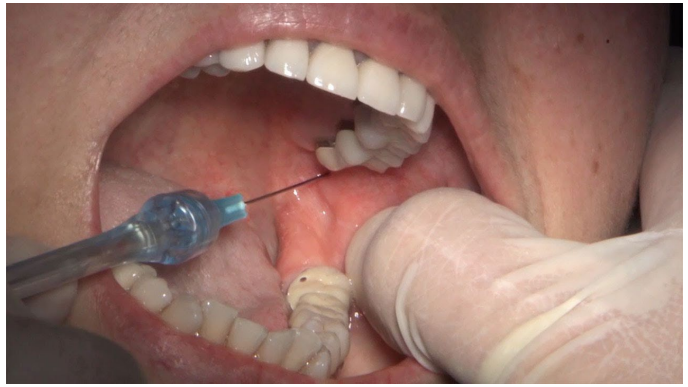

Complications of Local Anesthesia Lecture 2 DHS-4

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Edema

- Swelling of tissues can be due to
- 1. trauma during injection
- 2. infection
- 3. allergy,
- 4. hemorrhage,
- 5. injection of irritating solutions.

Edema

- The management of edema is dependent on the cause. Allergy-induced edema treatment consists:
- 1. of intramuscular epinephrine injection
- 2. antihistamine
- 3. corticosteroid administration
- 4. For the treatment of edema produced by infection, antibiotics should be prescribed

Hematoma

- Hematoma formation as a complication of local anesthesia is the result of a venous or arterial laceration; intra-arterial blood pressure increase causes effusion of blood into the surrounding soft tissues.

Hematoma

- Hematoma on specific regions such as: (Anatomical reasons)
- 1.anterior superior alveolar (infraorbital) nerve block below the lower eyelid,
- 2.(mental) nerve block at the chin area,
- 3. buccal nerve block
- 4. intraoral distal to maxillary tuberosity.

Hematoma

- Hematoma formation can be prevented by:
- 1. Aspirating before injecting the anesthetic solution, by using a short needle and a minimum number of needle penetrations into tissues.
- If happened:
- 1. localized pressure should be applied with a minimum of 2 minutes. This will stop the hemorrhage.
- 2. Both swelling and discoloration usually subside in 10 to 15 days. Ice packs should be held for the first 24 hours after surgery following which intermittent hot moist packs can be used to resolve the condition and massage therapy using a heparin cream.
- 3. Antibiotics should be prescribed if the hematoma is large in order to prevent the development of a wound infection.

Gingival lesions

- Gingival lesions consist of recurrent aphthous stomatitis, and herpes simplex can occur intraorally after a local anesthetic injection or after any trauma to the intraoral tissues. The exact mechanism is unknown, but any trauma to tissues by a needle may activate the latent form of the disease process that was present in the tissues with previous injection.

- No management is necessary until there is severe pain, just topical anesthetic relieves or Triamcinolone acetonide without corticosteroid can remedy pain

  (refer to oral medicine)

Soft tissue injury

- Lip or tongue biting or chewing can occur on children with special needs or disabled patients, following dental local anesthesia with the unfamiliar sensation of being numb.

- Shorter-acting local anesthetics such as plain mepivacaine should be chosen, and the patient or the guardian should be warned about eating, drinking hot fluids, and biting on the lips or tongue to test for anesthesia; cotton rolls can be placed between the teeth and soft tissues to prevent chewing.

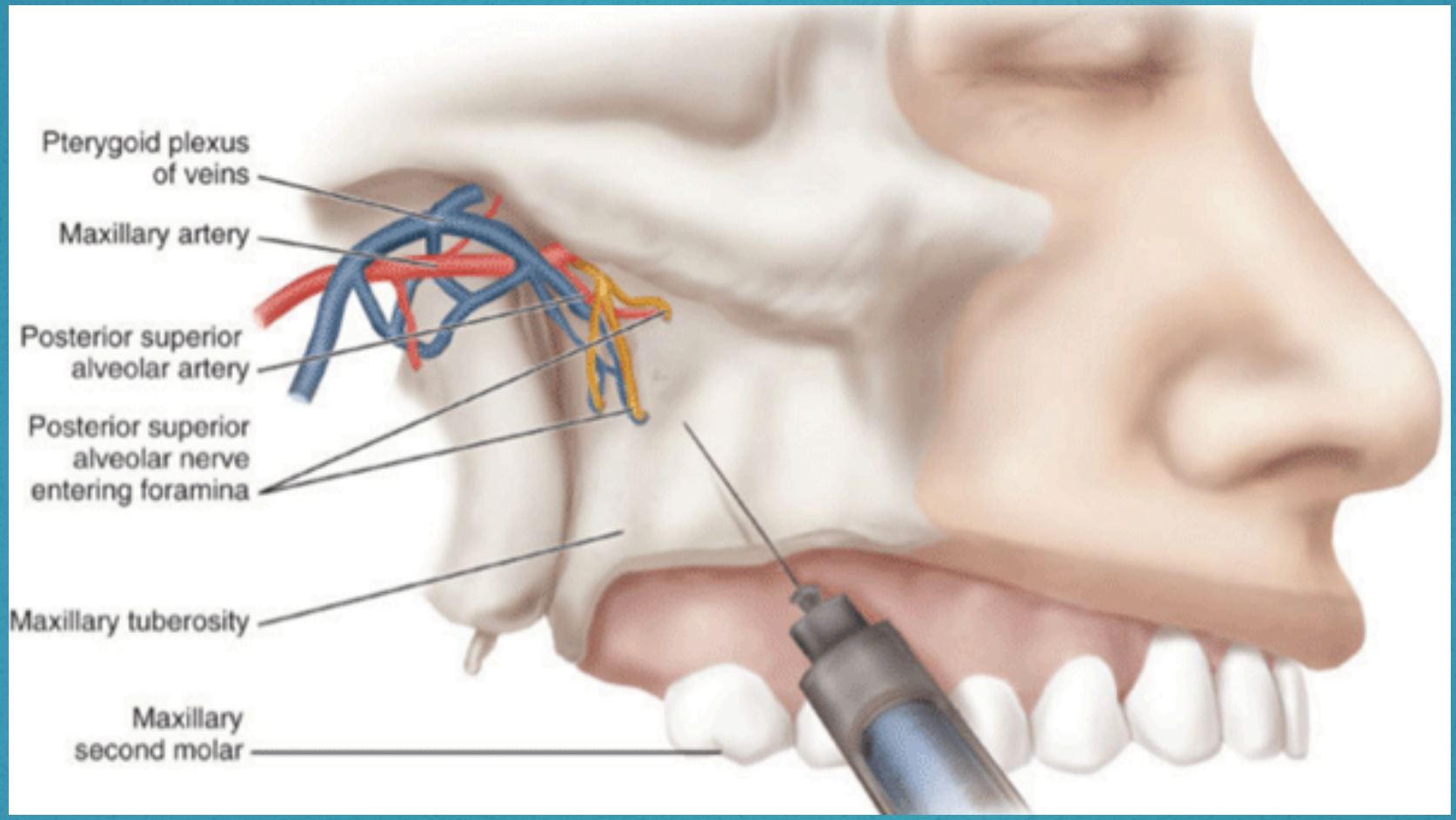
Soft tissue injuries

- In order to accelerate recovery time for sensation, an alpha-adrenergic receptor, phentolamine mesylate (OraVerse), may be injected.
- For adults, the proposed dosage is 1 to 2 cartridges of phentolamine mesylate (a dose of 0.4 to 0.8 mg), while for children the proposed dosage is 0.5 to 1 cartridge (0.2 to 0.4 mg).
- Swelling may resolve after 2 to 3 days. The lesion will heal over the next 10 to14 days. For pain complains, analgesics may be prescribed and topical local anesthetic gel may be applied to the area.

Ocular complications

- The most common complications include diplopia (dual vision), ophthalmoplegia (paralysis or weakening of eye muscles), ptosis, and mydriasis (dilatation of pupil).
- In extremely rare instances, amaurosis (partial/total blindness) can be seen.
- All these complications are transient and disappear on interruption of the anesthetic effects.

Ocular complication



Ocular complication

- Intra-arterial injection or perforation of the vascular wall would stimulate the sympathetic fibers running alongside the **internal maxillary** artery until reaching the orbit.

- The intravenous injection could reach the **cavernous sinus** via the pterygoid plexus and **anesthetize the oculomotor, trochlear, or abducens nerves.**

Ocular complications

J Endod. 2013 Dec;39(12):1654-7. doi: 10.1016/j.joen.2013.09.006. Epub 2013 Oct 7.

Concomitant horner and harlequin syndromes after inferior alveolar nerve block anesthesia.

Huang RY[1], Chen YJ, Fang WH, Mau LP, Shieh YS.

⊕ Author information

Abstract

INTRODUCTION: Intraoral anesthesia is probably the most commonly used procedure in dentistry.

METHODS: Although inferior alveolar nerve block (IANB) anesthesia is one of the safest procedures to anesthetize the mandibular teeth, side effects of IANB anesthesia can still give rise to potential risks for patients. Fortunately, most observed alterations are transient and self-limited.

RESULTS: The complications of IANB anesthesia are varied in nature and could be specifically categorized into systemic, localized, and distant complications. When the complications occur around the orofacial structures including the temporomandibular joint, middle ear, facial skin, and the eye, which are away from the oral cavity, it can be defined as distant complications. However, to our best knowledge, the concomitant occurrence of neurologic phenomena such as Horner syndrome combined with cutaneous complications in a patient receiving IANB anesthesia has never been discussed.

CONCLUSIONS: In this exceptional case, the unusual Horner syndrome manifestations related to unilateral ptosis, miosis, and anisocoria were simultaneously developed with skin ischemia, paresthesia, and asymmetric flushing after the administration of IANB anesthesia.

Systemic Complications of local anesthesia

- Common systemic reactions due to local anesthesia are reported as
- **1. Psychogenic reactions,**
- **2. Systemic toxicity,**
- **3. Allergy**
- **4. Methemoglobinemia.**

Psychogenic reactions

- patient's body counterbalance to an anxiety-inducing situation or due to adrenaline secreted by the vasoconstrictor agent.
- As a result of mood changes, heart rate, respiratory rate, and blood pressure are altered.
- Patients often have a blush or erythema which mimics allergic reactions, hyperventilation, nausea, and vomiting.
- It is important to understand the patient and make them relax. In more severe cases, these reactions should be maintained as syncope and hyperventilation.

Psychogenic reactions

- For preventing psychogenic reactions, the patient should be relaxed before administering local anesthetic injections. Using **oral sedatives** is an efficacious method to manage dental fears. Not for all patients and should be evaluated by the anesthesiologist for sever cases.

- Initial dosage should be dependent on patient health, age, weight, and duration of the operation. For healthy adult patients in short-term operations antihistamine-diphenhydramine (Benadryl) 50 mg 1 hour prior to the operation mildly and moderately anxious dental patients can be managed using sedation or extremely anxious or phobic patients using general anesthesia.

Systemic toxicity

- Systemic toxicity
- Local anesthetic systemic toxicity develops when a sufficient (toxic) concentration of anesthetic drug in the blood level reaches to the central nervous system and cardiovascular systems.

Systemic toxicity

- Initial symptoms are characterized by central nervous system signs such as excitation, convulsions, followed by loss of consciousness and respiratory arrest.

- These symptoms are often accompanied by cardiovascular signs such as hypertension, tachycardia, and premature ventricular contractions. The clinical signs and symptoms usually show objective symptoms such as quick talking, flicker, and tremor in the extremities.

Systemic toxicity

- Early signs:
- 1-Restlessness
- 2-Talkative
- 3-Exicted
- 4-Convulsion

Late signs:

1- Increase in blood pressure

2- Increase heart rate

2- Increase respiratory rate

Systemic toxicity

- Predisposing factors are associated with:
- **age**
- **Weight**
- **other drugs**
- **gender,**
- **the presence of disease**
- **genetics,**
- **vasoactivity,**
- **concentration dose,**
- **route of administration,**
- **the rate of injection,**
- **vascularity of the injection site,**
- **the presence of vasoconstrictor**

Systemic toxicity

- Prevention:
- 1. patient evaluation and assessment of medical history
- 2. The volume of local anesthesia should be decreased,
- 3. young or light weight patients should not be treated all four quadrants at one visit using local anesthetic alone
- 4. accurate and slow injection technique,
- 5. adjustment of dosage divided administration and aspirating technique,
- 6. using agents with low toxicity such as ropivacaine and levobupivacaine, and performing an aspiration test are recommended

Systemic toxicity

- Preventing from a toxic dose complication, it should be evoked that for healthy adults, the suggested **maximum safe dose** of 2% lignocaine in 1:80,000 adrenaline is four-and-a-half,
- Another strategy to reduce toxicity is using the guideline of 1/10th cartridge per kilo as a rough guide to the maximum dose.

- Dentists should be aware that excessive doses of topical anesthetics while these agents are more concentrated to facilitate infiltration may lead to toxic effects, particularly in children.

How to calculate the dose of anesthesia

- Two per cent lignocaine translates into 20 mg per 1 ml
- So each 1.8 ml of a carpoul = 36 mg.
- The maximum recommended dose of lignocaine is 4.4 mg per kilogram.
- So as an example 75 kg=330 mg (maximum dose)= 5 cartridge(1.8 ml/each).
- Therefore, a local anaesthetic with 1:100000 adrenaline concentration will translate to 0.01mg/ml resulting in a 1.8ml local anaesthetic cartridge containing 0.018 mg adrenaline. The maximum dose of adrenaline in healthy patients is 0.2mg per appointment.

Systemic toxicity

- Treatment at the office includes:
- airway support,
- administration of 100% oxygen
- supine positioning
- protection from injury in the event of seizure activity.
- treating convulsions (benzodiazepines or thiopental; propofol cannot be used in patients with unstable blood pressure, heartbeat). If severe hypotension arrhythmia occurs, administration of the infusion of a 1.5 mL/kg 20% lipid emulsion over approximately 1 minute and then starting with continuous application at 0.25 mL/kg/min = 1000 mL/h)

in the hospital

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The Evaluation of the Changes in Blood Pressure and Pulse Rate of Hypertensive Patients during Tooth Extraction

M. Gungormus and *M. C. Buyukkurt*

Keywords: Tooth extraction – blood pressure – pulse rate – hypertension – epinephrine.
Schlüsselwörter: Zahnextraktion – Blutdruck – Pulsschlag – Bluthochdruck – Epinephrine.

Summary: The purpose of this investigation was to evaluate the changes in blood pressure and the pulse rate of hypertensive patients having dental extraction under a local anesthetic containing a vasopressor. The study included 64 patients (42 female and 22 male), 38 to 78 years of age. Twenty-six of the patients were normotensive, 38 were hypertensive patients. The hypertensive patients were identified as those patients who had histories of medically diagnosed high blood pressure and baseline recordings of blood pressures higher than 140/90 mm Hg. Articain HCl with 0.012 mg epinephrine hydrochloride, was used as the local anesthetic for all patients and one tooth was extracted from each patient. Blood pressure and pulse rate measurements were recorded immediately prior to anesthesia, just before extraction and 5 minutes after extraction. The data were analyzed by a two-way ANOVA with repeated measures. Analysis of the data indicated no statistically significant changes in the systolic and diastolic blood pressures and pulse rate for all interval measurements in both normotensive and hypertensive patients ($P > 0.05$). In this study, it was determined that there were no significant changes in the blood pressures and the pulse rate of hypertensive patients during surgical procedure, and one cartridge local anesthetic with articain HCl containing 0.012 mg pinephrine may be used safely in hypertensive patients with blood pressure equal or smaller than 154 / 99 mm Hg.

(Acta Med Austriaca 2003;30:127–129)

Should we screen for hypertension in general dental practice?

C. Sproat,[1] S. Beheshti,[2] A. N. Harwood[3] and D. Crossbie[4]

VERIFIABLE CPD PAPER

IN BRIEF

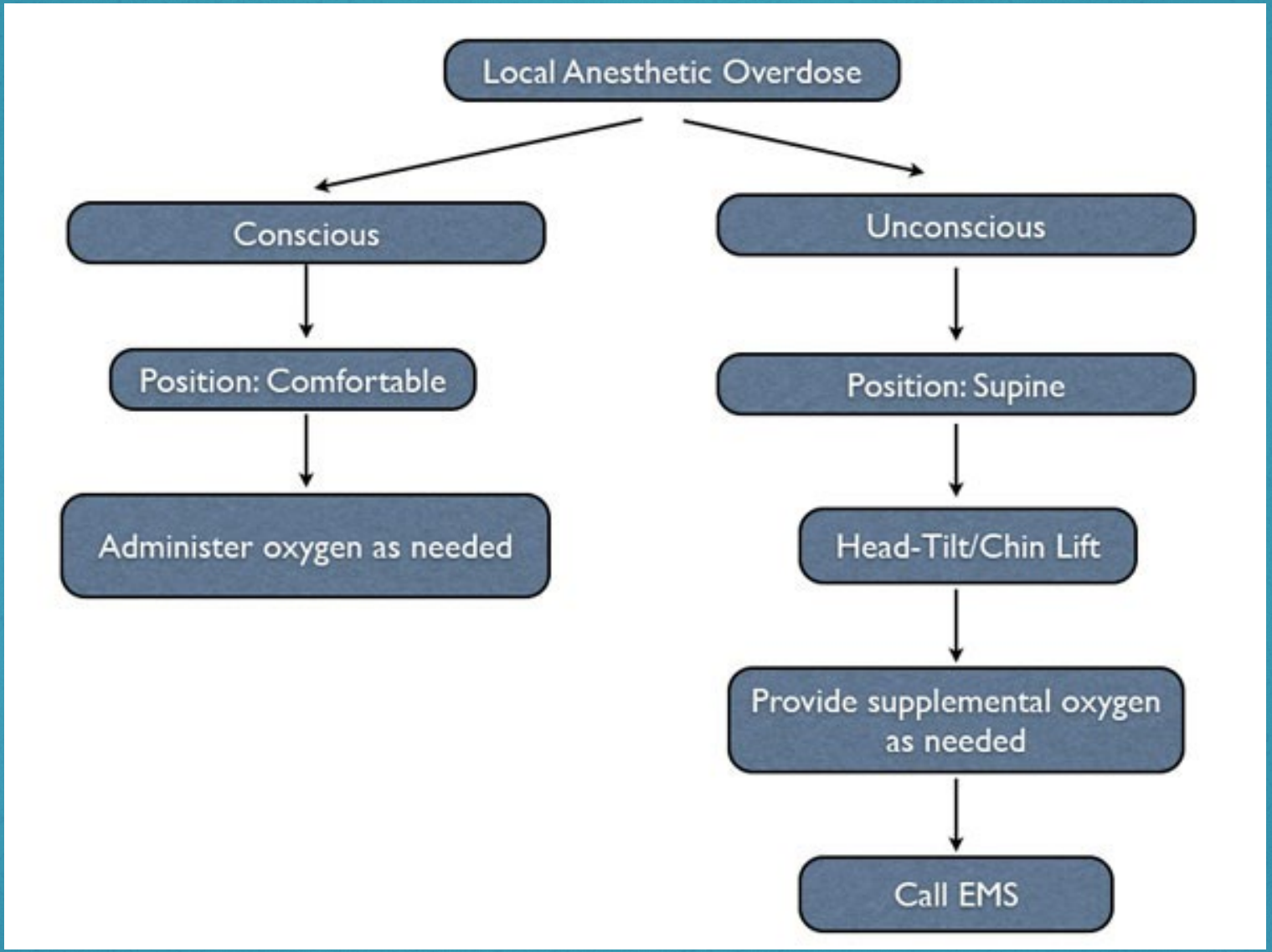
- Raises awareness of the prevalence of undiagnosed and/or poorly controlled hypertension.
- The results of the survey show that there is no correlation between elevated blood pressure and anxiety.
- Suggests that dentists in practice may be useful in identifying patients with elevated blood pressure who would benefit from further investigation.

PRACTICE

Hypertension is reported by the World Health Organisation as one of the most important causes of premature morbidity and mortality, although it is often asymptomatic. Approximately 40% of the UK population are thought to be affected, however, only one third of these are currently detected. Dental practice offers an ideal opportunity to screen for hypertension, due to the large cohort of the general population who regularly attend. A pilot study was carried out to screen for hypertension and associated risk factors in 114 consecutive patients who attended a city general dental practice. Results revealed that 39% (44) of the population screened had a high blood pressure reading but only 18% (8) of these were previously diagnosed as hypertensive, and 16% (7) had systolic readings greater than 160 mmHg. Of those currently receiving treatment for hypertension, the blood pressure was still elevated in 63% (5). This suggests that screening for hypertension in general dental practice may be of benefit to the population at large.

is safe to proceed. Elevation of SBP higher than 180 mmHg or DBP higher than 110 mmHg is used by many dental clinicians as a cutoff point for offering urgent treatment without medical consultation and referral. It would also be sensible to delay routine treatment in patients whose SBP is higher than 160 mmHg or DBP higher than 110 mmHg. Pending clear guidelines from research or professional consensus, this appears to be sound advice.

Systemic toxicity



Allergy

- Allergy is also known as hypersensitive reactions, initiated by immunological mechanisms acquired through exposure to a specific allergen; re-exposure to which produces a heightened capacity to react.

- The prevalence of allergic reactions to amide group local anesthetics is rare. It is predicted that less than 1% of all complications are caused by an allergy.

Allergy

- Ester-type local anesthetics are more allergenic than amide-type local anesthetics. Therefore, amide-type anesthetics are broadly used, among which lidocaine is the most commonly used for dental anesthesia epinephrine involving form.

- Adverse reactions to local anesthesia are caused by **preservatives** (e.g., methyl-phydroxybenzoate), antioxidants (e.g., bisulfate), antiseptics (e.g., chlorhexidine),vasoconstrictor (e.g., sulfites), and other antigens such as latex, as well as local anesthetic drugs themselves

Allergy

- Allergic reactions may include mild symptoms, such as urticaria, erythema, and intense itching, as well as severe reactions in the form of angioedema and/or respiratory distress.
- Even more severe life-threatening anaphylactic responses include symptoms of apnea, hypotension, and loss of consciousness
- How to diagnose allergy? (skin prick test)

Allergy

- Allergic reactions vary from a mild skin irritation or rash to an anaphylactic shock. The main signs and symptoms of anaphylactic shock are chest discomfort, urticaria, stomach pain and dyspnoea. An anaphylactic reaction can rapidly lead to a life-threatening condition due to airway passage obstruction in association with laryngeal oedema.

Anaphylactic

- If the person is conscious: Dentists should place them in a position where they are comfortable and able to breathe easily until the ambulance arrives.

- f the person is unconscious: Dentists should place them in the recovery position (on their side, supported by one leg and one arm, with the head tilted back and the chin lifted).

Anaphylactic shock

- Adrenaline (epinephrine) intramuscularly (IM) in the anterolateral aspect of the middle third of the thigh (safe, easy, and effective):

  Adult IM dose 0.5 mg IM (=500 µg = 0.5 mL of 1:1000) adrenaline (epinephrine).
- >12 years: 500 µg IM (0.5 mL) that is, the same as the adult dose.
- 6-12 years: 300 µg IM (0.3 mL).
- <6 years: 150 µg IM (0.15 mL).

Anaphylactic shock

- In sever cases of anaphylactic shock, Adrenaline should be administered for anaphylaxis by intravenous (IV) route only in the case of profoundly hypotensive patients or patients who develop a cardiopulmonary arrest or those who fail to respond to multiple doses of IM adrenaline because of the potential cardiovascular adverse effects of IV administration of adrenaline.

Methemoglobinemia

- Methemoglobinemia is a unique dose-dependent reaction where the iron in hemoglobin is stabilized in the ferric (Fe^{3+}) form, unable to attach oxygen, leading to tissue hypoxia and causing a varying degree of cyanosis.
- Methemoglobinemia can be either inherited or acquired.
- The risk of methemoglobinemia increased in infants and the elderly. Patients with underlying health problems; liver cirrhosis, with underdeveloped hepatic and renal function; heart disease; and pulmonary disease (chronic obstructive pulmonary disease, pneumonia) are under the risk of methemoglobinemia.
- When administered in excessive doses, the local anesthetics mostly prilocaine and benzocaine (90% of reported cases) and barely lidocaine and articaine may also lead to methemoglobinemia.

Methemoglobinemia

- Symptoms of cyanosis will be observed in nail beds and mucous membranes. In more severe cases, headache, dizziness, fatigue, dyspnea, and tachycardia are seen. For diagnosis in the dental clinic, pulse oximetry and in-hospital arterial blood analysis play an essential role.
- Management of methemoglobinemia begins with supplemental oxygen (100%) immediately and call Emergency.

- As a guideline, methylene blue, which is a heterocyclic aromatic chemical compound increasing the rate of conversion of methemoglobin to hemoglobin, may be given to a symptomatic patient. For severe cases, hyperbaric oxygenation may also be used if available.

Conclusion

- In order to prevent local anesthetic complications**, the medical history of the patients should routinely be evaluated in details**, and effective anxiety management should be performed.

- **Doses of local anesthetics should be always strictly assessed with body weight, and the maximum recommended dosages should be considered**. While administrating anesthesia, the painless injection should be performed, avoiding intravascular or intramuscular or direct trauma to the nerve.

- Well trained dentist on medical emergencies, BLS, ACLS ETC..

- END OF COMPLICATIONS OF LOCAL ANESTHESIA

- GOOD LUCK