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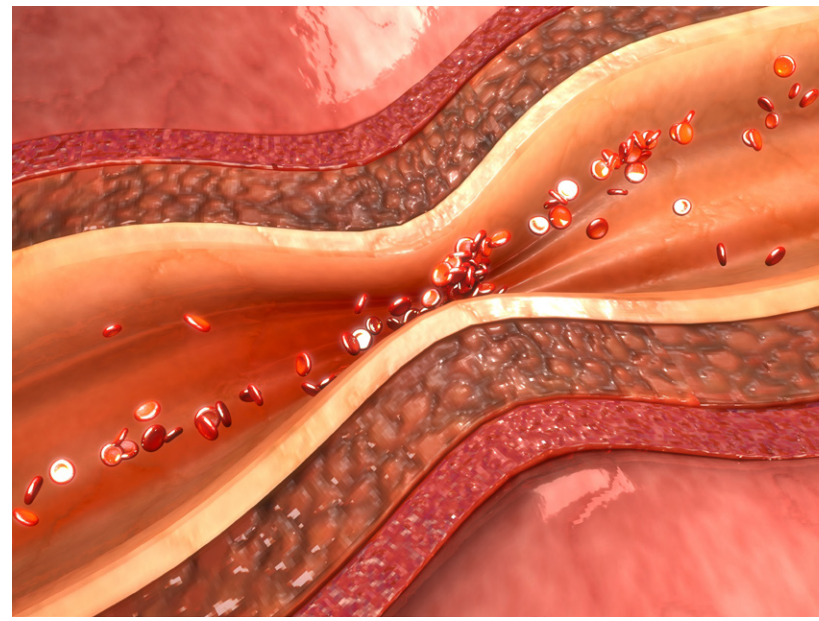

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Management of dental patients with coronary vasospasm

A PEER-REVIEWED ARTICLE | by Kandice Swarthout, RDH, LPC

ABSTRACT

Coronary vasospasm is considered a rare cardiac condition in the world of cardiology, but recent research and expanded dialogue in the medical community are beginning to show that coronary vasospasm may be more widely experienced and underdiagnosed. Many dental implications can arise with affected patients. Dental considerations include stress management; psychological experiences for the patient; use of proper and safe anesthesia; medical complications in the dental chair; oral manifestations of cardiac medications; and drug interactions. Knowledge expansion of dentists and dental hygienists for patients with coronary vasospasm is crucial in globally recognizing this condition and safely treating a compromised population.

EDUCATIONAL OBJECTIVES

Upon completion of this course, the dental professional should be able to:

1. Define coronary vasospasm
2. Describe the epidemiological factors of coronary vasospasm
3. List symptoms, diagnosis, and treatment of coronary vasospasm
4. Identify who is at risk for coronary vasospasm
5. Describe medical complications and management in the dental chair

Coronary vasospasm defined

A variety of terms identifies coronary vasospasm. The original name, "Prinzmetal's angina," was coined in the mid-1950s when Dr. Myron Prinzmetal and others published their initial observations of patients with an irregular type of angina pectoris.[1] Since those early days of discovery, Prinzmetal's angina has established an assortment of designations as research sheds light on the condition. It is also referred to as vasospastic angina, coronary artery spasm (CAS), and variant angina.[2] These terms are used interchangeably in the research and, if not well understood, could confuse the reader. For consistency, this article will use the term *coronary vasospasm* to describe this condition.

Coronary vasospasm is defined as "a focal spasm of one or more coronary arteries, without clinically significant atherosclerosis or atherosclerotic plaque."[3] One or more coronary arteries go into spasm and occlude blood flow. Coronary vasospasm can be comorbid with other coronary diseases, but it usually happens without the presence of significant atherosclerotic blockage. This can be

differentiated only through cardiac angiography, a procedure that uses radiographic imaging to see the heart's blood vessels.[3] Spasms of the coronary arteries induce anginal symptoms and temporary ischemia.[3] Typically, angina is described as heaviness, pain, or pressure in the chest brought on by exercise, stress, or other stimuli.[4] However, coronary vasospasm offers a unique feature in that chest discomfort or altered sensation in the chest is most experienced during rest or ordinary activity, not during exertion.[5]

Ischemia occurs when there is a reduction of blood flow to the heart. This prevents the heart muscle from receiving enough oxygen and can result in a partial or complete blockage, which, in turn, could lead to a heart attack (muscle death), syncope (temporary loss of consciousness caused by a fall in blood pressure), or irregular heart rhythms.[5,6] When ischemia is indicated in coronary vasospasm in patients with no coronary blockage, it is referred to as ischemia with nonobstructed coronary arteries (INOCA).[7] If a heart attack occurs under these ischemic circumstances, it is called myocardial infarction with nonobstructed coronary arteries (MINOCA).[8] MINOCA is a heterogeneous, nonbenign group of vascular syndromes encompassing coronary vasospasm. Patients will present with elevated troponins (cardiac enzymes that are elevated following heart damage such as a heart attack) and little or no blockage on angiogram.[8]

Ischemic disorders (INOCA and MINOCA) occur in patients with coronary vasospasm and coronary microvascular dysfunction (CMD).[9] CMD resembles coronary vasospasm in many symptoms and clinical signs. The major exception is that in microvascular angina, the small vessels of the heart are affected with abnormal constriction and dilation.[9] Coronary vasospasm affects the macrovascular system of the heart. It is estimated that three to four million people in the United States live with INOCA and have a cardiac death rate of 17%.[9] Though this paper focuses on patients with macrospasm, microspasm may occur comorbidly and result in similar consequences.[2,9]

Symptoms of Coronary Vasospasm[2]

Angina (chest discomfort)
Angina at rest
Shortness of breath
Heaviness in the chest
Extreme fatigue
Light-headedness
Pain in the jaw, shoulders, face, neck, arms, and hands
Cold sweats
A sense of unease or doom

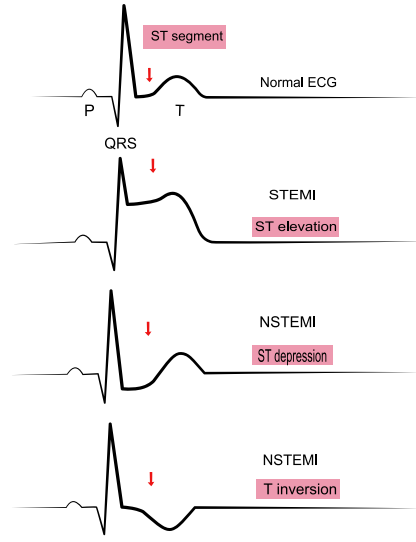

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FIGURE 1. Normal ST segment versus elevated or depressed[13,14]

Symptoms and clinical features

One of the most common symptoms of coronary vasospasm is angina (chest discomfort).[10] Angina experienced by patients with coronary vasospasm typically happens during rest and most often between midnight and 5:00 a.m. but can occur any time of day or night.[10] This at-rest clinical manifestation is a feature that differentiates coronary vasospasm from other cardiac-related issues.[10] Patients with vasospasm describe chest pain as discomfort, aching, pressure, burning, dullness, radiating, or constrictive.[4] The pain occasionally arises with vasovagal symptoms (the body's overreaction to certain triggers) such as nausea, vomiting, and cold sweats.[10] The distress may also radiate to the arm, jaw, back, shoulders, and neck. The intensity of the pain is often severe but can vary from mild to severe.[11] These events may bring on feelings of uneasiness, anxiety, dizziness, fatigue, and shortness of breath **(see box above)**.[2,12] Bouts are accompanied by ST segment elevations with reciprocal depression on an electrocardiogram. ST segments on an EKG correspond with major coronary arteries. Temporary elevation of the ST segment with reciprocating depressions indicates that someone is in ischemia.[5] See **figure 1** as an example of a normal ST segment versus elevated or depressed.[13,14]

In silent ischemia, spasms are not accompanied by angina.[10] Patients may experience ischemia without any physical warnings, and it is believed that it occurs two times as often as spasms with angina. This poses a risk of further manifestations as the patient may not be aware of the problem and not seek medical treatment.[10] With or without angina, these episodes can be of varying lengths. Chronic episodes of spasms can occur in clusters that last from five to 15 minutes.[15]

Epidemiology and pathophysiology

Coronary vasospasm incidence and prevalence are difficult to quantify as there is a limitation on the data due to under- or misdiagnosis in part by a lack of elevated troponin levels.[3] It is reported that, from a database of 400,000 symptomatic (angina) patients in the US who underwent angiography, 59% had no evidence of coronary artery disease or blockage. These findings do

not prove vasospasm in the "healthy" set.[7,10] Still, they suggest that half of the patients experiencing chest pain with no coronary disease on angiography could suffer from coronary vasospasm, resulting in a misdiagnosis.[7,10]

Though coronary vasospasm is seen broadly among all races and ethnicities, it seems to have the most profound impact on the Japanese population at 24.3%. It occurs in men and women, with an increased incidence in women and usually affects people between the ages of 40 and 70.[10,11]

The cause of coronary vasospasm is multifactorial and not entirely understood. Endothelial dysfunction is an associating factor in the etiology due to the possibility of insufficient release of nitric oxide (N_2O).[5,10,16] This colorless gas encourages smooth muscle relaxation and vascular dilation. The lack of N_2O creates a chain of events that result in constriction of the coronary arteries.[5,10,16]

Chronic inflammation from smoking, obesity, and other factors has been identified as having a possible relationship to coronary vasospasm.[10] Oxidative stress may play a part in a patient who is deficient in vitamins C and E.[10] The genetic influence is believed to be due to polymorphisms or mutations for a variety of enzymes, receptors, and mediators that play a role in the pathogenesis of coronary vasospasm. Some susceptible genes have been identified, but the role of family history has not. Therefore, the mutations are considered environmental.[10]

It is believed that there is a complex relationship between coronary vasospasm and the autonomic nervous system.[10,16] The autonomic nervous system can be divided into two parts: parasympathetic and sympathetic.[17] The parasympathetic nervous system is mainly responsible for downregulating or "turning things down." The sympathetic nervous system houses the fight, flight, or freeze response and "turns things up."[17] Therefore, the autonomic nervous system is either excitatory or repressive.[17] Under normal conditions, these two systems work in harmony. An imbalance between sympathetic and parasympathetic tone can be a catalyst for exaggerated vasoconstriction.[10,16] The imbalance triggers the sympathetic nervous system during rest or REM sleep, when the parasympathetic nervous system is supposed to be activated. The disturbance or enhanced activity of the parasympathetic system stimulates coronary spasms.[5,10,16] Other possible causal factors include genetics, magnesium deficiency, smooth muscle hypercontractility, and microvascular dysfunction.[5,10]

Risk factors that can exacerbate an anginal or ischemic episode for a coronary vasospasm patient include:[2,7]

- Chronic smoking/vaping
- Extreme temperatures (especially cold)
- Trigger foods such as sugar, caffeine, artificial sweeteners
- Alcohol
- Cannabis
- Lack of quality sleep
- Chronic stress
- Acute emotional or mental distress
- Medications such as beta blockers, antidepressants, antimigraine, chemotherapy, diet pills, and some cold remedies.[2,7]

A COVID-19 link

According to the World Health Organization, there were more than 500 million cumulative cases worldwide of the novel coronavirus COVID-19 from March 2020 through July 2022.[18] Though COVID-19 is usually considered a respiratory infection, research has uncovered more extensive systemic damage. Evidence points to the development of endothelial dysfunction due to a cytokine storm while infected with COVID-19.[19] Cytokines are proteins that help control inflammation. When there are too many, excess inflammation and autoimmune disorders can arise. Cytokine storms are a response to an overwhelming release of pro-inflammatory proteins due to a host immune response from a virus, bacterium, malignancy, or other stimuli.[20]

Also, microvascular dysfunction has been noted in patients during a COVID-19 infection.[19] This could explain the increase in reports of MINOCA during COVID-19. However, this does not prove causality but establishes a possible connection to coronary vasospasm following a bout with COVID-19.[19] Though more research is needed to make the connection between coronary vasospasm and COVID-19, this information may be valuable to health-care providers when exploring a diagnosis.[19]

Diagnosis

Because the spasms, or spontaneous squeezing of the coronary arteries, occur at rest, are unpredictable, and thought to be uncommon, coronary vasospasm can be challenging to diagnose or missed through common cardiac assessments such as an EKG echocardiogram or stress test.[16,21] Though an EKG may show elevated ST segments, undiagnosed patients visiting the emergency room are often sent home with a stress and anxiety reduction protocol. This is not only frustrating and frightening for the patient suffering from undiagnosed coronary vasospasm but also potentially life-threatening. The patient could be at risk for a cardiovascular event such as MINOCA, heart failure, ventricular tachycardia (fast heart rate in the heart's lower chambers), ventricular fibrillation (abnormal heart rhythm), stroke, or death.[9,22]

The most reliable method of diagnosing coronary vasospasm is through the provocation of spasms during a cardiac angiogram.[10] An angiogram is a special x-ray of the coronary arteries. A small tube is inserted through the groin or wrist and maneuvers into the heart. A

contrasting agent is released by a catheter to make the arteries visible on examination.[4] Once the catheter is in place, the spasms are provoked by injection of substances such as ergonovine or acetylcholine. When the substance is injected, the arteries will spasm, confirming the diagnosis.[10] This can pose several risks during testing, such as arrhythmias, hypertension, hypotension, nausea, vomiting, and abdominal cramps.[21] Therefore, this evaluation must be done only by a skilled cardiologist knowledgeable in administering such tests.

Treatment and medical management

There is no set protocol for treating coronary vasospasm. It is often approached with a trial-and-error method until the correct medication(s) works for an individual patient.[2,7] Common medical interventions are calcium channel blockers; long-lasting nitrates such as tablets, patches, or IVs; short-acting nitrates such as sublingual tablets; statins; and low-dose aspirin.[2,3] More aggressive approaches include coronary stents and implanted defibrillators.[3]

Some patients will participate in cardiac rehabilitation and exercise and behavioral training.[3] Coronary vasospasm patients are strongly encouraged to adopt a healthy lifestyle focusing on stress management. Recommended strategies include a healthy diet, exercise, weight loss or maintenance, smoking cessation, alcohol reduction, mindfulness practices, and proper management of other health conditions.[5,7] Many patients take L-arginine as a supplement. L-arginine is an over-the-counter vasodilator that assists in the production of nitric oxide, which has been reported to reduce constriction of the arteries.[23]

The dental appointment

Though the incidence of medical emergencies is low in the dental setting, dental providers should be diligent in obtaining comprehensive medical histories of every patient, with attention to potential medical emergencies, oral manifestations, and drug interactions.[24,25] As the population ages and dental patients present with more complicated medical histories, dental professionals should be prepared to properly manage medical emergencies in the dental chair.[25] A dental professional educated on vasospasm can be a key collaborative player in the patient's overall health and wellness.

Medical complications in the dental chair

Once believed that syncope was the most prevalent emergency in the dental chair, further research shows that cardiac events are becoming more predominant.[25] One study showed that 53% of dental students surveyed considered themselves "totally or sufficiently qualified to carry out basics of CPR."[26] When these students were asked to perform CPR in a simulation exercise, only two out of 76 were able to display adequate technique.[26] None of the surveyed dental students could identify a cardiac event during the exercise.[26]

In another study of 800 dental students, only 15% of the subjects would proceed with CPR and call 911 if a patient were to go into cardiac arrest.[27] This eye-opening sample is a reminder of the importance of regular refresher courses on medical emergencies in the dental office and perhaps an indication that more intense training is needed as basic life support skills diminish after a few months when not routinely practiced.[27]

Recognizing and managing cardiac events is especially important when treating patients suffering from coronary vasospasm as these events can occur at rest or under stress.[10] As described above, the primary symptom of coronary vasospasm is angina.[10] Unfortunately, many dental professionals lack training in recognition of the signs of angina and ischemia.[27] Many patients with a confirmed vasospasm diagnosis are well versed in proper action steps when angina occurs. Questioning a patient with coronary vasospasm before treatment as to how they can be assisted during an attack can reduce or eliminate confusion and prepare the clinician to act if needed. Therefore, a thorough health history and the recording of vital signs must be conducted at each dental appointment.[27]

While it is recommended that dental offices maintain an up-to-date emergency kit that contains nitroglycerin, many coronary vasospasm patients diligently carry their own. Dental professionals should be trained on the administration of nitroglycerin in the event of an emergency.[27] Nitroglycerin is available in extended-release capsules, patches, fast-acting sprays, tablets, and powders. Extended-release tablets and patches are meant to be taken daily on a specific schedule for prevention. Rapid-acting oral/sublingual doses are used as needed when there is breakthrough angina not controlled by other medications.[28]

If the patient is prescribed a rapid-acting nitroglycerin, the clinician could request that the patient make it readily available by removing it from a bag or pocket. The clinician should also have easy access to the office's emergency kit that houses the medication.[27] When the patient feels an anginal attack coming on, ask them to be seated if standing. Supplemental oxygen can be administered.[29] The patient will place a sublingual tablet or spray under the tongue or in the vestibule. Sublingual spray is easier to administer in the event of an emergency. Sublingual tablets should never be chewed or crushed.[28] Both the tablet and spray should give the patient relief within five minutes. If the pain does not subside, a second dose may be taken after five minutes. If there is still pain after

another five minutes, a third dose may be administered. Following the third dose, if pain persists, the clinician should contact 911.[28]

The dental provider needs to be aware that following fast-acting nitroglycerin, an episode of spasms, dizziness, fainting, and mild to severe headache may occur.[28,30] Lower the chair so the patient is in the supine or Trendelenburg position and guide the patient through taking slow deep breaths through the nose. The dizziness should pass within a few minutes.[26,28] If fainting occurs, manage the airway, administer oxygen, keep the patient in the supine position for 10 minutes after recovery, and activate EMS if necessary.[29]

Local anesthesia and sedation considerations

Dental anesthesia protocol specifically for patients with coronary vasospasm is poorly defined in the literature. Local anesthesia in the proper doses appears safe for patients with controlled cardiovascular disease.[31,32] In addition, several studies conclude that anesthesia containing vasoconstrictors used on patients with controlled cardiovascular disease proved safe, and the increase in heart rate and blood pressure was clinically insignificant.[31] Though plain local anesthetic (no epinephrine) is recommended for patients with angina, modest amounts of a vasoconstrictor may be used when necessary. Greater quantities may be tolerated but also increase the risk to the patient.[29,31,33] However, this information is based on patients with typical stable angina. When treating a patient with coronary vasospasm, it is essential to remember that angina is caused by squeezing or spasms of the arteries and can be easily triggered by various stimuli.[3] It is of the utmost importance to assess each case individually and collaborate closely with the patient's cardiologist before considering anesthesia with vasoconstrictors or nitrous oxide and oxygen (N_2O–O_2).

Dental fear and stress reduction protocol

Patients diagnosed with coronary vasospasm may suffer with mild to severe dental anxiety. Real patient accounts describe a potentially lengthy and frustrating journey not only to obtain a vasospasm diagnosis, but also describe anxiety-provoking events in the attempt to find proper medical care and treatment.[2] Patients may also be dealing with major life-changing events to manage the condition. For many, it is recommended to change to a less stressful occupation, take more breaks during the day, and sometimes stop other activities that bring them joy, such as exercise.[33] This can pose a major adjustment emotionally and psychologically for individuals. When patients have not been cared for in the medical system by trauma-informed clinicians, the potential for distrust, apprehension, and fear of treatment is a possibility.[34]

Acute emotional or stressful situations often trigger vasospasms.[7] A visit to the dental office could trigger emotional stress and set off a vasospastic attack. The dental clinician should approach the patient with compassion and maintain a peaceful environment.[35] Cardiac patients may need stress-reducing protocols during the visit such as short appointments during the time of day in which the spasms are the least active, the use of N_2O–O_2 if cleared by the collaborating cardiologist, offering the patient a blanket if they feel cold, a trauma-informed trained clinician who is skilled in managing dental anxiety, and collaboration and mutuality from the provider.[7,32,35] Helping patients feel calm and relaxed can reduce the chances of a cardiac event.

Oral manifestations of coronary vasospasm medications

Common medications for vasospasm patients that may pose an oral manifestation risk include calcium channel blockers, nitroglycerin spray or sublingual tablet, and low-dose aspirin.[3]

Calcium channel blockers: Calcium channel blockers (CCB) such as amlodipine, diltiazem, and verapamil are one of the most common cardiac drugs given to coronary vasospasm patients that significantly impact oral health.[3,36] A complex cellular interaction process with CCBs results in a high incidence in patients with gingival enlargement.[36,37] Signs of CCB-induced gingival enlargement can be seen within one to three months of beginning the medication.[37] The gingival changes can present as a mild increase in gingival papillae to severe enlargement affecting the papillary and marginal tissues.[37] These tissue changes result in pockets harboring pathogenic biofilm, negatively affecting home care and increasing susceptibility to infection and periodontal disease.[37]

The severity of gingival enlargement is directly correlated with the patient's level of oral hygiene.[37] Poor oral hygiene will worsen CCB-induced enlargement. Educating the patient on proper home care is imperative for coronary vasospasm patients taking CCBs.[37] Nonsurgical periodontal therapy may be an appropriate treatment for mild to moderate gingival overgrowth, while surgical intervention may be necessary for more severe cases.[37] Recurrence is possible within three to six months after surgical and nonsurgical therapies. Impeccable oral hygiene is vital for these patients.[37]

Oral nitroglycerin: Oral nitrates, such as sublingual nitroglycerine tablets or spray, are commonly taken.[38] Some patients take nitroglycerin in these forms several times a day to relieve the pain of vasospasms. Oral manifestations include xerostomia and blistering and peeling of the skin.[38] Though the literature does not identify blistering and peeling of the skin as side effects limited to the dermis or the oral cavity, there are anecdotal reports from individuals on online

forums using sublingual nitroglycerin tablets and spray that describe oral tissue burning, blistering, and throbbing after contact with the medication.[38] The clinician could consider recommending a gentle, alcohol-free, sulfate-free, dye-free toothpaste and mouthrinse or products known to treat xerostomia. Consider removing any oral hygiene products that may be harsh on the oral mucosa.

A patient taking nitroglycerin should be advised to store it in a cool, dark place (in its original bottle) and avoid alcohol. A bottle of nitroglycerin carried in a pocket or too close to the body may deactivate it due to increased temperatures.[39] Remember that nitrates can cause hypotension, leading to marked dizziness, light-headedness, syncope, or headache, and the patient should be advised to stay seated for a few minutes after the dental chair is raised and to get up slowly.[39]

Aspirin therapy: It is commonly known among dental professionals that aspirin may increase bleeding during dental procedures. Many patients with coronary vasospasm take daily doses of aspirin. Increased bleeding should be expected but not clinically significant with doses £325 mg. Modification of the patient's aspirin regimen is not required.[33]

With the awareness and diagnosis of coronary vasospasm on the rise, it is becoming more likely that a dental professional will need to be well versed in treating these individuals. Acquiring a complete health history and vitals, awareness of oral and systemic medication manifestations, knowledge of proper anesthesia, ability to manage a cardiac medical emergency and to proceed with empathy are of utmost importance for patients with coronary vasospasm. In addition, dental professionals must work collaboratively with the patient's cardiologist. The collaborative efforts between the dental and cardiology teams could assist in the ease of patient management, provide positive dental treatment outcomes, and be a matter of life or death for the patient.

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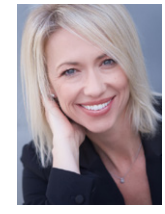

Kandice Swarthout, RDH, LPC, is a licensed professional counselor and registered dental hygienist. She is a full-time dental hygiene educator in Texas. Kandice is the owner of Inspired Education & Wellness, where she is a speaker, writer, and private practice therapist. She combines her clinical dental and mental health experience to help other health-care professionals have a fulfilling work-life experience. Kandice is an approved provider under Texas Health and Human Services for human trafficking training for health-care professionals. Read her articles in *DentistryIQ*, *Today's RDH*, and her blog on Facebook, Fearless Compassion: Stories of Personal Triumph. Contact Kandice at kandiceswarthout.com or on social media @thecounselorhygienist.

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1. Coronary vasospasm is also referred to as:
   - A. Prinzmetal angina
   - B. Coronary artery spasm
   - C. Vasospastic angina
   - D. All of the above

2. Differential diagnoses for coronary vasospasm can be ruled out via:
   - A. Blood tests
   - B. Angiography
   - C. Ultrasound
   - D. Urine sample

3. Coronary vasospasm affects:
   - A. The macrovascular system of the heart
   - B. The microvascular system
   - C. Cardiac beats per minute
   - D. Cardiac valves

4. Which of the following symptoms can be associated with coronary vasospasm?
   - A. Arm/jaw pain
   - B. Anxiety
   - C. Angina
   - D. All of the above

5. Patterns of chronic spasm episodes can occur in clusters that last:
   - A. 5–15 minutes
   - B. 45 minutes–1 hour
   - C. 5–10 hours
   - D. 2–3 minutes

6. Spasms are defined as:
   - A. Squeezing of the ventricles
   - B. Dilation of the coronary arteries
   - C. Squeezing of the coronary arteries
   - D. Squeezing of the aorta

7. During the diagnostic process, ___ is injected to provoke spasms.
   - A. Acetylcholine
   - B. Gadolinium
   - C. Epinephrine
   - D. Iodine

8. According to data, coronary vasospasm seems to have a profound impact on which population?
   - A. Black women
   - B. Japanese patients
   - C. Hispanic men
   - D. Middle-aged Caucasians

9. At what age does coronary vasospasm typically affect patients?
   - A. 20–30
   - B. 70+
   - C. 30–40
   - D. 40–70

10. Risk factors that can exacerbate an anginal or ischemic episode for a CV patient include all of the following except:
   - A. Smoking
   - B. Autoimmune disease
   - C. Extreme stress
   - D. Cannabis

11. What time of the day does angina experienced by patients with coronary vasospasms most often occur?
   - A. When the patient first wakes up
   - B. Between midnight and 5:00 a.m.
   - C. Between noon and 5:00 p.m.
   - D. 8:00 p.m.

12. It is believed that silent ischemia occurs ___ more often than spasms with angina.
   - A. 2x
   - B. 5x
   - C. 10x
   - D. 12x

13. Which of the following is a possible causal factor for coronary vasospasm?
   - A. Genetics
   - B. Magnesium deficiency
   - C. Endothelial dysfunction
   - D. All of the above

14. All of the following medications can exacerbate an anginal episode for a coronary vasospasm patient except:
   - A. Calcium channel blockers
   - B. Beta blockers
   - C. Diet pills
   - D. Chemotherapy

15. If left undiagnosed, a patient with coronary vasospasm can be at risk for:
   - A. Heart failure
   - B. Ventricular tachycardia
   - C. Stroke
   - D. All of the above

16. In the dental setting, when a patient feels an anginal attack coming on, the clinician should:
   - A. Advise the patient to stand up
   - B. Advise the patient to sit down
   - C. Place the patient in a supine position
   - D. Place the patient in a Trendelenburg position

17. Sublingual nitroglycerin tablets should never be:
   - A. Kept in a dark, cool place
   - B. Taken out of the patient's pocket or purse during treatment
   - C. Chewed or crushed
   - D. Placed under the tongue until dissolved

18. During an anginal attack in the dental office, how many doses of nitroglycerin tablets or spray can be administered before contacting 911?
   - A. 1
   - B. 2
   - C. 3
   - D. 4

19. Which of the following are stress reduction protocols appropriate for patients with coronary vasospasm?
   - A. Use of trauma-informed care by the dental clinician
   - B. Short appointments
   - C. N_2O–O_2 if cleared by the cardiologist
   - D. All of the above

20. In the dental office, which of the following is not appropriate for the care of patients with coronary vasospasm?
   - A. Monitoring vitals
   - B. Acquiring a complete health history
   - C. Proceeding with empathy
   - D. Assuming chest pain is just stress and will go away

21. Local anesthesia in proper doses is safe for patients with:

A. Nitroglycerin tablets in their possession
B. A recent history of MI
C. Calcium channel blocker interventions
D. Controlled cardiovascular disease

22. Calcium channel blockers are known to cause:

A. Osteonecrosis
B. Thinning of enamel
C. TMJ disorders
D. Gingival enlargement

23. Which can deactivate nitroglycerin medication?

A. Increased temperatures
B. Decreased temperatures
C. Dropping the bottle
D. Oxygen exposure

24. Which of the following is not a recommended medication for patients with coronary vasospasm?

A. Beta blockers
B. Calcium channel blockers
C. Nitroglycerin
D. Low-dose aspirin

25. Calcium channel blocker-induced gingival enlargement can be seen within ___ of beginning medication.

A. 2 days
B. 1–2 weeks
C. 1–3 months
D. 5 minutes

26. According to patient reports, which of the following is not a reported oral manifestation of nitroglycerin?

A. Gingival hyperplasia
B. Blistering
C. Burning
D. Throbbing

27. Which of the following is not appropriate treatment for calcium channel blocker-induced gingival enlargement?

A. Systemic antibiotics
B. Nonsurgical periodontal therapy
C. Oral hygiene education
D. Surgical periodontal therapy

28. What is a dental consideration for patients who are taking nitroglycerin?

A. Nitrates can cause hypotension, dizziness, and syncope.
B. Patients should not take nitroglycerin before dental appointments.
C. Gingival overgrowth can occur while taking nitroglycerin.
D. None of the above

29. Which of the following should be advised to patients taking nitroglycerin?

A. Take nitroglycerin only at bedtime.
B. Store nitroglycerin in a cool and dark place.
C. Take nitroglycerin with meals.
D. Do not take nitroglycerin while taking vitamins.

30. What is a dental consideration for aspirin therapy?

A. Nausea
B. Excessive blood clotting
C. Light-headedness
D. Increased bleeding

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Management of dental patients with coronary vasospasm

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EDUCATIONAL OBJECTIVES

1. Define coronary vasospasm
2. Describe the epidemiological factors of coronary vasospasm
3. List symptoms, diagnosis, and treatment of coronary vasospasm
4. Identify who is at risk for coronary vasospasm
5. Describe medical complications and management in the dental chair

COURSE EVALUATION

1. Were the individual course objectives met?

   Objective #1: Yes No Objective #3: Yes No Objective #5: Yes No

   Objective #2: Yes No Objective #4: Yes No

Please evaluate this course by responding to the following statements, using a scale of Excellent = 5 to Poor = 0.

2. To what extent were the course objectives accomplished overall? 5 4 3 2 1 0
3. Please rate your personal mastery of the course objectives. 5 4 3 2 1 0
4. How would you rate the objectives and educational methods? 5 4 3 2 1 0
5. How do you rate the author's grasp of the topic? 5 4 3 2 1 0
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8. Please rate the usefulness and clinical applicability of this course. 5 4 3 2 1 0
9. Please rate the usefulness of the references. 5 4 3 2 1 0
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11. Would you take a similar course on a different topic? Yes No
12. If any of the continuing education questions were unclear or ambiguous, please list them.

    _____

13. Was there any subject matter you found confusing? Please describe.

    _____

14. How long did it take you to complete this course?

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15. What additional dental continuing education topics would you like to see?

    _____

    _____

Mail/fax completed answer sheet to:

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5.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	20.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
6.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	21.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
7.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	22.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
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9.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	24.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
10.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	25.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
11.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	26.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
12.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	27.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
13.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	28.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
14.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	29.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
15.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	30.	Ⓐ	Ⓑ	Ⓒ	Ⓓ

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