

Pediatric Oral and Maxillofacial Surgery: textbook

The textbook is the result of effective work of employees of the department of pediatric dental surgery. Based on years of experience, the authors elaborated on the etiology and pathogenesis, clinical patterns of inflammation, trauma, tumors, and congenital malformations of the maxillofacial region in children. New data on the diagnosis, differential diagnosis and treatment of these diseases were added. The textbook corresponds to the programs approved by the Ministry of Health of Ukraine. **For students of dental and pediatric departments with English-language teaching of higher medical educational institutions, interns and dentists.**

Підручник є результатом плідної праці співробітників кафедри хірургічної стоматології та щелепно-лицевої хірургії дитячого віку. Ґрунтуючись на багаторічному досвіді роботи, автори докладно висвітлили питання етіології та патогенезу, законо-мірностей клінічного перебігу запальних, травматичних, пухлинних процесів і вроджених вад розвитку щелепно-лицевої ділянки в дітей. Подано нові дані щодо діагностики, диференціальної діагностики та лікування цих захворювань. Підручник відповідає програмам, затвердженим МОЗ України, і є базовим державним. Для студентів стоматологічного і педіатричного факультетів з англomовною формою навчання медичних закладів вищої освіти, інтернів та лікарів-стоматологів.

**L.V. KHARKOV
L.M. YAKOVENKO
N.V. KISELYOVA**



PEDIATRIC ORAL AND MAXILLOFACIAL SURGERY

Textbook

Edited by Professor **L.V. Kharkov**

Second edition

RECOMMENDED
by the Ministry of Health of Ukraine
as a textbook for students of higher medical
educational institutions

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Автори:

Л.В. Харьков – чл.-кор. НАМН України, д-р мед. наук, професор, зав. кафедри хірургічної стоматології та щелепно-лицевої хірургії дитячого віку Національного медичного університету імені О.О. Богомольця;

Л.М. Яковенко – д-р мед. наук, професор кафедри хірургічної стоматології та щелепно-лицевої хірургії дитячого віку Національного медичного університету імені О.О. Богомольця;

Н.В. Кисельова – асистент кафедри хірургічної стоматології та щелепно-лицевої хірургії дитячого віку Національного медичного університету імені О.О. Богомольця

Рецензенти:

Г.П. Рузін – д-р мед. наук, професор кафедри хірургічної стоматології та щелепно-лицевої хірургії Харківського національного медичного університету, член Європейської асоціації черепно-щелепно-лицевих хірургів (EACMFS);

П.І. Ткаченко – д-р мед. наук, професор, зав. кафедри дитячої хірургічної стоматології і пропедевтики хірургічної стоматології з реконструктивною хірургією голови та шиї ВДНЗУ «Українська медична стоматологічна академія»

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LOCAL AND GENERAL ANESTHESIA OF THE MAXILLOFACIAL TISSUES AREA

LOCAL ANESTHESIA OF THE MAXILLOFACIAL TISSUES AREA

Classification of local anesthesia:

1. Injection:

- infiltration: of soft tissues and hard tissues (intraosseous);
- conduction anesthesia: central and peripheral.

2. Non-injection anesthesia:

- application method: chemical, physical;
- tissue irrigation method.

NON-INJECTION ANESTHESIA (*Applicatio terminus*)

Application or superficial anesthesia provides the terminal nerve endings analgesia. It includes chemical (medicines administration) and physical (electro-anesthesia) methods of pain relief.

Indications for the use of application anesthesia are limited and it's use hasn't been proven for the removal of temporary teeth. Application anesthesia is used only to relieve pain of the mucous membrane at the site of injection and to open submucosal abscesses mainly on the gums.

The local anesthetics used for application anesthesia are Piromekain (Roman name "Pyromecainum"), Cora-Caine, Aroma paste (ointments), Instillagel, Xilonar (gel).

INJECTION, OR INFILTRATION ANESTHESIA (*Infiltration*)

This type of anesthesia provides pain relief of the peripheral nerve endings. An anesthetic is injected directly into the tissue to be operated on. The necessary indications for the use is to anesthetize the soft tissues of the maxillofacial area, alveolar process of jaws (with cystotomy, removal of minor benign tumors) and removal of the temporary and permanent single-rooted teeth in children. In adults, this type of anesthesia is not effective for tooth extraction because of dense cortical plate of jaws. In case the infiltration anesthesia with 4 ml of anesthetic (1–2 ampoules) is not enough, you use standard solutions, prepared in the pharmacy with or without vasoconstrictor. If you need more than 4 ml of anesthetic solution, it is possible to use a lower concentration (from 0.25 to 1 %).

Local anesthetics used for infiltration are Ultracaine DS Forte 4 %, Ubi-
stesin 4 %, Septanest 2 %, and Articaine 4 %.

Before anesthesia is given, it is important to collect the allergic anamnesis
and conduct the sensitivity testing to drugs.

Prick-test (prick-prick) is the most common to identify the drug allergy,
which is easy to perform and quite informative. Other skin tests (scarification,
dripping, intradermal) are complementary. To carry out the prick-test it is re-
quired a standard set, which consists of a 0.01 % solution of histamine (positive
control), diluted fluid (negative control) and disposable lancets. Diluted fluid
contains 0.03 % solution of albumin in physiologic saline of 0.4 % phenol.

Prick-test is conducted as follows. After processing with 70 % solution of
ethanol, it is necessary to use the inner surface of the forearm skin area 10 cm
from the elbow, at 2 cm intervals using 0.01 % solution of histamine, diluted
liquid, and 0.1 % solution of anesthetic. Prick the skin through the drops with
the help of disposable lancet, but leave a lancet fixed for 3 seconds, and then
rotate slowly to 180° from one side to another and then 180° back. This modifi-
cation makes it possible to improve the testing.

In 10 minutes, you will be able to assess the test only if there is a positive
reaction to the solution of histamine (a papule of 3 mm in diameter and more),
and negative reactions to the diluted liquid.

Skin reaction to an anesthetic is in the form of a papule measuring 5 mm
and more, which is considered to be a positive result.

The contraindications for prick-test include: anaphylactic shock in the past,
the present anamnesis of exacerbated allergic and skin diseases, children un-
der the age of 5, chronic heart, kidney and liver diseases in the stage of decompensation,
severe form of diabetes mellitus.

Intradermal test. 0.1 ml of anesthetic diluted in 0.25 % solution of physio-
logic saline is injected with insulin syringe on the inner surface of the forearm;
0.1 ml of physiologic saline is injected 10 cm below this point. Assess the tissue
reaction in 10–15 minutes. The test proves to be positive when the diameter of
the hyperemic skin area at the point of the injection exceeds 1 cm.

The provocative tests include the traditional sublingual and the conjuncti-
val test, when a drop of the anesthetic is put under the tongue or conjunctival
sac, however these tests are unsafe and undesirable for children.

Soft tissue anesthesia technique: the needle puncture is performed under the
low angle to the skin or mucosa, infiltrating slowly into the tissues and intro-
ducing the needle to the site where surgery intervention is planned to be per-
formed. *Dental anesthesia technique (plexus anesthesia):* the needle is inserted in
the projection of the root apex to the bone (cut, turned to bone) and 0.3–
0.6 ml of anesthetic is injected. After the needle has been removed the place of
injection is pressed with a pad for the anesthetic to penetrate deeper into the
bone in the apical region.

Intraligamentous anesthesia. It provides the anesthetic injection into periodontal tissues that penetrates into intraosseous space and through to periapical area, through the lamina cribriform. Anesthesia occurs in a minute after injection and lasts 20–30 minutes.

Indications for the use: dentistry, teeth extractions 14, 15, 16, 17, 24, 25, 26, 27, 34, 35, 36, 37, 44, 45, 46, 47, 54, 55, 64, 65, 74, 75, 84, 85. *Anesthesia technique:* an injection is given in a circular ligament of a tooth with a needle (cut turned to the root) 30–40° angularly to the axis of the tooth. The needle is put into the periodontium to 1–3 mm, and then injects 0.12–0.18 ml of anesthetic is injected for single-rooted tooth, 0.24–0.36 ml – for birooted tooth and 0.36–0.54 ml – for triple rooted tooth. The anesthetic is injected from the approximal dental surfaces (medial and distal) for each root.

Peripheral conduction anesthesia

Peripheral conduction anesthesia (*Anesthesia locate conductor*) provides delivery of the anesthetic to the peripheral branches of the main nerve trunks (2nd and 3rd branches of the trigeminal nerve). At the same time, the anesthetic blocks the conduction of nerve impulses, preventing the membrane depolarization by suppressing the incoming of “sodium flux”. While choosing the method and the way of conduction anesthesia you should follow these rules:

- The extraoral methods of conduction anesthesia are preferred, especially for children;
- For conduction anesthesia it is necessary to know the site of injection and the target point for each of them;
- Choosing a method and way of conduction anesthesia opt for the one providing the minimum needle movements along the bones and in muscles. In case it is inevitable, the anesthetic solution must be injected while moving the needle along the bone. The cut of the needle end should be placed along the bone with some needle movement;
- During the conduction anesthesia a part of the needle (0.5–1 cm) should be outside, which will help to remove it easily in case of breaking off in the site of its connection with a cannula;
- An anesthetic solution should be injected close enough to the target point; this will provide the perineural anesthesia;
- The efficiency and time of anesthesia action depends on the concentration of the anesthetic solution, its quantity, accurate approaching up to the nerve, the characteristics of the surrounding tissues (presence of scars, adhesions, diseases of peripheral nerves);
- The conduction anesthesia should be given slowly to prevent excess compression of the tissues, which is also considered to be a biological test.

Principles of conduction anesthesia for children.

1. Conduction anesthesia is used only for the children at the age of 6–15 to extract the maxillary permanent teeth, mandible temporary and permanent teeth and for other surgical interventions.

2. In accordance with the growth of the jaws, the positions change of the target points includes the following:

- on the upper jaw – infraorbital foramen sinks from the suborbital edge with the age of a child: from 6 to 12 years – 1–2 mm, from 13 to 15 years – up to 4–4.5 mm; exit sites of the anterior upper alveolar branches in the area of the maxillary cusp tend to shift downwards and take place closer to the alveolar margin in older children;
- the incisive foramen tends to shift backwards from the alveolar process along the central incisors line;
- the location of greater palatine foramen changes insignificantly towards the border of the hard and soft palate;
- mandibular foramen rises with age and mental foramen shifts from the first molar to the second one during temporary occlusion, and during the permanent occlusion it is located between premolars.

3. One should not enter the needle into canals while giving the peripheral conduction anesthesia; it is enough to inject an anesthetic solution near the foramen for children aged 6–12.

4. Carrying out the peripheral conduction anesthesia (except palatal) in children, an anesthetic should be injected extra orally, as far as, there is less likelihood of tissues infection. It is not necessary to move the needle along the bone (periosteum) and in the muscle, which then excludes a number of complications. If copied it is impossible due to the development of complications during abrupt movements of the child's head, movement of the needle by the tongue and its injury as well as unexpected closing of the mouth, etc.

5. Before giving the extraoral conduction anesthesia in children it is recommended to anesthetize the injection site with the help of application anesthesia.

6. After the conduction anesthesia and before surgical intervention the doctor should not send the child to the corridor to wait until the anesthesia works so that the doctor could consult another patient, as well as get distracted or leave the surgery. The doctor should not leave a child unattended after conduction anesthesia in case of an emergency situation (general and local complications, unexpected behavior of patient etc.).

7. Conduction anesthesia in children is given by 1 % solution of anesthetic. You take half of an adult dose if you use the anesthetics without the instructions of solutions concentrations and dosage for children.

8. Central conduction anesthesia for children is given only in rare cases and it is necessary to assess the risk of it in order to choose the most optimal method.

Indications for the application.

1. The indications for the use of tuberal, infraorbital, incisive, palatal anesthesia are maxillary dental extractions, sinusotomy, cystotomy and cystectomy, reposition of bones fragments, oncotomy and interventions of the soft tissue of the upper lip.

2. Mandibular mental anesthesia is used for mandibular dental extraction on the, cystotomy, cystectomy, oncotomy, reposition of bones fragments within the dentition.

Local anesthetics used for conduction anesthesia:

Ultracaine DS Forte 4 %, Ubistesin 4 %, Septanest 2 %, Articaine 4 %.

An anesthetic dose for 3-year old children is $1/3$ of the adult dose, 6 years old – $1/2$, 10 year old – $3/4$, at 12 years old use an adult dose.

Local anesthetics contain vasoconstrictors (epinephrine, norepinephrine) at a concentration of $1/200,000$, $1/100,000$, $1/80,000$. They increase the duration of anesthesia and reduce postoperative wound bleeding. To enhance the analgesic effect the minimal content of vasoconstrictors $1:200,000$ is enough, and to improve hemostasis higher concentration – at least $1:100,000$ is necessary. The contraindications for the use of vasoconstrictors are relative. It is not recommended for the children under 3 years.

Peripheral conduction anesthesia for the maxilla

They are: tuberal, infraorbital, palatine and incisive anesthesia.

Tuberal anesthesia (Posterior superior alveolar nerve block)

Target point. The indicator to determine the target point is the upper first permanent molar and alveolar edge of the maxillar. If permanent molars are absent the distal surface of the second temporary molar (4–5 years) or zygomatic alveolar crista are the oriented point. The distance from the buccal wall of the alveolar of the last permanent molar to the alveolar canals is 1.2–1.5 cm.

Anesthesia technique.

Extraoral method. Patient's head is turned in the opposite direction. First, the fingers touch the body of the zygomatic bone, and then zygomatic alveolar crista before placing two fingers down and laterally on the soft tissues of the zygomatic bone edge. Injection is given at the lower pole wares of the zygomatic bone body, distally making count curs 1 cm from this place, to the bone (fig. 1). Using this method it is not necessary to move the needle backwards. When the end of the needle is on the bone, you need to pull the hub back making sure that the needle is out of the vessel and then inject 1–1.5 ml of anesthetic solution. After the needle better into the bone and not into the soft tissue of cheek.

Intraoral method. When the mouth of a patient is half-opened, the cheek is drawn off by a spatula or Farabeuf's hook. The indicator to determine the target point is the zygomatic alveolar crista and 16, 26, 55, 65 teeth. Injection is given

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