Oral Surgery

Lecture: 8 **Dr. Saif Saadedeen**

"Complications of Local Anesthesia"

Systemic Complications of Local Anesthesia

1. Fainting (vasovagal attack)
2. Hypersensitivity or allergy to local anesthesia
3. Overdosage and toxicity
4. Drug interaction

1. Fainting (Vasovagal Attack)

It is the most common systemic complication that occurs with local anesthesia in the dental office. It refers to a sudden transient loss of consciousness usually secondary to cerebral ischemia. The cerebral ischemia is secondary to vasodilatation or an increase in peripheral vascular bed, with a corresponding drop in blood pressure.

The collapse in the dental chair may occur suddenly and may not be accompanied by loss of consciousness, in most instances, these episodes are vasovagal attack and spontaneous recovery is usual. The patient often complains of feeling dizzy, weak, and nauseated, the skin is pale, cold and slow pulse is noticed.

Predisposing Factors or Triggering Stimulus

The predisposing factors for this condition may be divided into two groups:

1) Psychogenic factors:
   - Anxiety
   - Emotional stress
   - Pain of sudden and unexpected nature
   - The sight of blood, surgical or other dental instrument such as a local anesthetic syringe, an injection needle, etc.

2) Non-psychogenic factors:
    - Sitting in an upright position or standing for a prolonged period, it leads to pooling of the blood in the periphery, thereby decreasing cerebral blood flow.
    - Hunger or starvation, which leads to a decrease in cerebral blood glucose level.
    - Poor physical condition.
    - Hot, humid and crowded environment.

Mechanism of Vasovagal Syncope

Regardless of the trigger, the mechanism of syncope is similar. The brainstem is activated directly or indirectly by the triggering stimulus, resulting in simultaneous enhancement of parasympathetic nervous system (vagal) tone and withdrawal of sympathetic nervous system tone.

This results in the following responses:

1) The cardioinhibitory response, characterized by a drop-in heart rate and in contractility leading to a decrease in cardiac output that is significant enough to result in a loss of consciousness.
2) Vasodepressor response: dilation of the blood vessels as a result of the withdrawal of sympathetic nervous system tone. The blood will pool in the dilated peripheral vessels, at the same time, the blood flow to the brain is reduced.

Prevention

The prevention is directed toward the elimination of the cause; good preoperative assessment, the patient should be asked to take a light meal prior to the dental appointment, proper injection technique, use of sedation for the relief of anxiety, etc.

Management

The first aid treatment should be started at once, the head of the patient should be lowered, the legs elevated, tight belt and collar should be loosened, and respiration is stimulated. Spontaneous recovery is usual and it is often possible to complete the treatment at the same visit.

If signs of recovery are not apparent within 30 – 40 seconds, the collapse probably is not a vasovagal attack, the airway must be maintained, oxygen administered and, in this case, a medical emergency team should be asked immediately for help.

Cardiopulmonary Resuscitation (CPR)

An emergency procedure that combines chest compressions with artificial ventilation in an effort to manually preserve intact brain function until further measures are taken to restore spontaneous blood circulation and breathing in a person who is in cardiac arrest. It is recommended in those who are unresponsive with no breathing or abnormal breathing.

CPR involves chest compressions for adults of about 5 cm deep and at a rate of at least 100 per minute with a universal compression to ventilation ratio of 30:2 is recommended for adults. The rescuer may also provide artificial ventilation by either exhaling air into the subject's mouth (mouth-to-mouth resuscitation) or use a device that pushes air into the subject's lungs (mechanical ventilation).

2. Hypersensitivity or Allergy to Local Anesthesia

It is more commonly seen with ester type agent than amide type. Hypersensitivity reaction could be due to:

- local anesthetic agent
- vasoconstrictor
- additives like bisulfite which is used as a preservative

In general, hypersensitivity reaction to local anesthesia is very rare and represent less than 1 % of all complications of local anesthesia. True allergic response to local anesthesia may be localized or generalized and it may be immediate or delayed in onset, also the allergic reactions may vary from mild skin irritation or rashes to an anaphylactic reaction. Local reactions are seen more frequently than systemic and usually resolve without active treatment. If any degree of allergic reaction is observed, it is very important to determine the actual cause (allergen). Inadequate diagnosis and treatment can be life-threatening to the patient.

Clinical manifestations of allergy vary and include the following: fever, angioedema, urticaria, dermatitis, photosensitivity or anaphylaxis.

Prevention

Proper pre-anesthetic evaluation, which includes a proper personal history and the past dental history, particularly history of allergy to the local anesthetic agent, or history of allergy to any other drug.

Management

- Antihistamine injection
- Epinephrine 0.5 ml of 1:1000 IM (intramuscular)
- Administer O_2 if necessary.

Substitution of the local anesthetic agent

The local anesthetic agent can be substituted with another type of agent. If the reaction is in response to ester-type then an amide type such as lidocaine could be used.

Anaphylactic Shock

It is a rare, life-threatening hypersensitivity reaction to an antigen. It develops fast causing death within a few minutes. It is characterized by:

1) profound fall in the blood pressure
2) dyspnea and respiratory embarrassment
3) facial and laryngeal edema
4) loss of consciousness

Management of anaphylaxis

If you suspect the anaphylactic reaction, immediately seek medical help.

- Epinephrine is the most important medication; it is given as intramuscular injection working rapidly to make the blood vessels contract. it also relaxes the airway, helping the individual breathe easier and stop itching.
- Even if the patient responds to the epinephrine, it is vitally important to go to an emergency room immediately.

- Oxygen should be given to improve breathing.
- Intravascular (IV) fluid may be necessary to restore adequate blood pressure.
- Antihistamine should be given to contract the effect of histamine.
- If the patient stops breathing, start cardiopulmonary resuscitation (CPR) immediately until the patient begins to breathe again.

3. Overdosage and Toxicity

It is relatively rare, a toxicity reaction can occur when the concentration of local anesthesia in circulation increases too rapidly within a short period of time as in injecting too rapidly into the highly vascular area or when giving IV injection. The toxic effect is primarily directed to the central nervous system (CNS) and cardiovascular system (CVS). The dose necessary to induce toxicity varies among patients and is influenced by numerous factors which are:

- The patient general health, age and weight: in patients with dysfunction of the liver and kidneys, there is an increased level of local anesthetic in the bloodstream.
- Rapidity of injection.
- Rout of administration.
- Amount of local anesthesia administered.

Signs and symptoms: restlessness, agitation, convulsion along with increased blood pressure, heart rate and respiratory rate. There are two types of drugs that can exhibit toxic reactions in dental practice local anesthetic agent and the vasoconstrictor.

Prevention: The best method to avoid toxic reactions is by:

1) Use the smallest possible volume and lowest effective concentration.
2) The local anesthetic solution should be injected slowly.
3) Avoid intravascular administration by the use of aspirating syringe.

Management

- Stop the dental procedure.
- Position the patient supine with legs elevated.
- Reassurance of the patient.
- Administer O_2, IV anticonvulsant and monitor vital signs.
- Allow the patient to recover and then discharge.
- If the patient fails to recover then transfer him to the hospital.

Factors adding to the increased risk of local anesthetic overdose in younger patients

1) Treatment plan where all four quadrants are treated with local anesthetic in one visit.
2) Use of plain local anesthetic.
3) Exceeding the maximum dosage based on patient's body weight.

4. Drug Interaction

In some patients, the administration of two drugs will counteract each other, while in others, potentiation occurs. In patients using a tricyclic antidepressant, variable degrees of potentiation of blood pressure response to adrenaline will occur even to small doses; therefore, precautions should be taken during the use of these vasoconstrictors with the patient taking a tricyclic antidepressant.

The practitioners can minimize the risk of interaction by using an aspirating syringe, which reduces the likelihood of the local anesthetic being administered directly into a blood vessel.

Last Lecture

I wish nothing but the best for you.

Today, I am your senior, tomorrow you will be my colleagues, Let me proud of you.