

ADMINISTRATION OF MEDICINE IN PAEDIATRIC DENTISTRY

Dr. Laura Lipták
(based on Dr. Auth Adrienn's lecture)

Clinical specialist



SEMMELWEIS UNIVERSITY

FACULTY OF DENTISTRY

Department of Paediatric Dentistry and Orthodontics

<http://semmelweis.hu>

Anamnesis

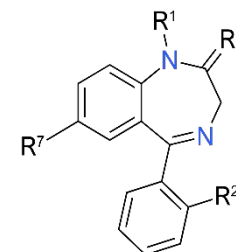
- **Present illness**
 - tonsillitis, influenza, etc.
- **Drug allergy**
 - penicillin, salicylate, Lidocain
- **General diseases**
 - haemophyilia, leukaemia, leukopaenia, diabetes, epilepsy
- **Latest medication**
 - the time passed since taking the latest medicine and its kind



<http://www.teluguone.com/comedy/content/funny-medical-quotes-34-10296.html>

Examination and treatment

- **Psychic preparation**
 - At home, in the dental office
- **Premedication- consultation with GP!**
 - Benzodiazepines (anxyolyticum)
 - minor tranquillizers
- **Local anaesthesia**
 - topical, infiltration, block

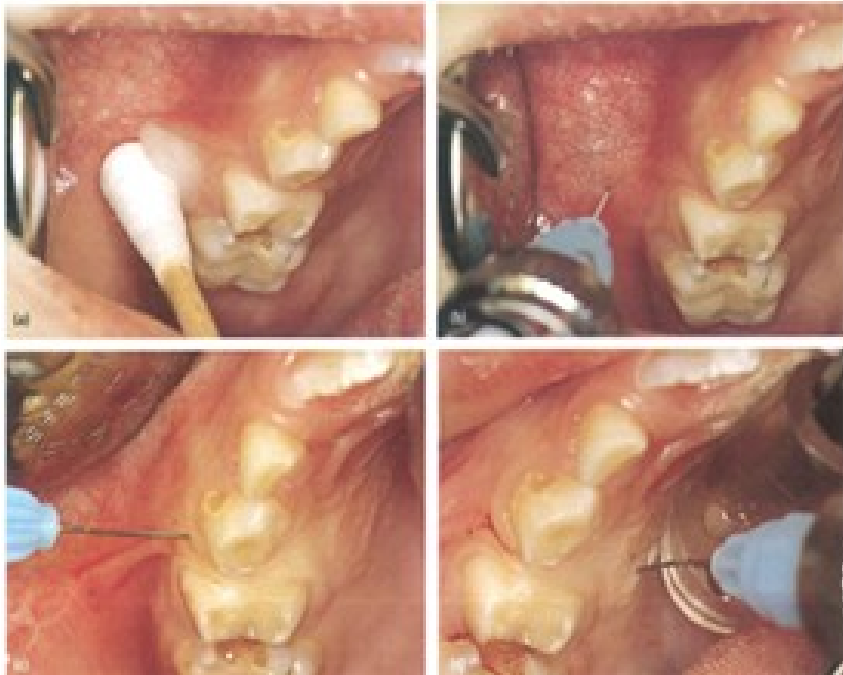


https://en.wikipedia.org/wiki/List_of_benzodiazepines

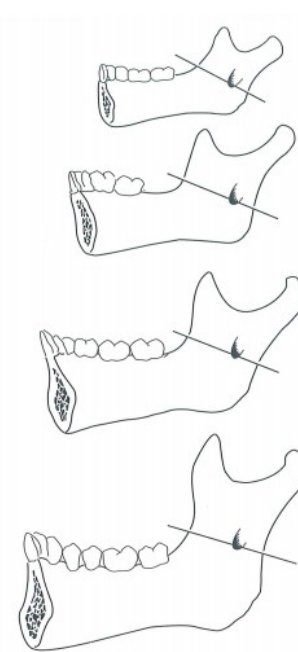


<https://gbdental.hu/hir/jon-szuri>

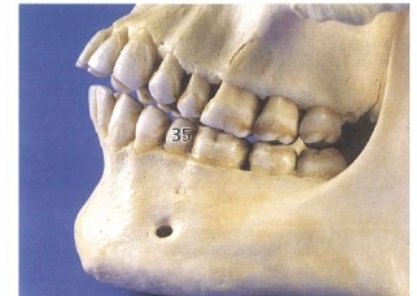
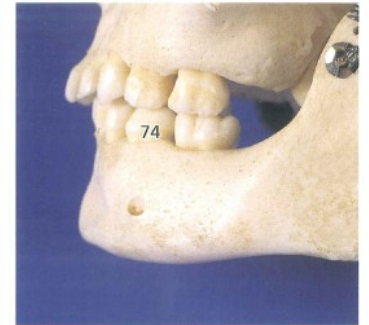
Local anaesthesia



topical, infiltration



block



Local anaesthesia

	Vasoconstrictor	Strength	Toxicity	Longevity (minute)	Max. dose adult	Max. dose child
Lidocaine	Adrenalin 0,001%	2-4	2	100-200	10 ml (2%)	7 mg/kg (with Adr.)
Articaine	Epinephrin or adrenalin	5	1,5	180-240	12,5 ml	7 mg/kg (with Epi.)
Bupivacain	Adrenalin	16	8	3-30 hours!	-	-

Contraindication: unkooperative patient, patient with bleeding diathesis, infection by the injection area, allergy

Local anaesthesia

Lidocaine

- First choice in local anaesthesia
- In dentistry, a 1% dilute solution is better
- Allergy is extremely rare, with complaints more often caused by adrenaline

Lidocain gele (home use) - 0,5% 5mg/ml

Lidocain spray (dental office) 1% (10mg/ml)



Articain/ Ultracain Forte

- 25-30 kg (age:4-8): 0,25-1 ml
- 30-45 kg (age: 8-12): 0,5-2 ml
- very good diffusion ability
- lower toxicity
- longer faster effect
- more expensive > Lidocaine
- **Not suggested under 4 years of age**



Medication to complete the local treatment

- Antimicrobial drugs

Antimicrobials are substances that kill or suppress the growth or multiplication of microorganisms, either bacteria, viruses, fungi, or parasites.

- Analgetic drugs



The most important questions

- The type of drug
- Ideal dose to be administered
- How long it should be continued
- Hypersensitivity



Antimicrobial drugs

- *Indication*
 - profilaxis of infective endocarditis
 - periostitis, increased swelling, cellulitis
 - injury, fever, osteomyelitis, persistent infection
- *Type of drug*
 - to culture the microorganism, antibiogram
 - Hypersensitivity
- *Adequate concentration of the drug to provide the therapeutic level*
 - Body weight kg
 - Solution, pill, capsule
- *Length of medication*

Antimicrobials: Mode of Action
Inhibition of Cell Wall Synthesis
Penicillins
Cephalosporins
Monobactams
Carbapenems
Glycopeptides
Azole antifungals
Echinocandins
Inhibition of Protein Synthesis
<i>Bind 50s ribosome</i>
Macrolides
Chloramphenicol
Lincosamides
Oxazolidinones
Streptogramins
<i>Bind 30s ribosome</i>
Aminoglycosides
Tetracyclines

Antimetabolites
Sulfonamides
Alteration of Cell Membrane Permeability
Polymyxins
Clotrimazole (antifungal)
Polyene antifungals
Inhibition of Nucleic Acid Synthesis
Rifampin
Griseofulvin
Nucleoside antivirals
Topoisomerase Inhibitors
Nalidixic acid
Quinolones
Inhibition of Cytochrome Sterol
Azoles (antifungal)

Antimicrobial agents

- Antibiotics
 - B-lactame (penicillin, cefalosporin)
 - Makrolids
 - Lincosamin/Clyndamycin
 - Sulfonamide, trimethoprim derivatives
 - Tetracycline
- Antiviral agents
 - Anti-herpes agents
- Antimicotics

Penicillin

- penicillins are by far the most widely effective and the most extensively used antibiotics
- penicillins sensitive to beta-laktamase
 - Should be given at other than mealtimes
- broad spectrum penicillins
 - e.g. ampicillin, amoxicillin
- penicillin resistant to beta-laktamase
 - e.g. ampicillin and amoxicillin and others can be protected from destruction by beta-lactamases if they are administered together with lactamase-inhibitors such as clavulanic acid

Dosage: adequate and constant plasma concentration should be maintained to elicit the effect

CAVE! Parallelallergy with Cephalosporine



Cephalosporin

- chemically related to penicillin
- four "generations,,
- similar to penicillins in activity against gram-positive organisms are resistant to penicillinase
- **the cephalosporins exhibit some cross-sensitivity in patients who are allergic to penicillin → DO NOT USE IN CASE OF PENICILLIN ALLERGY**
- fewer adverse effects than penicillins
- taste less bitter when given orally
- less anaerobic activity than penicillins
- cephalosporins generally offer no advantage over penicillins for most dental infections and are usually more expensive

Cephalosporins should be reserved for severe infections involving gram negative organisms or mixed infections.



Antimicrobials in Pediatric Dentistry: M W. Roberts, T. H. Belhorn in: Pinkham, Casamassimo, Fields, McTigue, Nowak: **Pediatric**

Dentistry, Infancy Through Adolescence 4.ed

SEMMELWEIS EGYETEM ©

<http://semmelweis.hu>

Dr. Laura Lipták

Administration of medicine in paediatric dentistry

Clyndamycin/Dalacyn C

- dental infections
 - good activity against most gram-positive and anaerobic bacteria associated with oral infections
 - gastrointestinal upset, including diarrhea associated with Clostridium difficile toxin, is occasionally associated with this drug
 - spectrum of activity
 - availability of oral and intravenous formulations
 - **not suggested for „the first choice” in dental infections by children → side effect can be:**
 - diarrhea
 - pseudomembranous colitis - need for intensive hospitalisation!
- a good option for management of oral infections*

Antimicrobials in Pediatric Dentistry: M W. Roberts, T. H. Belhorn in: Pinkham, Casamassimo, Fields, McTigue, Nowak: **Pediatric Dentistry, Infancy Through Adolescence**
Szakirogyászati Gyógyszerek alkalmazása a gyermekfogászati gyakorlatban in: Fábrián G, Gábris K, Tarján I: **Gyermekfogászat,**

Fogszabályozás és Állcsont- Ortopédia

SEMMELWEIS EGYETEM ©

<http://semmelweis.hu>

Dr. Laura Lipták

Administration of medicine in paediatric dentistry

Macrolides

- **Erythromycin**

- spectrum similar to penicillin's+ penicillinase-producing staphylococci, chlamydiae, Legionella, mycoplasma, and others
- well absorbed orally
- free-base form is unstable at gastric pH, so it is administered with an enteric coating or in a salt form (stearate or estolate)
- gastrointestinal upset in the form of diarrhea is a major disadvantage of erythromycin

- **Azithromycin and clarithromycin**

- structural derivatives of erythromycin that possess a broader spectrum of activity and improved bioavailability
- improved tolerability, specifically with less gastrointestinal upset
- greater use of these two agents

- **Macrolides**

- bacteriostatic rather than bactericidal
- in addition, increasing resistance to macrolides has been a concern and presents another drawback to the routine use of these agents
- atoxic (can be used in pregnancy)
- indicated in penicillin allergy



Tetracyclines

- **tetracyclines are bound to the growing bones and teeth**
- **tetracyclines are not indicated for pregnant women or for children under 8-12 years of age**
- bacteriostatic, with a broad spectrum of activity
- indication: if other AB can not be used
- chelation formation with metal ions:
- Ca^{2+} , Mg^{2+} , Fe^{2+} and Al^{3+} from antacids, antianemics, milk and so on.
other foods: insoluble complexes (chelates) which reduce absorption,
- binding to the growing bone and teeth as well!!!
- gastrointestinal side effects, sensitivity to light

alkalmazása a gyermekfogászati gyakorlatban in: Fábián G, Gábris K, Tarján I: **Gyermekfogászat, Fogszabályozás és Állcsont-**

Tetracyclines

Pregnancy, early u. Newborn:

Effect on the bone substance:

- inhibition of calcification
- delay of bone growth
- reversible

Children under 8-12 years:

Effect on the tooth hard substance:

- irreversible
- discoloration: yellow, brown
- enamel hypoplasia



Cave! As long as tooth germs are present or tooth growth occurs, you should avoid tetracyclines if possible!

Metronidazol (KLION)

- Kinetics: Per os well, gets to every tissue fluid
- Mechanism: Anaerobic bact. absorb and transfer to toxic metabolite
- Indication: first choice in anaerobic and mixed infections
- ANUG/ANUP therapy
- Side effect: metallic mouth taste, dark urine, dizziness

- Under 12 years of age 7,5 mg/ttkg
- Over 12 years of age 3x500 mg



Antimicrobials in Pediatric Dentistry: M W. Roberts, T. H. Belhorn

in: Pinkham, Casamassimo, Fields, McTigue, Nowak: *Pediatric Dentistry, Infancy Through Adolescence* 4.ed

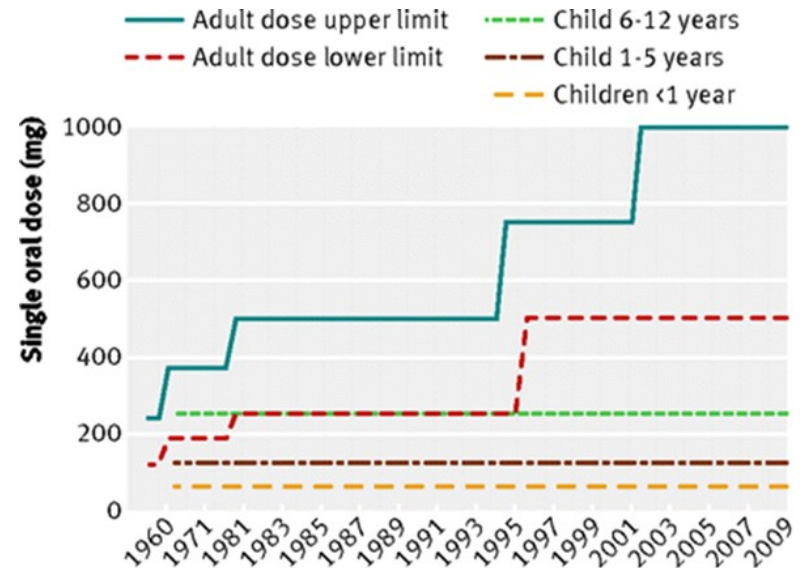
Indication of AB in pediatric dentistry

- **Periostitis with the combination of:**
 - Extreme swelling
 - High fever, malaise
- **Trauma**
 - Avulsio– replantation (to the root surface, per os)
 - Infected wound
- **Infective endocarditis prophylaxis**

Prescribe antibiotics

- Make an accurate diagnosis
- Use appropriate AB and dosing schedules
- Diagnosis and AB selection should be based on thorough medical and dental history
- **Overprescribing is wasteful and can cause unnecessary adverse effects**
- Risk of the inappropriate use of antibiotics
 - Gastrointestinal disturbances, AB alter the normal flora
 - Allergic responses: rash → anaphylactic reactions

Most serious complication of the widespread use of antibiotics is the development of bacterial resistance.



<https://www.bmj.com/content/343/bmj.d7803>

BNF year

Prescribe antibiotics

- Patient
 - allergy
 - liver or kidney function failure
 - immunosuppressed
 - unable to swallow
 - age
- Degree of infection
- Use appropriate AB



Prophylaxis of infective endocarditis in the dental practice

- IE in the anamnesis
- Congenital heart disease
 - Cyanotic heart disease without surgical intervention (palliative shunt, residual defects, conduit)
 - Congenital heart disease with surgical intervention, with implants- till 6 months after surgery
 - Restored congenital heart diseases with residual defects
- Abnormal heart valve function, after heart transplantation
- In the case of an artificial valve / valve plastic surgery

Literature: Kivovics P és mtsai: Állásfoglalás az antibiotikumok alkalmazásáról a szájsebészetben

Prophylaxis of infective endocarditis in the dental practice

- Dental treatment when the prophylaxis is necessary:
 - extraction, sculption, rootcanal treatment, resection, curettage, intraligamental inj., scaling, gingival and parodontal operation, ...**any intervention with bleeding**
- Antibiotics for prophylaxis:
 - 1 hour before and 6 hour after intervention:
 - amoxicillin per os
 - in case of penicillin-allergy: Makrolid /Clindamycin antibiotic

Prophylaxis of infective endocarditis in the dental practice

Dosage	Antibiotic	Child	Adult
1 hour before treatment , per os	Amoxicilline	50mg/kg	2g
30 min before treatment IV/IM	Ampicilline	50mg/kg	2g
1 hour before treatment in case of: Penicillin allergy, Per os	Clindamycin Cephalexin Azithromycin/Clarithromycin	20mg/kg 50mg/kg 15mg/kg	600mg 2g 500mg
30minutes before treatment: Penicillin allergy, IV, IM	Clindamycin Cefazolin	20mg/kg 25mg/kg	600mg 1g

Literature: Kivovics P és mtsai: Állásfoglalás az antibiotikumok alkalmazásáról a szájsebészetben

Prophylaxis for other high-risk patients

- **Compromised immune system**
 - increased risk of developing focal or systemic infection
 - following transient bacteremia associated with dental procedures
- AB prophylaxis may be considered
- Bacteremia in children with any form of indwelling hardware:
 - including vascular shunt, ventricular shunt, central venous line, various orthopedic devices, and the like, may also provide a source of infection for the hardware

In addition to consulting current guidelines regarding prophylaxis, consulting with the child's physician is recommended for optimizing patient treatment.

Analgetics

NSAIDs

- Diclofenac (Cataflam, Voltaren)
- Ibuprofen group
- Metamizol (Algopyrin)
- Aminophenazon (Demalgon, Germicid cone)
- Acetilsalicyl acid (Aspirin)

COX1, COX2 inhibitors

- inflammation reduction
- pain relief
- fever attenuation

Side effects:

- ulcers
- kidney function disturbance
- allergy
- blood disorders

Analgetics

	Pain	Inflammation	Fever	Children	Over 12 years	Comment
Diclofenac (Cataflam)	strong	strong	no	Susp.	pill	Slow half-life, bone pain++
Ibuprofen	good	good	good	Susp. (3 months)	pill	Least toxic
Metamizol (Algopyrin)	strong	weak	strong	avoid	pill	agranulocytosis
Aminophenazon (Demalgon)	strong	weak	strong	NO	NO	Stronger side effects Sedative
Acetylsalicylic acid (Aspirin)	medium	weak	medium	Not effective	Not effective	Other more effective analgetics Platelet effects (hinder the thrombocyte-aggregation – produce prolonged bleeding time)

Analgetics

Paracetamol

- COX3 inhibitor (?) little COX 1 and 2 effect
- Pain and fever relief (medium)
- Not reduce inflammation
- Liver toxicity
 - Toxic: 6-8g
 - Over 14 years max. 4g
 - Under 14 years max. 2g (50 mg/ttkg)

Forms: Reduce toxicity: Acetilcysteine

- Syrup: 0,5-2 tsp.(2months-12years)
- Cone: 125 mg (3 months-1 year)
- Pill.: over 12 years of age!!

Many brand:

- Ben-u-ron
- Béres Febrilin
- Doloramol
- Mexalen
- Miralgin
- Neo-Citran
- Panadol
- Paramax
- Rubophen
- Symptomed
- Talvosilen

Parent's attention not to take more type of analgetics in the same time!

Antifungal agents

- Candida species (esp. *C. albicans*) are in healthy mucous membranes of the body
- multiplication + invasion of the tissues → occur immunity of the host is compromised
- Oral and esophageal candidiasis is usually treated with topical suspensions
- Oral infection is frequent by infants- *soor oris/ mucocutan candidiasis*
- Systemic medication is not suggested
- In case of recurrent, non-persistent infection, further testing is recommended

Antifungal agents

Topical agents:

Nystatin

- most common topical agent
- treatment of oral candidiasis in children
- the drug is available as an oral suspension (100,000 U/ml), tablet (500,000 U), and pastille/ troche (200,000 U)
- a dose of 1 million to 3 million units per day in three to five divided doses for 10 to 14 days is recommended.

Corsodyl

- mild antifungal effect (allergy!)

Glycerinum Boraxatum:

- borax inhibits candida reproduction
- recently not recommended- toxic effects

Methylrosalinum

- fast, effective, mucosa blue discoloration

Systematic:

Fluconazole and Other Azoles → prescription by the general practitioner

Antimicrobials in Pediatric Dentistry: M W. Roberts, T. H. Belhorn in: Pinkham, Casamassimo, Fields, McTigue, Nowak: **Pediatric Dentistry, Infancy Through Adolescence** 4.ed

Szántó I: *Gyógyszerek alkalmazása a gyermekfogászati gyakorlatban* in: Fábrián G, Gábris K, Tarján I: **Gyermekfogászat,**

Fogszabályozás és Állcsont- Ortopédia

SEMMELVÉIS EGYETEM
Boríték: <http://semmelweis.hu>

Dr. Laura Lipták

Administration of medicine in paediatric dentistry

Antiviral agents

Rare in dental practice

Most frequent: herpes virus group

Herpes virus:

Herpes labialis

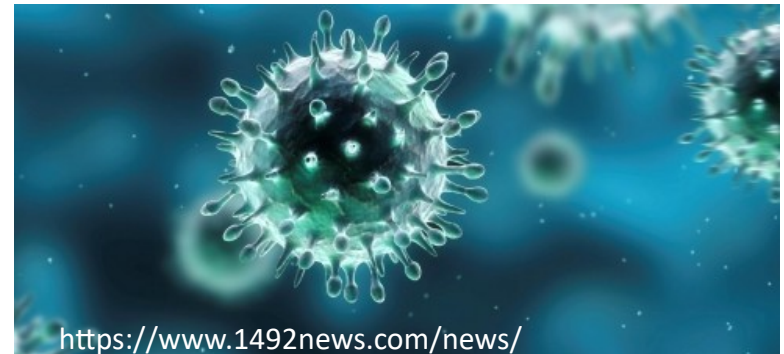
Gingivostomatitis herpetica

Varicella

Acyclovir (Telviran, Zovirax)

stop virus DNA synthesis

per os/ IV



Antiviral agents

Gingivostomatitis herpetica:

- Acute illness:
 - fever, malaise, irritability, cervical lymphadenopathy
 - oral and perioral ulcerative lesions
- Therapy:
 - resolves spontaneously within 10 to 14 days
 - requires only supportive therapy (Suspensio anaesthetica)
 - immunosuppressed patients primary/
 - reactivation of latent HSV infections } requires more aggressive therapy → paedrist!!
- In case of relapse: *Acyclovir* therapy per os / IV
 - Per os: 5x 200 mg over 2 years old

Antimicrobials in Pediatric Dentistry: M W. Roberts, T. H. Belhorn in: Pinkham, Casamassimo, Fields, McTigue, Nowak: **Pediatric Dentistry, Infancy Through Adolescence** 4.ed

Szántó J: *Gyógyszerek alkalmazása a gyermekfogászati gyakorlatban* in: Fábrián G, Gábris K, Tarián I: **Gyermekfogászat,**

Topical agents

Solutions for rinsing, pills

- Neomagnol (disinfection)
- Chamomilla floris
- Corsodyl, Chlorhexamed
- Smoke-bush (antiinflammatory, disinfectant)
- Glycosept, Phlogosol (antiinflammatory, disinfectant)
- Strepsils, Neo-Angin (mouth,throat disinfectant sucking tablets)
- Faringosept tabl. (local anaesthesia included: tetracaine!)

Topical suspension

- Zincum chloratum 10% (wound healing)
- Argentum nitricum 10% (disinfectant)
- Sanilind
- Acriflavin
- Phlogosol, Glycosept
- Vagothyl (aphta suspension)
- Gengigel/Gengigel baby

Creams

- Azulenol (epithelizing)
- Alsol (antiinflammatory)
- Corsodyl gel
- Virolex, Zovirax (acyclovir)
- Revidur (herpes)
- Hevizos (herpes)

Vitamins

- Rather in pediatric dentistry and internal medicine
- Tendonitis, ulcers, bone formation disorders
- Multivitamins
- Vitamin C- ascorbic acid: - 500 - 1000 mg / day;
 - fever, infectious diseases
 - recurrent aphthae
 - Gingivostomatitis herpetica
 - in the convalescence stage in larger dose
- Vitamin D+ Calcium

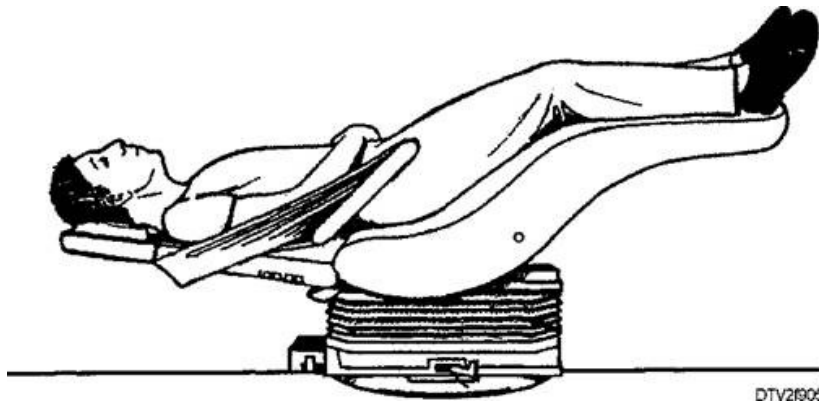


First aid

- *Trendelenburg position*
- Water with sugar, blood sugar test
- In case of epilepsy: Diazepam
 - *Stesolid (rectalis)*
 - *Seduxen (IV)*

Quinke-oedema, anaphylactic shock:

- *Depersolon (steroid)*
- *Di-Adreson F Aquosum (steroid)*
- *Calcimusc (calcium)*
- *Tonogen (mainly adrenalin)*
- *Isuprel (β 1-agonist, in bronchospasmus and bradycardia)*



Anti-allergic agents

Search for causative factors:

Symptoms:

- rashes on the face and upper body
- lip oedema (Quincke)

Local treatment

Medicines

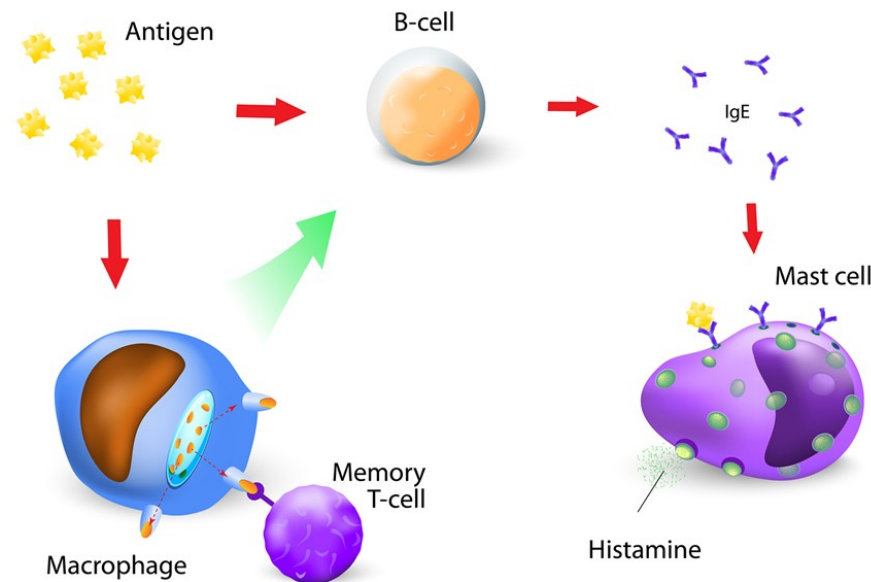
- Antihistamines
- Glukokortikoides

Side effects:

- drowsiness, fatigue
- dry mouth
- nausea

Interaction:

Sedative component of the analgesics



Minor tranquillants: Benzodiazepins

CONSULTATION WITH PEDIATRISTS

Indication:

- Anxiolytic, panic (alprazolam, diazepam)
- Sleeping pills, retrograd amnesia (midazolam)
- Muscle relaxation (diazepam)
- Epilepsy (diazepam, clonazepam)
- **Not analgesics!!**
- **Parental consent statement**
- **Release sheet**



Dosage

- Diazepam 0.12-0.3 mg / kg body weight
 - muscle relaxant
 - epileptic seizure prevention
- Midazolam 0.2-0.3 mg / kg body weight
 - retrograde amnesia

Thank you for
your attention!

liptak.laura.maria@semmelweis.hu