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## KRATAK PREGLED ZBRINJAVANJA PACIJENATA SA KARDIOVASKULARNIM OBOLJENJIMA ZA STOMATOLOŠKE INTERVENCIJE

### A SHORT REVIEW OF DENTAL CARE FOR PATIENTS WITH CARDIOVASCULAR DISEASES

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#### Sažetak

**Uvod:** Osnovna znanja o kardiovaskularnim bolestima, simptomima i komplikacijama koje mogu nastati kod pacijenata obolelih od kardiovaskularnih oboljenja u toku stomatološke intervencije, kao i postupak rada prilikom stomatološke intervencije neophodna su svakom stomatologu. Stomatološki pacijenti koji boluju od kardiovaskularnih bolesti, a nisu adekvatno lečeni, odnosno nemaju adekvatnu kontrolu osnovne bolesti, imaju značajno veću verovatnoću za pogoršanje opšteg zdravstvenog stanja tokom stomatološke intervencije, odnosno za pogoršanje osnovne bolesti.

**Rezultati:** Najčešća kardiovaskularna oboljenja na koja treba obratiti pažnju u pripremi pacijenata za stomatološku intervenciju su: arterijska hipertenzija, ishemijska bolest srca, cerebrovaskularna oboljenja, poremećaji srčanog ritma i srčana slabost.

**Zaključak:** Posebnu pažnju treba posvetiti pacijentima sa antikoagulatnom i/ili antiagregacionom terapijom, kao i pacijentima kod kojih je neophodna prevencija bakterijskog endokarditisa.

**Cljučne reči:** oralno zdravlje, kardiovaskularne bolesti, angina pectoris, arterijska hipertenzija

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#### Abstract

**Introduction:** The basic knowledge about cardiovascular diseases (CVD s), the symptoms and complications that can occur during dental interventions in patients suffering from cardiovascular diseases, and how to handle such patients during the dental intervention are essential to every dentist. Dental patients suffering from cardiovascular diseases that are not adequately treated have a significantly higher risk of cardiovascular event during the dental intervention.

**Results:** The most common cardiovascular diseases that need special dental care are: arterial hypertension, coronary heart disease, cerebrovascular disease, heart rhythm disorders and heart failure.

**Conclusion:** Particular attention is needed when patients are treated with anticoagulant and /or antiplatelet therapy or when prevention of bacterial endocarditis is required.

**Key words:** oral health, cardiovascular diseases, angina pectoris, arterial hypertension

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## Uvod

U poslednje dve decenije došlo je do naglog porasta broja kardiovaskularnih bolesti u mnogim zemljama u razvoju širom sveta, zajedno sa promenama u stilu života, načinu ishrane i fizičkoj aktivnosti<sup>1</sup>. Prema podacima Svetske zdravstvene organizacije, kardiovaskularne bolesti su bile na prvom mestu kao uzrok smrti u 2012. godini. U svetu godišnje umre više ljudi od kardiovaskularnih bolesti nego od svih drugih uzroka zajedno. Stomatolog se često susreće u svojoj kliničkoj praksi sa obolelima od kardiovaskularnih bolesti, jer su one u porastu<sup>2</sup>. Još uvek je nedovoljno ispitana povezanost kardiovaskularnih bolesti i bolesti usta i zuba. Neke studije su pokazale da periodontalne infekcije mogu povećati rizik od kardiovaskularnih bolesti za 15-19%<sup>3-4</sup>. Osnovna znanja o kardiovaskularnim bolestima, simptomima i komplikacijama koje mogu nastati kod pacijenata obolelih od kardiovaskularnih oboljenja u toku stomatološke intervencije, kao i postupak rada prilikom stomatološke intervencije kod pacijenata koji je obolelih od kardiovaskularnog oboljenja, neophodna su svakom stomatologu.

Stomatološki pacijenti koji boluju od kardiovaskularnih bolesti, a nisu adekvatno lečeni i nemaju adekvatnu kontrolu osnovne bolesti, imaju značajno veću verovatnoću za pogoršanje opšteg zdravstvenog stanja, odnosno za pogoršanje osnovne bolesti tokom stomatološke intervencije. Zbog toga je veoma važna anamneza. Prilikom razgovora sa pacijentom, stomatolog bi trebalo da se informiše o zdravstvenom stanju pacijenta, aktuelnim tegobama i eventualnim ranijim bolestima. Najznačajnija i najčešća kardiovaskularna oboljenja sa kojima će se stomatolog susretati i na koja treba obratiti pažnju u pripremi pacijenta za stomatološku intervenciju su: arterijska hipertenzija, ishemijska bolest srca, cerebrovaskularna oboljenja, poremećaji srčanog ritma, srčana slabost i dr. Posebnu pažnju treba posvetiti pacijentima sa antikoagulatnom i/ili antiagregacionom terapijom, kao i pacijentima kod kojih je neophodna prevencija bakterijskog endokarditisa<sup>5,6</sup>.

### *Priprema pacijenata sa arterijskom hipertenzijom za stomatološku intervenciju*

Arterijska hipertenzija (AH) predstavlja povišen krvni pritisak preko 140 i/ili 90mmHg. AH je bolest koja ima visoku prevalenciju

## Introduction

In the last two decades, there has been a rapid increase in the number of cardiovascular diseases (CVDs) in many developing countries worldwide, along with changes in lifestyle, diet and physical activity<sup>1</sup>. According to data from the World Health Organization, cardiovascular diseases were in the first place of all cause of death in 2012. Worldwide, more people die annually from cardiovascular disease than from all other causes combined. Because of the high incidence of (CVDs), dentists will often meet patients suffering from these diseases<sup>2</sup>. The association between dental health and CVD is still unknown. Some studies have shown that periodontal infection may increase a risk of cardiovascular disease by 15-19%<sup>3,4</sup>. The basic knowledge about (CVDs), the symptoms and complications that can occur during dental interventions in patients suffering from cardiovascular diseases, and how to handle such patients during the dental intervention are essential to every dentist.

Dental patients suffering from (CVDs), that are not adequately treated, or do not have adequate control of CVD have a significantly higher risk of cardiovascular event during the dental intervention. It is very important to talk to patient before the dental intervention. The dentist should be informed about the patient's current condition and previous diseases. The most common cardiovascular diseases that need special dental care are: arterial hypertension, ischemic heart disease, (CVDs), heart rhythm disorders and heart failure. Particular attention is needed when patients are treated with anticoagulant and /or antiplatelet therapy, or when bacterial endocarditis prevention is required<sup>5,6</sup>.

### *Dental care in arterial hypertension*

Arterial hypertension (AH) means increasing of blood pressure than 140 and / 90mmHg. Arterial hypertension (AH) has a high prevalence (35-40%) all over the world<sup>7</sup>. Current control rates for AH are still quite poor, and AH is often insufficient and not adequately treated.

(35-40 %) širom sveta<sup>7</sup>. Iako bolesnik zna da ima AH, ona je često nedovoljno i neadekvatno lečena. Lekovi koji se koriste u lečenju AH su AC inhibitori, beta blokatori, inhibitori kalcijumskih kanala, diuretici i angiotensin 2 receptor inhibitori. Često ovi lekovi mogu imati neželjene efekte (xerostomia, gingivalna hiperplazija, lihenoidna promena, gubitak ili promena čula ukusa) na oralnu sluzokožu i oralno zdravlje. Većina antihipertenziva ima interakciju sa lokalnim anestetima i analgeticima<sup>8</sup>.

Stomatološko lečenje bolesnika sa AH zahteva posebnu pažnju, jer svaka stresna situacija može da povisi krvni pritisak, a nekada da dovede do neželjenih događaja kao što su infarkt miokarda ili cerebrovaskularni inzult. Adekvatna kontrola bola i anksioznosti je veoma važna kod bolesnika sa AH. Ovi bolesnici imaju visok rizik od neželjenih kardiovaskularnih događaja zbog endogenih kateholamina koji se pojačano luče u stanjima bola i stresa. Preporučuje se i dodavanje anksiolitika (diazepam) redovnoj kardiološkoj terapiji pre stomatološke intervencije. Prilikom primene lokalnog anestetika treba izbegavati intravaskularnu aplikaciju anestetika sa vazokonstriktorom. Tokom intervencije treba izbegavati brze promene položaja tela pacijenta, kako bi se izbegla ortostatska hipotenzija. Stomatološki pacijenti koji boluju od arterijske hipertenzije koja je dobro regulisana ne predstavljaju rizičnu grupu i intervencija može da se realizuje bez rizika.

Ukoliko i pored adekvatne pripreme bolesnika, tokom stomatološke intervencije dođe do skoka arterijskog pritiska preko 200/120 mmHg treba zaustaviti intervenciju i dati kaptopril 25 mg sublingvalno. Ukoliko se i nakon 30 minuta održavaju visoke vrednosti arterijskog pritiska primeniti intravenski furosemid 40 mg i pozvati službu hitne medicinske pomoći<sup>9</sup>.

#### *Priprema pacijenata sa koronarnom bolešću za stomatološku intervenciju*

Ishemijska bolest srca je vodeći uzrok smrtnosti osoba starosti 40-65 godina. Stabilna angina pectoris predstavlja klinički sindrom koji karakteriše osećaj nelagodnosti, pritiska i/ili bola u grudima, smanjenje tolerancije na napor, uz bol koji prestaje unutar

Drugs used in the treatment of AH are AC inhibitors, beta blockers, calcium channel inhibitors, diuretics and angiotensin 2 receptor inhibitors. Often, these drugs can have side effects (xerostomia, gingival hyperplasia, Lichenoid changes, loss of taste) on oral mucosa and oral health. The majority of anti-hypertensive agents interact with local anesthetics and analgesics<sup>8</sup>.

Dental treatment of patients with AH requires special attention, because every stressful situation can raise blood pressure and sometimes lead to adverse events such as myocardial infarction or cerebrovascular accident. Adequate control of pain and anxiety is very important in patients with AH. Patients with cardiovascular disease have a high risk of complications due to endogenous catecholamines released in pain and stress. It is recommended to add anxiolytic (diazepam) to a regular therapy before dental intervention. Intravascular administration of anesthetic with vasoconstrictor should be avoided. During the intervention, rapid changes in body position should be avoided because of risk of orthostatic hypotension. Dental patients who suffer from hypertension, which is well treated, and if the patient is normotensive there is no high risk for adverse outcome and dental intervention should be done safely.

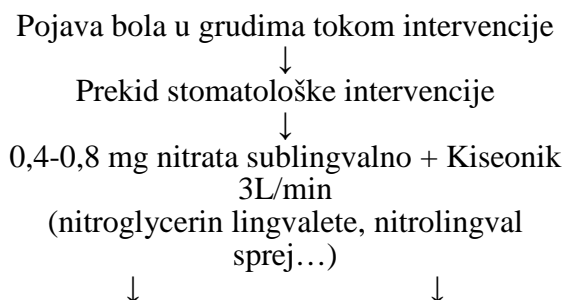
If despite adequate preparation of the patient, blood pressure raises over 200/120 mmHg during dental intervention, the intervention should be stopped and captopril 25 mg should be given sublingually. If arterial pressure is still high after 30 minutes, give intravenous furosemide 40 mg and call an ambulance<sup>9</sup>.

#### *Dental care in coronary heart disease*

Coronary heart disease is the leading cause of death for people aged 40-65 years. Stable angina pectoris is a clinical syndrome characterized by discomfort and/or chest pain and reduced tolerance to effort. Chest pain usually stops within 10 minutes after administration of nitroglycerin<sup>5</sup>. Myocardial ischemia, which leads to pain, is caused by

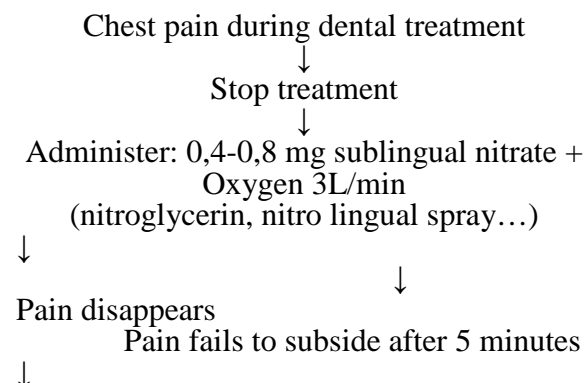
10 minuta po prestanku fizičkog opterećenja ili nakon primene nitroglicerina<sup>5</sup>. Ishemija miokarda koja dovodi do bola uzrokovana je smanjenim koronarnim protokom, odnosno nedovoljnim snabdevanjem miokarda kiseonikom u odnosu na potrebe, ali se može javiti i kod bolesnika s aornom stenozom, hipertrofičnom kardiomiopatijom ili hipertenzijom bez oštećenja koronarnih arterija. Kod većine obolelih sa stabilnom anginom pectoris patološki supstrat za pojavu ishemije miokarda predstavlja aterosklerotski izmenjen jedan ili više koronarnih krvnih sudova<sup>9</sup>. Najvažniji faktori rizika za nastanak koronarne bolesti predstavljaju: arterijska hipertenzija, hiperholesterolemija, šećerna bolest i pušenje. Priprema pacijenta koji boluje od koronarne bolesti srca za stomatološku intervenciju podrazumeva, u prvom redu, regulisanje krvnog pritiska i poremećaja srčanog ritma. Stabilna angina pectoris podrazumeva stanje u kome bol u grudima prestaje spontano nakon 5-10 minuta ili nakon primene nitroglicerina. Kod pacijenata koji su preboleli akutni infarkt miokarda predlaže se odlaganje stomatoloških intervencija šest nedelja. Tokom prvih šest nedelja od infarkta miokarda pristupa se samo hitnim stomatološkim intervencijama (ekstrakcije, drenaža apscesa, pulpektomija). Nakon šest nedelja, za svakog pojedinačnog pacijenta procenjuje se stepen rizika za intervenciju uz neophodnu saglasnost ordinirajućeg kardiologa. Pacijent treba da uzima preporučenu terapiju uz primenu anksiolitika pre izvođenja stomatološke intervencije. Pacijenta treba postaviti u, što konforniji položaj. Izbegavati promene položaja tela, kako bi se izbegla ortostatska hipotenzija<sup>10</sup>.

U slučaju pojave bola u grudima tokom intervencije, predložen je sledeći algoritam za zbrinjavanja pacijenta:



reduced coronary flow, or insufficient myocardial oxygen supply. Chest pain can also occur in patients with aortic stenosis, hypertrophic cardiomyopathy or hypertension. In the majority of patients with stable angina pectoris, myocardial ischemia occurs because one or more of the coronary arteries is narrowed or blocked<sup>9</sup>. The most important risk factors for coronary heart disease are: arterial hypertension, hypercholesterolemia, diabetes and smoking. Heart rhythm disorders and arterial hypertension should be under control before starting the dental treatment in these patients. In stable angina pectoris chest pain disappears spontaneously after 5-10 minutes, or after administration of nitroglycerin. In patients who have suffered an acute myocardial infarction dental procedures should be postponed for 6 weeks. In this time, dental treatment should be limited to emergency procedures aimed at pain relief: extractions, drainage of abscesses and pulpectomies. After this safety period, the treatment decision should be established on the basis of the situation and medical condition of each individual patient in consultation with the cardiologist. The patient should continue taking the prescribed medication as usual, with the use of anxiolytic before performing dental intervention. The patient should be placed in the most comfortable position for him or her. Avoid body position changes to avoid orthostatic hypotension<sup>10</sup>.

Management of patients with ischemic heart disease in the event of chest pain during dental treatment:



Prestanak bola    Bol se održava i nakon 5-10 minuta  
 ↓  
 Nastavak stomatološke intervencije  
 Ponoviti NTG + kiseonik  
 ↓  
 Održavanje bola u grudima →upućivanje pacijenta u kardiološku ambulantu - hospitalizacija

Consider continuing treatment or postpone

Administer second sublingual tablet  
 ↓  
 Pain fails to disappear after 15 minutes  
 ↓  
 Transfer the patient to the hospital

#### *Dental care for patient with heart rhythm disorders*

#### *Priprema pacijenata sa poremećajima ritma za stomatološku intervenciju*

Studije pokazuju da bolesnici koji imaju uznapredovale karijesne lezije korena kanala imaju signifikantno veću prevalenciju poremećaja srčanog ritma<sup>11</sup>.

Načestći poremećaj ritma koji se beleži u stomatološkoj kliničkoj praksi je atrijalna fibrilacija sa incidencijom do 3,8% kod pacijenata starosti 60 godina i 9% kod pacijenata starosti 80 godina<sup>12</sup>. Veoma često je vezana za koronarnu bolest, arterijsku hipertenziju i valvularnu bolest srca.

U pripremi ovih bolesnika za stomatološke intervencije neophodan je kardiološki pregled radi adekvatne kardiološke terapije. Pre izvođenja stomatološke intervencije neophodna je primena anksiolitika. Kod težih oblika poremećaja ritma predlaže se EKG monitoring i redukcija primene vazokonstriktora-adrenalina. U slučaju pojave poremećaja ritma uz hemodinamsku nestabilnost pacijenta (pad pritiska, omaglica, nesvestica.), treba primeniti nitroglicerin, kiseonik 3L/min, pacijenta prebaciti u Trendeleburgov položaj i pozvati službu hitne medicinske pomoći<sup>13</sup>.

#### *Srčana insuficijencija*

Srčana insuficijencija (SI) je klinički sindrom koji se karakteriše tipičnim simptomima (otežano disanje, oticanje nogu i vrtoglavica) koji može biti praćen znacima, npr. povišeni jugularni venski pritisak, periferni edemi i pukoti nad plućima. SI predstavlja nesposobnost srca da ispumpa krv brzinom koja odgovara metaboličkim potrebama tkiva. Posledica toga je nakupljanje povećane količine tečnosti u perifernim tkivima. Brojni kardiovaskularni poremećaji (bolest konorarnih arterija, kardiomiopatija, miokarditis, hipertenzija i td.) vode u SI. Lečenje hronične SI, podrazumeva lečenje osnovne bolesti koja

Studies show that patients who have advanced root canal carious lesions have a significantly higher prevalence of cardiac arrhythmias<sup>11</sup>.

Atrial fibrillation is the most common type of cardiac arrhythmia in dental practice, with a prevalence of 3.8% at 60 years of age and reaches 9% in individuals over 80 years of age<sup>12</sup>. Atrial fibrillation is often related to coronary heart disease, hypertension and valvular heart disease.

Before dental treatment, patient should be examined and medications should be prescribed by the cardiologist, with the use of anxiolytic before performing dental intervention. In severe cases of arrhythmias, it is advised to monitor ECG and to administer smaller dose of local anesthetic (epinephrine). In case of hemodynamic ally unstable patient (low arterial pressure, dizziness, fainting), nitroglycerin and oxygen 3L / min should be applied, and put the patient in the Trendeleburg position and call the ambulance<sup>13</sup>.

#### *Dental care for patients with heart failure*

Heart failure (HF) is a clinical syndrome characterized by typical symptoms (shortness of breath, swelling of the legs, and dizziness), which may be accompanied by signs (e.g. elevated jugular venous pressure, peripheral edema and lungs crackles). HF represents the inability of the heart that pumps out the blood at a rate that corresponds to the metabolic needs of the tissue. As a result, accumulation of increased amounts of fluid in the peripheral tissues occurs. Numerous cardiovascular diseases (coronary artery disease, cardiomyopathy, myocarditis, hypertension etc.) lead to HF. Treatment of chronic heart failure involves treating the underlying disease that caused it, and involves the use of antihypertensives, antiarrhythmics, nitrates, antiplatelet and / or anticoagulant therapy and diuretics<sup>14</sup>.

je dovela do SI, i podrazumeva upotrebu antihipertenzija, antiaritmika, nitrata, antitrombotičnih lekova ili antikoagulantnih terapija i diuretika<sup>14</sup>. Pre stomatološke intervencije pacijenti sa srčanom slabošću moraju biti upućeni svom kardiologu kako bi se eventualno korigovala postojeća terapija i stomatološkoj intervenciji pristupilo u stabilnom stanju kompenzovane kardiomiopatije. Kod dekompenzovanih pacijenata, kod postojanja dispnee u mirovanju, pacijenata sa izraženim pretibijalnim edemima, stomatološku intervenciju (osim hitnih) treba odložiti i pacijenta uputiti kardiologu.

Posete stomatologu treba da budu u jutarnjim časovima, kratke, ne duže od 30 minuta. Kod anksioznih bolesnika potrebno je dati sedative pre stomatološke intervencije. U lečenju SI kao posledici primene ACE inhibitora moguće su u ustima lihenoidne promene, osećaj pečenja i gubitak čula ukusa, neželjeni efekat diuretika furosemida je pojava xerostomie. Kod pacijenata koji u terapiji imaju preparate digitalisa i kod pacijenata sa poremećajima ritma srca treba smanjiti ili ne koristiti adrenalin u anestetiku.

U slučaju pojave gušenja, slabosti, vrtoglavice, cijanoze, hladnoće kože, ubrzanog disanja, ubrzanog pulsa, pacijenta treba staviti u sedeći položaj, dati kiseonik 4-6 L/min, nitroglicerina sublingvalno i uputiti bolesnika hitnoj medicinskoj pomoći<sup>10</sup>.

#### *Priprema pacijenata sa antiagregacionom i antikoagulantnom terapijom za stomatološku intervenciju*

Antiagregaciona i/ili antiokoagulantna terapija neophodna je kod brojnih kardioloških oboljenja radi prevencije tromboembolijskih događaja. Najčešće primenjivani antikoagulansi su vitamin K inhibitori (Varfarin) i acenokumarol (Sintrom). Novi oralni antikoagulansi (NOAC) su direktni inhibitor trombina (dabigatran) i inhibitori Xa faktora (apixaban, rivaroxaban i drugi). Najčešće korišćeni antitrombotični lekovi su aspirin, clopidogrel, tiklopidin, prasugrel i ticagrelor. Ukidanje ili smanjenje preporučene antiagregacione ili antiokoagulantne terapije može dovesti do pojave infarkta miokarda, tromboze ugrađenog stenta, tromboze veštačkog srčanog zaliska, cerebrovaskularnog infarkta ili drugih značajnih tromboembolijskih komplikacija<sup>15</sup>.

Before dental intervention, patients with heart failure should be referred to cardiologist in order to administer an adequate medical therapy. Dental intervention should be done in stable compensated HF. In decompensated patients, in the presence of dyspnea at rest, and patients with severe pretibial edema, dental intervention (except emergency) should be postponed and patient should be referred to a cardiologist.

Visits to the dentist should be in the morning hours, of short duration, no longer than 30 minutes. In anxious patients, anxiolytic drug is recommended before dental intervention. Due to drug treatments used by patients with heart failure, a series of oral manifestations can be observed. In this context, ACE inhibitors can produce lichenoid reactions, burning mouth sensation and a loss of taste sensation, while diuretics (furosemide) can produce xerostomia. In patients on digitalis treatment and in patients with heart rhythm disorders, adrenaline should be decreased or not used in a local anesthetic.

In case of choking, nausea, dizziness, cyanosis, cold skin, rapid breathing, and rapid heart rate patient should be placed in a sitting position; give oxygen at 4-6 L / min, nitroglycerin sublingual and refer patient to emergency medical center<sup>10</sup>.

#### *Antiplatelet and anticoagulant medications and dental procedures*

Antiplatelet and/or anticoagulant therapy is necessary in many cardiac diseases for the prevention of thromboembolic events. Most widely used anticoagulants are vitamin K inhibitors (Warfarin) and acenokumarol (Sintrom). The new oral anticoagulants (NOAC) are direct thrombin inhibitors (dabigatran) and inhibitors of Xa factor (apixaban, rivaroxaban, and others). The most commonly used antiplatelet drugs are aspirin, clopidogrel, ticlopidine, prasugrel and ticagrelor. Eliminating or reducing the recommended antiplatelet or anticoagulant therapy can lead to myocardial infarction, stent thrombosis, artificial heart valve thrombosis, stroke or other significant thromboembolic complications<sup>15</sup>.

It is advisable to continue with the recommended antiplatelet and anticoagulation therapy before dental procedures until the value of (INR) international normalized ratio

Savetuje se da se nastavi sa preporučenom antiagregacionom i antikoagulantnom terapijom pre stomatološke procedure sve dok se vrednosti INR-a (international normalized ratio) nalaze u referentnom opsegu od 2 do 3,5. U brojnim studijama nije dokazano da primena antiagregacione ili dvojne antioagregacione terapije dovodi do povećanog rizika za teža krvarenja tokom stomatoloških intervencija<sup>16</sup>.

Kod NOAK-a još uvek ne postoji veliki broj randomiziranih studija u slučaju dentalnih procedura. Ali opšti je zaključak da ne treba menjati dozu leka ukoliko se rade ekstrakcije do tri zuba, periodontalne operacije, incizije apscesa ili implantacije dentalnog implanta. U zavisnosti od komorbiditeta i opsežnosti planirane stomatološke intervencije, neophodna je individualna procena svakog bolesnika i po potrebi konsultacije sa njegovim lekarom. Većinu stomatoloških krvarenja moguće je sanirati sa kompresijom ili hirurškom suturom. Ukoliko je potrebno, moguće je odložiti dozu NOAK-a, izostaviti jednu dozu leka ili prekinuti lek na 24-48h<sup>17</sup>.

#### *Prevenција pojave bakterijskog endokarditisa tokom stomatološke intervencije*

Infektivni endokarditis (IE) uzrokovan proliferacijom mikroorganizama na endotelu srca, uključujući i infekcije velikih krvnih sudova ili infekcije intrakardijalnih stranih tela (veštačke valvule, elektrode pace-makera).

U slučaju da se dijagnoza postavi kasno i bolest ne leči pravovremeno, infektivni endokarditis je bolest sa visokim stepenom mortaliteta<sup>18</sup>.

Prevenција bakterijskog endokarditisa ima za cilj da spreči adherenciju bakterija za endokard nakon invazivnih procedura<sup>19</sup>. Prolazna bakterijemija niskog stepena praktično se dešava svakodnevno: tokom pranja zuba, čišćenja zuba ili žvakanja, pogotovo kod osoba sa lošom oralnom higijenom<sup>20</sup>. Rizik za razvoj IE je veći kod osoba koje imaju lošu oralnu higijenu i ponavljaju bakterijemiju niskog stepena nego onih koji sporadično imaju visokostepenu bakterijemiju kao u toku invazivnih procedura<sup>21</sup>. Većina studija nije potvrdila povezanost IE i dentalnih procedura. Zbog toga danas postoje vrlo ograničene indikacije za prevenciju IE<sup>22</sup>. Procenjen rizik za IE nakon stomatoloških intervencija je veoma nizak. Antibiotikom profilaksum moguće je izbeći samo mali broj IE.

are in the reference range from 2 to 3.5. Numerous studies have not proven that the use of antiplatelet or double antiplatelet therapy leads to an increased risk for serious bleeding during dental interventions<sup>16</sup>.

In case of anticoagulant treatment with NOAC's, there are not still large numbers of randomized trials in the case of dental procedures. However, the general consensus is that the dose should not be changed in the following cases: extraction of no more than 3 teeth, periodontal surgery, abscess incision and dental implants interventions. Individual assessment of each patient is required depending on comorbidity and planned dental intervention. The majority of dental bleeding can be stopped with local measures such as mechanical compression or suturing. If necessary, it is possible to postpone a dose of NOAC, skip one dose or discontinue the drug for 24-48h<sup>17</sup>.

#### *Infective endocarditis prevention in dentistry*

Infective endocarditis is caused by the proliferation of microorganisms on the endothelium of the heart, including infection of the great arteries or infections of intracardiac foreign materials (prosthetic valve, pace-maker electrodes)<sup>7</sup>.

In case when diagnosed too late and the disease is not treated promptly, infectious endocarditis is a disease with a high mortality rate<sup>18</sup>.

Prevention of bacterial endocarditis aims to prevent the adherence of bacteria to the endocardium after the invasive procedure<sup>19</sup>. Low-grade repeated bacteremia happens during daily activities such as tooth brushing, flossing or chewing, especially in patients with poor oral hygiene<sup>20</sup>. The risk of developing IE is higher in people who have poor oral hygiene and cumulative low-grade bacteremia than those who have sporadically high grade bacteremia during invasive procedures<sup>21</sup>. Most studies did not demonstrate an association between IE and invasive dental procedures. Therefore, today there are very limited indications for antibiotic prophylaxis for IE<sup>22</sup>. The estimated risk for IE after dental procedures is very low. Antibiotic prophylaxis may therefore avoid only a small number of IE cases, as shown by estimations of 1 case of IE per 150,000 dental procedures with antibiotics and 1 per 46,000 for procedures unprotected by antibiotics<sup>23, 24</sup>.

Procenjuje se da će na 150,000 stomatoloških procedura gde je preventivno dat antibiotik nastati 1 IE, a ukoliko antibiotska profilaksa nije data, nastaje 1 IE na 46,000 dentalnih procedura<sup>23,24</sup>.

Antibiotska profilaksa infektivnog endokarditisa (IE) se savetuje kod bolesnika koji imaju visok rizik od IE:

1. bolesnici koji imaju veštačku srčanu valvulu ili kod kojih je tokom kardiohirurške operacije korišćen veštački protetični materijal;
2. bolesnici koji su ranije imali IE;
3. bolesnici koji imaju kompleksne cijanogene srčane mane,
4. druge kompleksne srčane kongenitalne lezije nakon korekcije ako imaju ugrađen protetični materijal, do 6 meseci nakon operacije ili doživotno, ukoliko postoji rezidualni šant.

Antibiotska profilaksa se ne preporučuje kod bolesnika sa umerenim rizikom za IE ili bilo kojim oboljenjem prirodne valvule. I bolesnike sa visokim i umerenim rizikom za IE, kao i praktično sve ostale, treba savetovati o značaju adekvatne oralne higijene. Savetuje se antibiotska profilaksa za stomatološke procedure koje zahtevaju manipulaciju gingive, periapikalnog tkiva ili perforaciju oralne mukoze. To podrazumeva: ekstrakcije, periodontalne procedure, čišćenje koje uzrokuje gingivalno krvarenje, stavljanje implantata, endodontalne procedure.

Ne preporučuje se AB profilaksa kod: davanja lokalne anestezije (u neinflamirano tkivo), superficijalni karijes, uklanjanje hirurških konaca, plasiranje ortodontskih traka ili traumatska povreda usana ili oralne sluznice. AB profilaksa se preporučuje za bolesnike koji imaju visok rizik za IE samo ukoliko se planiraju stomatološke intervencije od visokog rizika ( gore nabrojane ) Tabela br 1.

Antibiotic prophylaxis of infective endocarditis (IE) is recommended in patients who have a high risk of IE:

1. Patients with a prosthetic valve or with prosthetic material used for cardiac valve repair
2. Patients that previously had IE
3. Patients with untreated cyanotic congenital heart disease
4. Any type of congenital heart disease repaired with a prosthetic material, up to 6 months after the procedure or lifelong if residual shunt or valvular regurgitation remains.

Antibiotic prophylaxis is not recommended in patients with moderate risk of IE or any disease of the natural valve. Patients at high and moderate risk for IE as well as all others should be advised about the importance of oral hygiene. Antibiotic prophylaxis is recommended for dental procedures that require manipulation of gingival tissue or per apical region of the teeth or perforation of the oral mucosa. These include: extraction, periodontal procedures, cleaning that causes gingival bleeding, placing implants and endodontic procedures.

Antibiotic prophylaxis is not recommended for local anesthetic injections in non-infected tissue, treatment of superficial caries, removal of sutures, placement or adjustment of removable prosthodontics or orthodontic appliances or braces, lips or oral mucosa trauma. Antibiotic prophylaxis is recommended for patients who are at high risk for IE only if planned dental interventions is of high risk (listed above) Recommended antibiotics and doses are listed in Table one.



**Tabela br 1.** Savetovana antibiotska profilaksa za bolesnike sa visokim rizikom od IE za stomatološke procedure od visokog rizika

**Table 1** Advised antibiotic prophylaxis for patients at high risk of IE for dental procedures with a high risk

	Antibiotik Antibiotic	Jedna doza 30-60 minuta pre intervencije Single dose 30-60 minutes before the procedure	
		Odrasli Adults	Deca Children
		Bez alergije na Penicilin No allergy to penicillin or ampicillin	Amoksicilin ili Ampicilin Amoksicilin or Ampicilin
Alergija na Penicilin Allergy to penicillin or ampicillin	Clindamycin Clindamycin	600 gr p.o. ili i.v. 600 gr orally or i.v.	20 mg/kg p.o. ili i.v. 20 mg/kg orally or i.v.

### Zaključak

Sve do sada navedeno podseća nas na važnost i značaj dobro uzete anamneze pre početka bilo koje stomatološke intervencije. Svi kardiovaskularni bolesnici treba da imaju dobru kontrolu svoje osnovne bolesti da bi mogli pristupiti stomatološkom lečenju. U fokusu su svakako antitrombocitna i antikoagulantna terapija u stomatologiji. Za većinu bolesnika nije potrebno korigovati ovu terapiju pre stomatoloških procedura. Mali je rizik za nastanak IE nakon stomatoloških procedura.

### Conclusion

The importance of the well-taken medical history is crucial before starting the dental treatment. All cardiovascular patients should be adequately treated and should be under the supervision of the cardiologist prior to dental interventions. Special care is needed in patients under antiplatelet and anticoagulant therapy. The majority of patients under this therapy do not need changing of their therapy before dental intervention. Infective endocarditis after dental interventions is very rare and antibiotic prophylaxis is reserved for high risk dental interventions in high risk patients.

## LITERATURA / REFERENCES

1. World Health Organization. Obesity: preventing and managing the global epidemic. Geneva, Switzerland: World Health Organization; 2000.books.google.com.
2. Smyth E, Caamano F, Fernandez-Riveiro P. Oral health knowledge, attitudes and practice in 12-year-old schoolchildren. *Med Oral Patol Oral Cir Bucal* 2007; 12(8): E614-E620.
3. Humphrey LL, Fu R, Buckley DI, Freeman M, Helfand M. Periodontal disease and coronary heart disease incidence: a systematic review and metaanalysis. *J Gen Intern Med* 2008; 23(12): 2079-86.
4. Khader YS, Albashaireh ZS, Alomari MA. Periodontal diseases and the risk of coronary heart and cerebrovascular diseases: a meta-analysis. *J Periodontol* 2004; 75(8): 1046-53.
5. Guidelines on the management of stable angina pectoris: executive summary: The Task Force on the Management of Stable Angina Pectoris of the European Society of Cardiology. *Eur. Heart J.*, June 2006; 27: 1341 – 1381.
6. De Backer G, Ambrosini E, Borch-Johnsen K, Bartons C, Cifkova R, Dallongville J et al. European guidelines on cardiovascular disease prevention in clinical practice: third joint task force of European and other societies on cardiovascular disease prevention. *Eur J Cardiovasc Prev Rehabil* 2003;10:S1-S10.
7. Mancia G, Fagard R, Narkiewicz K. The Task Force for the management of arterial hypertension of the European Society of Hypertension (ESH) and of the European Society of Cardiology (ESC). *European Heart Journal* 2013; 34: 2159–2219.
8. K. M. Habbab, D. R. Moles, and S. R. Porter. Potential oral manifestations of cardiovascular drugs. *Oral Diseases* 2010; vol. 16, no. 8, pp. 769–773.
9. Pamplona MC , Soriano YJ , Sarrión-Pérez MG. Dental considerations in patients with heart disease *J Clin Exp Dent*. 2011;3(2):e97-105.
10. Margaix-Muñoz M, Jiménez-Soriano Y, Poveda-Roda R, Sarrión G. Cardiovascular diseases in dental practice. Practical considerations. *Med Oral Patol Oral Cir Bucal*. 2008; 13: 296-302.
11. Pedersen PH, Avlund K, Morse DE, Stoltze K, Katz RV, Viitanen M, Winblad B. Dental caries, periodontal disease, and cardiac arrhythmias in community-dwelling older persons aged 80 and older: is there a link? *J Am Geriatr Soc*. 2005 Mar;53(3):430-7.
12. Muzyka BC. Atrial Fibrillation and its relationship to dental care. *J Am Dent Assoc*. 1999; 130:1080-5.
13. Lifshay FM. Evaluation of and Treatment Considerations for the Dental Patient with Cardiac Disease. *NYSDJ*. 2004;70(8):16-9.
14. Ponikowski P, Voors AA, Anker S et al. The task force for the diagnosis and treatment of acute and chronic heart failure of the European Society of Cardiology. *European Heart Journal*: first published online 20 may 2016;37(27):2129-200.
15. Napenas JJ, Hong CH, Brennan MT, et al. The frequency of bleeding complications after invasive dental treatment in patients receiving single and dual antiplatelet therapy. *J Am Dent Assoc* 2009;140(6):690-5.
16. Heidbuchel H, Verhamme P, Alings M, et al. Updated European Heart Rhythm Association Practical Guide on the use of non-vitamin K antagonist anticoagulants in patients with non-valvular atrial fibrillation. *Europace* 2015;17(10):1467-507.
17. Elad S, Marshall J, Meyerowitz C, Connolly G. Novel anticoagulants: general overview and practical considerations for dental practitioners. *Oral Dis* 2016;22(1):23-32.
18. Habib G, Lancellotti P, Antunes MJ et al. The Task Force for the Management of Infective Endocarditis of the European Society of Cardiology *European Heart Journal* 2015; 36: 3075–3123.
19. Lockhart PB, Brennan MT, Sasser HC, Fox PC, Paster BJ, Bahrani-Mougeot FK. Bacteremia associated with tooth brushing and dental extraction. *Circulation* 2008;117:3118–3125.
20. Veloso TR, Amiguet M, Rousson V, Giddey M, Vouillamoz J, Moreillon P, Entenza JM. Induction of experimental endocarditis by continuous low-grade bacteremia mimicking spontaneous bacteremia in humans. *Infect Immun* 2011;79: 2006–2011.
21. Van der Meer JT, Van Wijk W, Thompson J, Vandenbroucke JP, Valkenburg HA, Michel MF. Efficacy of antibiotic prophylaxis for prevention of native-valve endocarditis. *Lancet* 1992;339:135–139.
22. Lacassin F, Hoen B, Leport C, Selton-Suty C, Delahaye F, Goulet V, Etienne J, Briancon S. Procedures associated with infective endocarditis in adults. A case control study. *Eur Heart J* 1995;16:1968–1974.
23. Strom BL, Abrutyn E, Berlin JA, Kinman JL, Feldman RS, Stolley PD, Levison ME, Korzeniowski OM, Kaye D. Dental and cardiac risk factors for infective endocarditis. A population-based, case-control study. *Ann Intern Med* 1998;129: 761–769.
24. Duval X, Alla F, Hoen B, Danielou F, Larrieu S, Delahaye F, Leport C, Briancon S. Estimated risk of endocarditis in adults with predisposing cardiac conditions undergoing dental procedures with or without antibiotic prophylaxis. *Clin Inf Dis* 2006;42:102–107.