Analgesics and Antibiotics in pediatric dentistry

CONTENT

Introduction

The most common clinical situations in dentistry amenable to drug therapy in children are pain and infection. The drug control is vital to all phases of dentistry and a thorough knowledge of the art and science of analgesic therapy is essential for proper patient care. The management of dental pain in pediatric patient has lagged markedly behind than that in the adult patient resulting from misconceptions regarding the existence of pain sensation and its tolerance in children.

Concepts about pain in children:

- Children have high tolerance to pain
- Pain perception is low because of biologic immaturity
- Little or no memory of a painful experience
- More sensitivity to side effects of analgesics
- Special risk for addiction to narcotics

Classification of analgesics

- 1) centrally acting analgesics

  (narcotics)

- 2) peripherally acting analgesics

  (non- narcotics)

- More effective against acute pain
- Administered parenterally
- Limited use in pediatric dentistry due to drug dependance and abuse liability

Alfentanil/ remifentanil/tramadol

Alfentanil/remifentanil

- Rapid onset within 1 to 1.5 minutes
- Metabolized in liver
- Half-life is 1to 2 hours

Uses:

- Short/painful procedures/intense analgesia
- Remifentanil neurosurgical procedures

Tramadol

- Mechanism of action: weak agonist against all types of opioid receptors
- Uses: 1) mild to moderate pre and post operative pain

2) severe acute or chronic pain

- Dosage: 0 to 14 years single dose 100mg

maximum daily dose: 400 mg

children: 1- 1.5 mg/kg

- Special precautions hypo-thyroidism/adeno-cortical insufficiency/ raised intra-cranial pressure/ head injury

Peripheral acting analgesics

- Less effective against severe pain
- Administered orally --. Chronic low grade pain
- Low drug dependance /less abuse liability

Combination therapy (NSAIDS)

 ibuprofen and paracetamol

 diclofenac sodium and paracetamol

 nimesulide and paracetamol

 mefenamic acid and paracetamol

- New approaches to analgesics
- Enkephalinase inhibitors --> thiorphan
- Neuropeptiides somatostatin / calcitonin
- Adenosine analogues / adenosine kinase inhibitors
- Agonist at nicotinic acetylcholine based on epibatidine
- Transplantation of enkephalin – secreting adrenal medulla cells into spinal canal

Antibiotic therapy for children

Introduction:

Oral cavity is sterile at birth, Number of micro-organisms increase following 6 to 8 hours after birth. At 12 months of age various micro-organisms acquired in oral cavity, S. Salivarius first oral streptococcus, S.mutans and s.sanguis are not present till eruption, S.mutans gets disappeared when there is a full mouth extraction, Veillonella , actinomyces, lactobacillus, nocardia , fusobacterium

List of antibiotic classes

- penicillins
- tetracyclines
- cephalosporins
- quinolones
- lincomycins
- macrolidaes
- sulfonamides
- glycopeptides
- aminoglycosides
- carbapenems

Tetracyclines

Tetracyclines are broad-spectrum against many bacteria and treat conditions such as acne, urinary tract infections, intestinal tract infections, eye infections, sexually transmitted diseases, Periodontitis (gum disease), Other bacterial infections.

Cephalosporin

There are five generations of cephalosporins, with increasing expanded coverage across the class to include gram-negative infections. Newer generations with updated structures are developed to allow wider coverage of certain bacteria. Cephalosporins are bactericidal (kill bacteria) and work in a similar way as the penicillins. Cephalosporins treat many types of infections, including strep throat, ear infections, urinary tract infections, skin infections, lung infections, and meningitis.

Quinolones

The quinolones, also known as the fluoroquinolones, these are a synthetic, bactericidal antibacterial class with a broad-spectrum of activity. The quinolones can be used for difficult-to-treat urinary tract infections when other options are aren't effective, hospital-acquired pneumonia, bacterial prostatitis, and even anthrax or plague

Macrolides

Macrolides are a class of antibiotics found in streptomycetes, they are natural lactones with a large ring, consisting of 14 to 20 atoms. Macrolides bind to the 50s subunit of the bacterial ribosome and inhibit ribosomal translocation, leading to inhibition of bacterial protein synthesis. Their action is primarily bacteriostatic but may be bactericidal at high concentrations, or depending on the type of microorganism. The macrolides can be use to treat community-acquired pneumonia, Pertussis (whooping cough), Uncomplicated skin infections, among other susceptible infections, Ketolides are a newer generation of antibiotic developed to overcome macrolide bacterial resistance

Aminoglycosides

Aminoglycosides inhibit bacterial synthesis by binding to the 30s ribosome and act rapidly as bactericidal antibiotics (killing the bacteria). These drugs are usually given intravenously (in a vein through a needle)

Principles in antibiotics

- Antibiotics do not cure the patient but provide time for natural host defenses
- Antibiotics are not a substitute for surgical drainage:
- Lower antibiotic dosaging is needed in pediatric patients due to reduced gastric acid, plasma protein binding, blood flow to muscles , renal and hepatic activity, body fat and increased intracellular fluid.

Dose calculation

It is done by age, sex, weight and chronic disease of any major organs of metabolism and excretions. Creatinine clearance, peak and trough and symptomatic patient response are often used to titrate doses for a given, therapeutic effect

Antibiotic resistance

Sooner or later micro-organisms gets antimicrobial resistance according to archer in 1991, Caused due to improper dose or duration, we want to advice the patient to take the medicines proper indication, dosages and duration.

Examples

- Methicillin-resistant staphylococcus aureus (mrsa)
- Vancomycin-resistant enterococcus (vre)
- Multi-drug-resistant mycobacterium tuberculosis (mdr-tb)
- carbapenem-resistant enterobacteriaceae (cre) gut bacteria
- Ceftazidime-avibactam,
- meropenem-vaborbactam,
- plazomicin

These are relatively new antibiotics, all having been approved by the us food and drug administration within the last 5 years

CONCLUSION

Sound knowledge about antibiotic and analgesic is mandatory for clinician. Drugs and its dose calculation helps in removal of pain and infection in children.

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