

# Local anesthesia-local complications

- Needle breakage
- Prolonged anesthesia or parathesia
- Facial nerve paralysis
- Trismus
- Soft tissue injury
- Hematoma
- Pain on injection
- Burning on injection
- Infection
- edema
- Slouging of tissues and postanesthetic intraoral lesions

## ■ Needle breakage :

- Stainless steel dental local anesthetic needles, needle breakage has become an extremely rare complication.
- Needle fracture occur usually at the hub.
- Additional factors include: 1) intentional bending of the needle by doctor 2) sudden unexpected movement by the patient while injecting 3) forceful contact with the bone

## ■ Prolonged anesthesia or parathesia:

- patient feel numb many hours and days after local anesthesia.
- Patient clinical response response to this include sensations of numbness,swelling,tingling and itching
- Associated oral dysfunction including tongue biting,drooling,loss of taste and speech impediment.

## ■ Facial nerve paralysis:

- 7th cranial nerve carries motor impulses to the muscles of facial expression of scalp, external ear and other structures
- Paralysis of some of its terminal branches occurs whenever an infraorbital nerve block is administered or when maxillary canines are infiltrated

## ■ Trismus:

- Defined as prolonged tetanic spasm of the jaw muscles by which the normal opening of the mouth is restricted
- Mainly due to trauma to muscles or blood vessels in the infra temporal fossa

## ■ Soft tissue injury:

- Self inflicted trauma to lips and tongue is frequently caused by patients inadvertently biting or chewing these tissues while still anesthetized

## ■ Hematoma:

- The effusion of blood into extravascular spaces can be caused by inadvertent nicking of blood vessel during administration of local anesthesia.



■ Pain on injection:

■ Mainly due to careless injection technique

# Local anesthesia-systemic complications

# Drug Actions

All drugs produce multiple effects

These effects are categorized as:

Desired

**OR**

Undesired

# General Principles

No drug exerts a single action

No drug is non-toxic

Potential toxicity is user dependent

# Adverse Drug Reactions

Direct extensions of usual effects

Side effects

Overdose

Local toxic effects

# Adverse Drug Reactions

Altered recipient

Disease process

Emotional disturbances

Genetic aberrations

Idiosyncrasy

# Adverse Drug Reactions

## Allergic reaction

Immediate - anaphylaxis

Delayed - contact dermatitis

# Overdose

Dose related

Systemic distribution

Extension of pharmacologic effects

Selective CNS or CVS depression



# Allergic Reactions

Not dose related

May be systemic or localized

Unrelated to pharmacological effects

Exaggerated immune system response

# Idiosyncrasy Reaction

Unexplained by any known mechanism of the drug's action

Neither overdose nor allergic reaction

Unpredictable; treat symptoms

# Predisposition - Overdose

## Patient factors

Age

Weight

Sex

Medications

# Predisposition - Overdose

## Patient factors

Disease

Genetics

Psychological attitude

# Predisposition - Overdose

## Drug factors

Vasoactivity

Concentration

Dose

Route of administration

# Predisposition - Overdose

## Drug factors

Rate of injection

Vascularity of site

Vasoconstrictors

# Cause of Overdose Levels

Total dose is too large

Absorption is too rapid

Intravascular injection

Biotransformed too slowly

Eliminated too slowly

# Biotransformation

Esters are hydrolyzed in the plasma and liver by pseudocholinesterase into PABA

Amides are biotransformed by microsomal enzymes in liver



# Elimination

Both esters and amides are eliminated through kidney, some in unchanged form eg. (lidocaine - 10%)

Prilocaine is eliminated by lungs

# Excessive Dose

Maximum dose should be based on:

Age

Physical status

Weight

# Rapid Absorption

Vasoconstrictors should be used unless specifically contraindicated

# Intravascular Injection

Occurrence varies with type of injection:

<u>Nerve Block</u>	<u>% positive aspirate</u>
Inf. alveolar	11.7
Mental/Incisive	5.7
Post. sup. alv.	3.1
Ant. sup. alv./ Buccal	< 1

# Prevention

Use aspirating syringe

Use needle - 25 ga or larger

Aspirate in 2 planes

Inject slowly

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# CLINICAL MANIFESTATIONS of OVERDOSE

# Minimal to Moderate

## Signs

Talkativeness

Apprehension

Slurred speech

Excitability

Stutter

Euphoria

Dysarthria

Nystagmus

Muscular twitching / tremors

# Minimal to Moderate

## Signs (cont.):

Elevated BP

Sweating

Elevated heart rate

Nausea/vomiting

Elevated resp. rate

Disorientation

Failure to follow commands / reason

Lack of response to painful stimuli



# Minimal to Moderate

## Symptoms:

Restless

Visual disturbances

Nervous

Auditory disturbances

Numbness

Metallic taste

# Minimal to Moderate

## Symptoms (cont.):

Light-headed and dizzy

Drowsy and disoriented

Losing consciousness

Sensation of twitching (before actual twitching is observed)

# Moderate to High

Generalized tonic-clonic seizure activity

**followed by**

Generalized CNS depression

Depressed BP, heart rate

Depressed respiratory rate

# Pathophysiology

Local anesthetics cross blood-brain barrier, producing CNS depression as level rises

eg. **LIDOCAINE**

<u>Blood Level</u>	<u>Action Produced</u>
< .5 ug/ml	- no adverse CNS effects
0.5-4 ug/ml	- anticonvulsant
4.5-7.5 ug/ml	- agitation, irritability
> 7.5 ug/ml	- tonic-clonic seizures

# Pathophysiology

Local anesthetics exert a lesser effect on the cardiovascular system

eg. **LIDOCAINE**

## Blood Level

## Action Produced

1.8-5 ug/ml

- **treat** PVCs, tachycardia

5-10 ug/ml

- cardiac depression

>10 ug/ml

- severe depression,

bradycardia, vasodilatation, arrest

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# MANAGEMENT of OVERDOSE

# Mild Reaction -slow onset

Reassure patient

Administer O2

Monitor vital signs

Consider IV anticonvulsant

Allow recovery or get medical help prn

Get medical consultation, esp. if possibility of metabolic or renal dysfunction

# Severe Reaction - rapid onset

Stop all treatment

Place patient in supine position, feet up

Establish airway, give O2 (BLS)

If convulsions, protect patient

Summon emergency medical help

Consider anticonvulsant drugs, vasopressors



# Severe Reaction - slow onset

Stop all treatment

Establish airway, give O<sub>2</sub> (BLS)

Administer anticonvulsant

Summon emergency medical help

Consider vasopressors

Get medical consultation, esp. if possibility of metabolic or renal dysfunction

# Vasoconstrictor Overdose

## Clinical manifestations:

Fear, anxiety

Tenseness

Restlessness

Tremor

Weakness

# Vasoconstrictor Overdose

## Clinical manifestations (cont.):

Throbbing headache

Perspiration

Dizziness

Pallor

Respiratory difficulty

Palpitations

# Epinephrine Overdose

Sharply elevated BP (systolic)

Increased heart rate

Cardiac tachyarrhythmias

# Management - v/c overdose

Stop dental treatment

Sit patient up

Reassure patient, administer O<sub>2</sub>

Monitor BP and pulse until fully recovered

# Allergic Reactions

<u>Type</u>	<u>Mechanism</u>	<u>Time</u>	<u>Clinical Example</u>
I	Antigen induc.	sec/min	Angioedema, Anaphylaxis
IV	Cell mediated	48 hrs	Contact dermatitis

# Allergens in Local

Esters - usually to the Para-amino-benzoic-acid product

Na bisulfite or metabisulfite - found in anesthetics as preservative for vasoconstrictors

Methylparaben - no longer used as preservative in dental cartridges

# Management of Allergy Pts.

If the patient gives a history of allergy to local anesthetics - Assume that an allergy exists

Elective procedures

Postpone until work-up is completed



# Management of Allergy Pts.

## Emergency treatment

Protocol #1 - no invasive treatment ( I&D, analgesics, antibiotics)

Protocol #2 - use general anesthesia

Protocol #3 - Histamine blocker (Benadryl)

Protocol #4 - Others: electronic dental anesthesia, hypnosis, adjunctive N2O

# Allergy - signs/symptoms

## Dermatologic:

Urticaria - wheals, pruritis

Angioedema

Minor rash

# Allergy - signs/symptoms

## Respiratory:

Laryngeal edema

Bronchospasm

distress

anxiety

wheezing

diaphoresis

dyspnea

cyanosis or flushing

tachycardia

use of accessory  
muscles

# Anaphylaxis

## Typical progression \*

Skin reactions

Smooth muscle spasms (GI, GU, respiratory)

Respiratory distress

Cardiovascular collapse

\*may occur rapidly, with considerable overlap

# Management of Reactions

## Delayed skin reaction

Benadryl - 50 mg stat & Q6H X 3-4 days

## Immediate skin reaction

Epinephrine 0.3 mg IM or SC

Benadryl - 50 mg IM

Observation, medical consultation

Benadryl - 50 mg Q6H X 3-4 days

# Management of Reactions

## Bronchial constriction

Semi-erect position, O<sub>2</sub> - 6 L/min

Inhaler or Epinephrine 0.3 mg IM or SC

Benadryl - 50 mg IM

Observation, medical consultation

Benadryl - 50 mg Q6H X 3-4 days

# Mangement of Reactions

## Laryngeal edema

Place supine, O<sub>2</sub> - 6 L/min

Epinephrine 0.3 mg IM or SC

Maintain airway

Benadryl - 50 mg IV or IM

Hydrocortisone - 100 mg IV or IM

**Perform Cricothyrotomy**

# Management of Reactions

## Anaphylaxis

Place supine, on flat surface

ABCs of CPR, **call for medical help**

Epinephrine 0.3 mg IV or IM (Q 5 mins)

O<sub>2</sub> - 6 L/min, monitor vital signs

After clinical improvement,

Benadryl and Hydrocortisone



# Differential Diagnosis

Psychogenic reaction (Syncope)

Overdose reaction

Hypoglycemia

Stroke (CVA)

Acute adrenal insufficiency

Cardiac arrest

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PREVENTION  
of  
SYSTEMIC COMPLICATIONS

# Prior to Treatment

Complete review of medical status  
(including vital signs)

Anxiety / Fear should be assessed and  
managed before administering anesthetic

# Administration of Anesthetic

Place pt. supine or semi-supine position

Dry site, apply topical X 1 min

Select appropriate drug for treatment (time)

Vasoconstrictor unless contraindicated

# Administration (cont.)

Weakest anesthetic in the minimum volume  
(compatible with successful anesthesia)

Inject slowly (minimum of 60 sec / 1.8 ml)

Continually observe -

**Never leave patient alone after injection**

# Administration (cont.)

Use only aspirating syringe

Aspirate in two planes, before injecting

Use sharp, disposable needles of adequate diameter and length