1. Differential Diagnosis of Pain Around the Head and Neck

1.1. Pain:

Feeling of discomfort due to external noxia, deterioration of health or mental disorder.

1.2. Types of pain:

somatic - external noxas excite tissue with otherwise intact nerve elements

- Ø Dental (endodontic, periodontal)
- Ø Mucosa of the mouth (erosions, ulcers, injury)
- Ø Ear (otitis, foreign body, injury, horn)
- Ø Eye (inflammation, pressure increase, injury, foreign body)
- Ø Nose and sinuses (inflammation, foreign body)
- Ø Salivary gland (inflammation, stone, tumor)
- Ø Throat (inflammation, injury, tumor)
- Ø TMI (trauma, inflammation)
- Ø Cervical spine (Eagle sy., Trauma, musculoskeletal joint)
- Ø General (angina, infarct, thyroiditis)

neurogenic - pain develops in the nervous system due to nerve damage

- Ø Neuropathy
- Ø Neuritis (herpes simplex and zoster)
- Ø Neuralgia (trigeminus, Glossopharyngeal)
- Ø Oral burns (psychological and hormonal effects)
- Ø Causalgia(dull, diffuse, burning, after nerve trunk injury)

psychogenic - due to emotional causes (tissues and nerves are intact)

- Ø They resemble neurogenic pain but are less specific and may be due to emotional distress, CNS medications, and mental illness.

2. Focal Diseases

2.1 Definition of a focal point:

A focal point is a closed, chronic inflammation that contains bacteria, from which pathogens and their toxins can constantly be circulating through the blood and lymphatic system. The lesion is partly or completely asymptomatic.

2.2. The most common foci are:

Teeth / tonsils / middle ear / sinus / Prostate / gallbladder / ovary / cecal

2.3. Most Common Focal Diseases (Focal Disease = Evoked Disease):

Eczema / Neuritis / Endocarditis rheumatica / Asthma bronchiale / allopecia / allopecia arata

2.4. The dental foci:

The focal points are approx. 10% of tooth origin.

- microflora in dead pulp
- chronic, asymptomatic dental inflammation
- periodontitis apicalis chronica
- periodontal pockets around tooth
- abscessus apicalis acuta and chronica
- chronic gingivitis and periodontitis
- necrotic tooth
- radix relicta
- Cyst

2.5. Finding focal points:

Most patients are asked for a dental focal examination before a surgical procedure (eg transplantation, implantation of a prosthetic valve, implantation of a hip prosthesis). The purpose of this exam is to uncover the foci in the body, which contributes to the success of the surgery. The examination includes panoramic, intraoral radiographs and a clinical intra-extraoral assessment.

2.6. Eliminating the foci:

In practice, the origin of the foci can be proven by the fact that after removal of the foci, the symptoms of the focal disease disappear. It can happen that the elimination of the foci and the recovery from its supposed secondary disease happen by chance. Before starting treatment, take note of the patients dental status.

3. Drug Side Effects and Interactions

Certain medications and medicated patients pose an increased risk for dental treatments. This group includes:

- anticoagulants
- bisphosphonates
- steroids
- chemotherapeutic agents
- other drug interactions

3.1. Anticoagulants:

Hemorrhage may develop as a result of a general disease or drug interaction.

General Disease:

Coagulopathies:

Primary and secondary hemostasis disorders

Thrombocytopathies:

Primary and secondary hemostasis disorders

Direct coagulopathies:

- Congenital: Haemophilias (A and B), von Willebrand syndrome
- Acquired: Vitamin K dependent

Immuncoagulopathy: antibodies are produced against coagulation factors

DIC (disseminated intravascular coagulopathy): an acquired syndrome, coagulation happens within the vascular system, there is fibrin formation, which results in the formation of micro-thrombi within the vascules, withdrawing platelets, and due to the relative lack of platelets, hemorrhage develops.

Drug Interaction: Blood thinners

There are basically two groups, TAG (platelet aggregation inhibitors) treatment and vitamin K antagonists. One group is applied to the arterial side and the other side to the venous side. Patients taking these drugs have a higher risk of hemorrhage during invasive procedures. Withdrawing the drugs increases the chance of a thromboembolic event.

-important: consultation with a general practitioner / cardiologist

Recommendations during oral anti-thrombotic therapy:

PAI = platelet aggregation inhibitors
KVA = Vitamin K antagonists
NOAC = so called new oral anticoagulants

- Increased bleeding that may occur during the procedure should be brought to the attention of the patient

- it is not advisable to suspend the so-called Single (aspirin or Clopidogrel or Ticlopidine) and so-called "Dual" (usually with aspirin and clopidogrel) PAI treatments

- For KVA, the INR should be checked 24-72 hours before dental treatment

- KVA (hydroxycoumarin, acenocoumarin, phenprocoumon) treatment should not be discontinued if the INR (International Normalized Rate) ≤ 3.5

- If the INR < 3.5, consultation with the patients doctor or the so-called an "anticoagulation team" (GP, internist, cardiologist, hematologist) is required. The KVA dosage should be adjusted so that the INR is below the desired 3.5. If this is not possible, then bridging to LMWH (Low Molecular Weight Heparin) low molecular weight heparin) should be carried out, with referral to the proper institution.

- Patients taking KVA are more likely to have excessive bleeding if they have a history of other conditions that affect blood clotting (liver disease, kidney disease, platelet disorders).

- It is recommended to continue the NOAC ("xaban", dabigatran) treatment. However, the drug should be taken later than 3 hours prior to dental surgery.

- If possible, perform the intervention prior to when the patient needs to take their daily dose of the medicine.

- In case of NOAC, INR and PTR (prothrombin) values are misleading and inadequate. They do not need to be checked.

3.2. **Bisphosphonates**:

Osteoprosis is a worldwide problem. For the treatment of osteoporosis, patients are given bisphosphonates, i.e. inorganic pyrophosphate analogs, which inhibit bone resorption. Bisphosphonates are administered orally for osteoporosis and intravenously in the treatment of carcinomas affecting the bone and bone metastases.

Unlike for other bones, they have a higher accumulation ratio in the jaw bones. This is why the jaw bones have the highest potential of bone necrosis. Discontinuation of treatment does not inhibit the progression of necrosis, since bisphosphonates have a long half-life of nearly 20 years. Therefore, there is still a potential risk of necrosis years after treatment has been discontinued. Its development is characterized by erythema, ulcer and mobility of teeth. To prevent the development of bone necrosis, dental treatment and rehabilitation should be performed before the bisphosphonate treatment is initiated. Chlorhexidine mouth rinsing and antibiotic prophylaxis are essential.

If an invasive procedure is performed According to the recommendation of the Magyar Orvostársaságok és Egyesületek Szövetsége (MOTESZ) antibiotic prescription should be started 1-2 days before the procedure and continued for two weeks after the procedure, but at least until the mucosa has primary closure.

Administration	Antibiotic	Dosage
Primary choice, orally	Amoxicillin + Clavulanic acid	2 x 1000mg/day
In case of penicillin allergy, orally	Clindamycin	4 x 300mg/day

3.3. NSAIDs:

These include indomethacin, diclofenac, ibuprofen. They inhibit COX-1 more than COX2. They pose an increased threat to the gastric mucosa and platelet function. Furthermore, they may cause excessive hemorrhage. To avoid this, selective COX2 enzyme inhibitors (coxibs) can be used. The COX2 enzyme is primarily responsible for the development of pain and inflammation. Oxicam and nimesulide are the most commonly used COX2 enzyme inhibitors.

3.4. Chemotherapeutic agents:
Because they impair the immune system, invasive interventions increase the risk of infection, which can lead to serious complications. Antibiotic prophylaxis is recommended with the same protocol as for patients treated with bisphosphonates.

3.5. Drug Interactions:
Many prescribed drugs can interact with one another. Most commonly NSAIDs or antibiotics prescribed by the dentist can interact with other medications.
Interactions may have the following results

- the effect the medicine can increases to dangerous levels
- some medicine may become ineffective
- other undesirable dangerous effects can occur

Many drugs can cause side effects in the oral cavity. The most important side effects include gingival hyperplasia, mucositis, dry mouth, fungal and bacterial infections, ulcers or tooth decay.

4. Treatment of High Risk Patients

Patient's disease can be a risk
- to themselves (eg. artificial valves, haemophilia)
- to the environment, including health personnel (eg infectious diseases)
- both (eg HIV positive patient)

That's why it's especially important
- preparation of a detailed medical history
- Recognition of clinical signs
- evaluation of findings
- reduction of trauma and stress as carefully as possible

Diseases to consider during treatment
diabetes mellitus / hematologic disorders / cancer / musculoskeletal disorders / GI-related diseases / psychiatric disorders / autoimmune diseases / patients receiving chemotherapy / biological therapy patients / pregnant women / transplanted patients / patients with cardiovascular disease

4.1. Infectious diseases:

Patients can have acute (eg. influenza, herpes) or chronic (eg. HIV, HBV, HBC, TBC) infections. In case of an acute infection, if possible dental treatment should be postponed or a conservative approach should be taken. Treatment cannot be denied due to chronic infectious disease. During treatment special care and safety precautions must be taken. In most cases, contact with the blood or secretion fluids of a person infected with HBV, HCV or HIV will not result in coinfection. In the event of accidental exposure, it is very important to acquire the serological status of the source.

4.2. Organ transplanted patients

These patients receive cyclosporine, which inhibit organ rejection but weakens their immune systems and make them more susceptible to various infections. Most of the time they come to the dentistry for focal examination. It is important that these patients acquire dental care prior to organ transplantation. Often these patients receive anticoagulant, which can complicate dental treatment.

4.3. Cardiovascular diseases

A risk of or a previous episode of infectious endocarditis is a major risk factor. Patients require prophylaxis before dental interventions.
We distinguish low, medium and high risk patients for conditions requiring prophylaxis. There is no need for prophylaxis in the low-risk group. The group

includes patients with rheumatic fever without coronary artery disease, coronary bypass and pacemaker.
Prophylaxis is always required for patients with artificial shunt valve, shunts, valve defects, mitral prolapse, a history of infectious endocarditis and congenital heart disease.

High Risk
Prosthetic cardiac valve or prosthetic material used for cardiac valve repair
Previous infective endocarditis
Congenital heart disease but only if it involves: unrepaired cyanotic defects, including palliative shunts and conduits completely repaired defects with prosthetic material or devices, whether placed by surgery or catheter intervention, during the first six months after the procedure (after which the prosthetic material is likely to have been endothelialised) repaired defects with residual defects at or adjacent to the site of a prosthetic patch or device (which inhibits endothelialisation)
Rheumatic heart disease in patients at high risk of endocarditis (indigenous Australians and those at significant socioeconomic disadvantage)
Heart transplant patients (consult the patient's cardiologist for specific recommendations)

The purpose of antibiotic prophylaxis is to prevent and prevent infections. It is used when the risk of infection is higher in that particular patient or if the infection has frequent and severe consequences.

Administration	Antibiotic	Child	Adult
1 hour before treatment orally	Amoxicillin + clavulanic acid	50mg/kg	2000mg
30 minutes before treatment IV/IM	Ampicillin	50mg/kg	2000mg

1 hour before treatment orally (in case of penicillin allergy)	Clindamycin Cephalexin / Cefadroxil Azithromycin / Clarithromycin	20mg/kg 50mg/kg 15mg/kg	600mg 2000mg 500mg
30 minutes before treatment IV/IM (in case of penicillin allergy)	Clindamycin Cefazolin	20 mg/kg 25 mg/kg	600mg 1000mg

4.4. Irradiated patients

- From a dental point of view, only irradiation in the head and neck region deserves special attention.
- Irradiation can lead to stomatitis, which heals spontaneously after the irradiation treatment.
- Irradiation weakens the blood supply to the jaws, which reduces the jaws ability to defend against pathogens.
- Before irradiation, dental focal examination and foci removal are required.
- After irradiation treatment, tooth extraction is contraindicated for 1 year, and for 5 years antibiotic therapy is required before the intervention.
- Patients undergoing radiotherapy may develop osteoradionecrosis of the jaw, which requires complex treatment.

5. Differential Diagnosis of Regional Lymphoid Node Swelling

Cervical lymph node swelling can be a symptom of various diseases. Locating the swollen nodules can help determine the disease itself. Therefore, locating the nodules is critical.

- if they are located behind sternocleidomastoid muscle, that suggests disease of the epipharynx and scalp
- if they are located before the sternocleidomastoid muscle or in the jaw angle, that suggests diseases of the larynx, hypopharynx, tonsils and parotid
- if the submandibular and submental lymph nodes are swollen, we can conclude that there are diseases of the tongue, teeth and mouth
- palpable swollen lymph nodes around the trachea indicate diseases of the trachea and subglottic area

supraclavicular lymph nodes may be signs of chest disease, but gastric carcinoma, for example, may also be present in the left supraclavicular area

Examination:

- viewing, palpation
- if palpable - size, tactile, sensitivity, tissue fixation, number
- if more than 1 lymph node is detected
    - dental origin can be excluded
    - further examination for generalized lymphadenopathy is required
- UH, CBCT
- healthy lymph nodes <1 cm (not palpable) - mobile, unrelated to the environment (easy to move from the base), soft, flexible, rounded

Differential diagnostics:

In acute infection: large, soft, painful, mobile, standalone lymph nodes
In chronic infection: large, dense, slightly sensitive, mobile lymph node
In the case of lymphoma: solid, painless, multiple lymph nodes
In the case of metastatic tumor: bone hard palpation, fixed, painless lymph node

6. Differential Diagnosis of Inflammation

6.1. Alveolitis:

(ostitis alveolaris, dry socket syndrome, dolor post extractionem)

Etiology

sicca (lack of coagulum)

- lack of careful curettage
- rinsed out by the patient
- the patient sucked on the extraction wound

ichorosa (disintegration of coagulum after infection)

- lack of secretory IgA

Symptoms

- usually 2-3 after extraction day
- very severe, dull, radiating pain
- inflamed, lobular gingiva around the alveolus
- free bone surface with a greyish coloration
- swollen lymph nodes, increased heat
- strong “foetor ex ore”

6.2. Periostitis

Etiology

- subperiosteal infiltrate (serous)
- subperiosteal abscess (parulis)
- may enter into the spaces, abscess
- submucosal / internal incision /
- subcutaneous / external incision /

Symptoms

- Local, generalized, regional inflammatory symptoms
- High sensitivity of tooth palpation
- Strong, spontaneous, pulsating pain
- Swelling in the vestibule
    - without fluctuation → serous
    - with fluctuation → purulent
- X-ray shows periapical bone resorption

6.3. Phlegmon:

Phlegmon is a medical term describing an inflammation of soft tissue that spreads under the skin or inside the body. Without proper diagnosis and treatment it can be fatal.

Etiology

- The body's defense mechanism has decreased
- Extreme virulent pathogen (anaerobes)

Symptoms

- Severe edema, which the skin being very hard and red
- Painful, swelling that is hard to the touch
- Septic fever (> 38 ° C)
- General inflammatory symptoms
- Poor general condition
- Restricted mouth opening, difficulty in swallowing and breathing

6.4. Angina Ludowici

- Simultaneous inflammation of the submandibular + sublingual regions
- Both sides of the submandibular region is swollen (bilateral)
  tongue is heavily swollen and moves to the back
- High swallowing difficulty, salivation
- Difficulty in breathing (glottis edema)