Hypotension
Atropine sulfate	1/150 to 1/100 gr	Intravenously	Bradycardia
Succinylcholine chloride	20 to 50 mg	Intravenously	Convulsions
Dantrolene sodium (Dantrium)	350 mg	Intravenously	Malignant hyperthermia

# THANK YOU



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# Local irritations or tissue reactions caused by solutions

