

ACUTE CARDIOVASCULAR EMERGENCIES: PREVENTION, DIAGNOSIS AND DENTAL MANAGEMENT

EMERGÊNCIAS CARDIOVASCULARES AGUDAS: PREVENÇÃO, DIAGNÓSTICO E MANEJO ODONTOLÓGICO

Raquel D'Aquino Garcia Caminha,¹
Aloizio Premoli Maciel,¹
Frederico Buhatem Medeiros,²
Paulo Sérgio da Silva Santos¹

1. Department of Surgery, Stomatology, Pathology and Radiology, Faculdade de Odontologia de Bauru, Universidade de São Paulo, São Paulo, Brazil.

2. Department of Dentistry, Sociedade de Cardiologia do Estado de São Paulo (SOCESP).

Correspondence:
Paulo Sérgio da Silva Santos
Alameda Otavio Pinheiro Brisolla,
n° 9-75, Vila Universitária, Bauru, SP,
Brazil. paulosss@fob.usp.br

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ABSTRACT

Acute cardiovascular emergencies are cardiac complications with high mortality rates, and can occur during the dental care of cardiac patients. To contribute to the prevention, diagnosis and dental management of acute cardiovascular emergencies during dental treatment, through an integrative review. A detailed anamnesis, associated with measures of stress/anxiety control, are the main ways to prevent the occurrence of cardiac events in the dental office. During the crisis, a knowledge of the main signs and symptoms is fundamental in the differential diagnosis of acute heart diseases and once established, basic first aid should be given, activating the emergency services followed by the appropriate body positioning of the patient and administration of specific pharmacological protocols for each situation. The dental office must have the equipment needed to monitor the vital signs during the acute cardiovascular event, and ensure the availability of oxygen, so that the dental surgeon can initiate resuscitation protocols if the patient goes into cardiopulmonary arrest. Dental management of acute cardiovascular emergencies begins with specific preventive care, a correct diagnosis of acute cardiopathy, and correct management of cardiac complications that can occur during dental treatment, aiming to reduce the morbidity and mortality of these emergencies.

Keywords: Dental Care; Myocardial Infarction; Emergencies

RESUMO

As emergências cardiovasculares agudas são complicações cardíacas com altos índices de mortalidade e podem ocorrer durante o atendimento odontológico de cardiopatas. Contribuir com medidas de prevenção, diagnóstico e manejo odontológico de emergências cardiovasculares agudas durante o tratamento dentário através de uma revisão integrativa. A anamnese minuciosa associada a medidas de controle de estresse/ansiedade são as principais formas de prevenir a ocorrência de eventos cardíacos no consultório odontológico. Durante a crise, o conhecimento dos principais sinais e sintomas é fundamental no diagnóstico diferencial de cardiopatias agudas e, após estabelecido, devem-se iniciar os primeiros socorros básicos através do acionamento do serviço de emergência, seguido pelo posicionamento corporal adequado do paciente e administração dos protocolos farmacológicos específicos para cada situação. O consultório odontológico deve obrigatoriamente possuir os equipamentos necessários para monitorização dos sinais vitais durante o evento cardiovascular agudo e garantir a disponibilização de oxigênio para que o cirurgião-dentista possa iniciar os protocolos de ressuscitação caso o paciente evolua para uma parada cardiorrespiratória. O manejo odontológico das emergências cardiovasculares agudas inicia-se com cuidados preventivos específicos, realização do diagnóstico correto da cardiopatia aguda, tomada de conduta adequada das complicações cardíacas que possam ocorrer durante o tratamento odontológico, objetivando a diminuição da morbimortalidade dessas emergências.

Descritores: Cuidados Odontológicos; Infarto do Miocárdio; Emergências.

INTRODUCTION

According to the World Health Organization, cardiovascular diseases account for the highest percentage of deaths in the world¹⁻³ and occur mainly in low- and middle-income countries.¹

The main associated risk factors are smoking, alcoholism, obesity, hypertension, diabetes³, dyslipidemia, and genetic predisposition.¹ Acute cardiovascular diseases are usually

caused by arterial blockage that prevents adequate blood flow to the heart and can lead to death, if not adequately managed.^{1,4,5}

Several acute cardiac emergencies (ACEs) can occur during dental care,³⁻⁵ and the dental surgeon must identify them to provide adequate first aid^{4,6} and reduce the morbidity and mortality of patients.^{1,3-5} In Brazil, the medical emergencies that most frequently occur during dental care are pre-syncope, orthostatic hypotension, moderate allergic reactions, hypertensive crisis, asthma, vasovagal syncope, angina, convulsion, hypoglycemia, hyperventilation crisis, asphyxia, and stroke. The least frequently occurring emergencies are anaphylaxis, myocardial infarction, and cardiac arrest.⁵

Only few previous studies have focused on the prevention and dental management of ACE, so these are the most challenging medical complications for dental surgeons in terms of diagnosis and conduct.⁵ Through an integrative review, this article aimed to assist dental surgeons to prevent, diagnose, and intervene during an ACE in a dental office.

MATERIAL AND METHODS

Through an integrative review, this study collected data from selected articles and summarized the results obtained in an organized and standardized manner. To select articles, a search was performed in the following databases: PUBMED/MEDLINE, SCOPUS, WEB OF SCIENCE, EBSCO HOST, LILACS, and SCIELO, with the following keywords: "Dental Care AND Myocardial Infarction". According to MeSH, the

keyword "myocardial infarction" covers all types of ACE that we aimed to discuss in this article, such as "atrial fibrillation," "myocardial infarction," "cardiovascular stroke," "heart attack," and "heart rupture." The term "medical emergency" covers numerous complications that are not related to cardiac emergencies, such as anaphylaxis, epilepsy, hypoglycemia, and asthma crisis.

The inclusion criteria were as follows: 1) articles published in English and Portuguese; 2) articles on the diagnosis, dental management, and/or prevention of ACE; 3) articles available online; and 4) articles published from 2007 to 2018. The exclusion criteria were as follows: 1) articles not addressing the management, diagnosis, or prevention of ACE and 2) articles not published in English or Portuguese. To guide this study, the following was considered: type of ACE and dental management performed and/or preventive measure.

RESULTS

A total of 233 articles were found in the selected databases, of which 50 articles were found in Pubmed/Medline, 41 articles in Scopus, 42 articles in Web of Science, 95 articles in Ebsco Host, three articles in Lilacs and two articles in Scielo. Seven articles were selected for the final sample after applying the inclusion criteria established in the methodology (Figure 1).

The data obtained through the final sample of the selected articles were listed and summarized in Table 1 in chronological order.

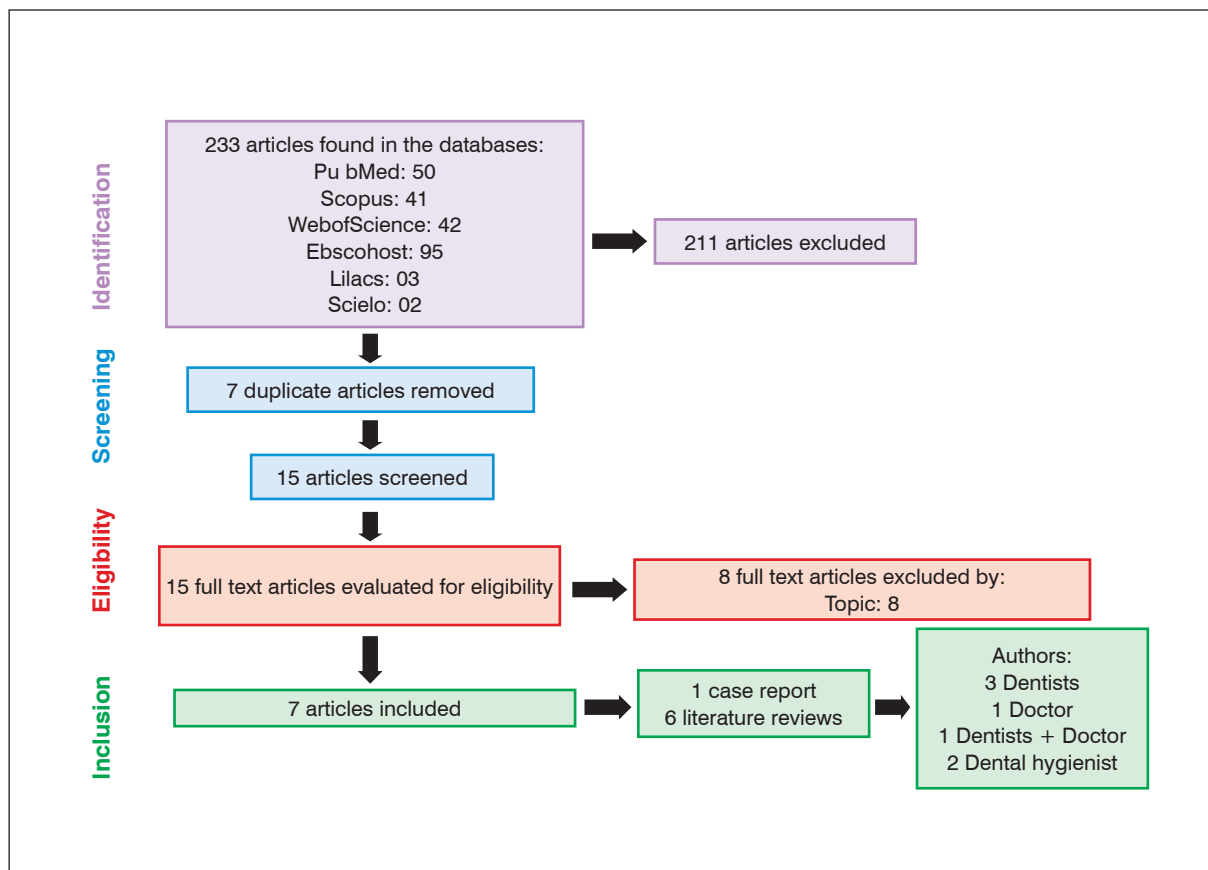


Figure 1. Flowchart of articles found in the PubMed, Scopus, Web of Science, Ebsco Host, Lilacs and Scielo databases.

Table 1. Characteristics of the diagnosis, dental management, prevention and outcome of ACE.

Article (Country)	Emergency	Diagnosis	Management	Prevention	Outcome	Authors
Muñoz, et al.; 2008 (Spain)	CI	Sudden chest pain, intense and radiated with possible vegetative manifestations (bacterial proliferation in atheromas)	1) Call ES 2) Adm O ₂ 4-6 L/min 3) Adm NGT 0.4-0.8 mg/5-10 min tab subl 4) If pain after 20 MIN/3 doses subl (1 every 5 min) of NGT: probable AMI. Morphine (5mg IV/IM), benzodiazepines (vegetative manifestation). Start CPR, i/n 5) No pain: calm the patient, in control until the arrival of the ES	NR	NR	Dentist (2) and physician (2)
	HD	NR	NR	1) Stress reduction 2) Effective pain management (up to 2 tubes with 1:100,000 adrenaline). Do not use retraction wire with adrenaline 3) First 6 months after AMI only emergency treatment (pain/infection), if possible in a hospital setting. 4) Med thromb suspension with prescribing physician. Med antic (previous ideal INR ≤ 4) and not suspended antiag plaq: local heme (bone wax, sutures, gao, collagen, prp, color, fs, es/laser, atran, aepi) OR: aepi 4 g/4 or 6 h, and atran 1-1.5 g 2-3x/day cp, ap or buc. wash 5) Pacemaker: do not use dental ultrasound and es	NR	
Pickett, 2008 (USA)	CC	NR	NR	1) Recent AMI: evaluate functional capacity for release of dental surgery (>4 points) 2) Type of surgery/procedure + stress: cc risks 3) Detailed anamnesis, stress reduction, BP, pulse and respiratory rates, pain control (4.5 ml of anesthetic with epinephrine 1: 100,000 with aspiration and slow injection, i/n benzodiazepine use, analgesia/oxygen sedation. Suspend treatment if BP 180/110 and refer you to the attending physician.	NR	Dental hygienist
Wilson, et al.; 2009, (Ireland)	AP	Pain/discomfort in the chest. Possible nausea, sweating, dyspnea, or fainting sensation.	1) Stop the procedure 2) If dyspnea: adm O ₂ 3) GTN 400 µg subl spray 4) Symptoms for >10 min: suspect AMI	NR	NR	Dentist
	AMI	Intense central thoracic pain with possible irradiation: arms, neck, jaw and epigastrium. Possible nausea, vomiting, sweating and cold skin, pallor, dyspnea.	1) Call ES 2) If awake: sit, if unconscious: lie down 3) Adm O ₂ (high flow) 4) Adm aspirin 30 mg (chew or suck) 5) Monitor vital signs 6) Start CPR, i/n	NR	NR	
Pickett, 2010 (USA)	CC	NR	NR	1) Recent AMI: wait 30 days after AMI to intervene 2) Do not suspend medic antiag/ antic (only in cases of high risk of bleeding by other medical conditions) 3) Anesthesia with up to 2 epinephrine tubes 1: 100,000 with aspiration and slow injection 4) Quick checks 5) Release of the cardiologist for dental care 6) Monitor BP, pulse. Suspend procedure if BP>180/110 and pulse of <50 or >120 bpm)	NR	Dental hygienist

Article (Country)	Emergency	Diagnosis	Management	Prevention	Outcome	Authors
Weitz, et al.; 2010 (USA)	AMIS	NR	NR	Do not suspend old medication plat	NR	Cardiologist
Reed, 2010 (USA)	AP AMI	AP: thoracic pain (several episodes), high BP AMI: severe chest pain (1st episode), radiates: arm, jaw, shoulders, possible shortness of breath, BP fall P	Proper positioning AP: adm NGT (subl or spray transm). AMI: 1) Call ES 2) Adm morphine, O ₂ (50:50), NGT and aspirin 3) Monitor BP	NR	NR	Dentist
Thoms, et al.; 2016 (Pennsylvania)	AMI + CRA after local anesthesia	Shortness of breath, chest pain, sense of imminent death	1) NGT spray subl (3 sprays) 2) Adm O ₂ (10 L/min) 3) ECG and monitor vital signs 4) Call ES 5) Calm the patient 6) Inhalation of albuterol (3 sprays) 7) During the medical assistance patient presented 3 CRPs that were reversed	NR	Discharge after 8 days of hospitalization	Dentist

NR, not reported; AP, angina pectoris; CI, cardiac ischemia; AMI, acute myocardial infarction; HD, heart disease; CC, cardiac complications; CRA, cardiorespiratory arrest; S, stroke; ES, emergency service; ADM, administer; Tab, tablet; SUBL, sublingual; CPR, cardiopulmonary resuscitation; MIN, minutes; I/N, if necessary; IV, intravenous; IM, intramuscular; NTG, nitroglycerin; O₂, oxygen; TRANSM, transmucosal; BP, blood pressure; ECG, electrocardiogram; ICU, intensive care unit; MED, medication; TROMB, thrombolytic; ANTIC, anticoagulant; ANTIAG, antiaggregant; BPM, beats per minute; PLAT, platelet; HEMO, hemostasis; GAO, gelatin of animal origin; PRP, platelet-rich plasma; ROC, regenerated oxidized cellulose; FS, fibrin sealant; ES, electric scalpel; ATRAN, tranexamic acid; AEPI, epsilon-aminocaproic acid; OR, oral route; AP, ampoule; BUC WASH, mouthwash.

DISCUSSION

Among the main ACEs that occur during dental care, angina pectoris and acute myocardial infarction are the most frequent. Recognizing the main signs and symptoms for the differential diagnosis between these emergencies⁴ is fundamental for the correct diagnosis, management, and reversal of ACE.³

The correct interpretation of chest pain reported during ACE is essential for the diagnosis of angina pectoris and acute myocardial infarction because chest pain is common in the general population and its occurrence is not limited to ACE. Acute myocardial infarction is often associated with conscious patients with chest pain.⁷ Acute myocardial infarction is also associated with other signs and symptoms, such as shortness of breath, sweating, nausea/vomiting, and sense of imminent death.²

The guidelines of the American Heart Association provide information on the prevention of cardiac complications during dental care in a dental office and define that the functional capacity presented by the patient is more relevant than the time that passed between the onset of acute myocardial infarction and dental intervention. The control of anxiety, fear, and pain are also addressed and present an important correlation with the prevention of complications during dental care.⁸

Fear and anxiety are frequently observed during dental care, with clinical manifestations including xerostomia, sweating, spasms, tremors, dizziness, and fainting. Individuals with systemic changes associated with exacerbation of fear/anxiety can evolve and develop a cardiovascular disorder that leads to the elevation of heart and respiratory rates.⁹ The stress reduction protocol recommends effective control of pain through anesthesia and control of fear/anxiety⁸ using a patients' conditioning approach (verbal and psychological conditioning) and pharmacological methods (anxiolytics, benzodiazepines, oral/endovenous sedation,

and general anesthesia). Oral sedation is indicated for patients with cardiovascular disorders who exhibit mild to moderate anxiety/fear, and general anesthesia is indicated for those with severe anxiety.¹⁰ Stress/fear/anxiety control is extremely important because it allows the dental surgeon to work safely, besides offering comfort and assurance to the patient during dental care.^{11,12}

The European Society of Cardiology (SEC) emphasizes the importance of a careful anamnesis for the correct identification of individuals at increased risk, and it is considered the most effective approach to prevent ACE in dental practice and ensure a safe and effective dental treatment by correctly approaching these patients, especially those undergoing non-cardiac surgical procedures (such as dental surgery).¹³ Although a study has shown that dental procedures after an acute cardiovascular event do not increase the risk of new cardiovascular complications regardless of whether the procedure is performed at intervals shorter than 30 days or after 180 days of the cardiovascular event.¹³ The SEC recommends that individuals who experienced acute myocardial infarction should ideally wait at least 30 days after the event to undergo dental surgery, prioritizing only emergency care.⁸ The SEC also recommends that the pharmacological therapy prescribed to these patients, such as antiplatelet agents and anticoagulants, should not be suspended to avoid thromboembolic events.¹³

A literature review has addressed the association between the suspension of antiplatelet agents and anticoagulants and the occurrence of acute complications, such as acute myocardial infarction and stroke, and concluded that discontinuation of the drug therapy is directly related to the increased occurrence of these complications.¹¹ Suspension of the anticoagulation drug therapy to perform oral surgery presents a risk of embolic morbidity greater than the risk of hemorrhagic complications, even for long surgeries.^{14,15}

One of the articles has reported a case of a hypertensive cardiac patient with important comorbidities (stage 5 kidney disease, dialysis, hypertension, angina, poorly controlled congestive heart failure, asthma, epilepsy, gastroesophageal reflux, hypercholesterolemia, anemia, latent tuberculosis, hypothyroidism, secondary hyperparathyroidism, insomnia, and glaucoma) that evolved into cardiorespiratory arrest after local anesthesia during dental care, and this complication could have been avoided with an adequate anamnesis.

The authors emphasized the importance of tracing a patient's risk profile by performing tests, assessing the functional capacity, applying the stress reduction protocol for effective control of pain, anxiety, and fear, and, when necessary, discussing the clinical case with the cardiologist to assess the risks and benefits of the dental procedure for the patient and to determine the best conduct regarding the timing of the procedure.¹⁶

Based on the present literature review, Figures 2 and 3 demonstrate how to proceed in ACE during dental care and prioritize the actions that must be taken by the dental surgeon.

CONCLUSION

The dental management of the cardiac patient includes providing specific preventive care for these patients, correctly diagnosing the acute cardiovascular events, and taking adequate action against these complications when they occur in the dental office, aiming at reducing the morbidity and mortality of patients using these emergencies.

CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest in conducting this study.

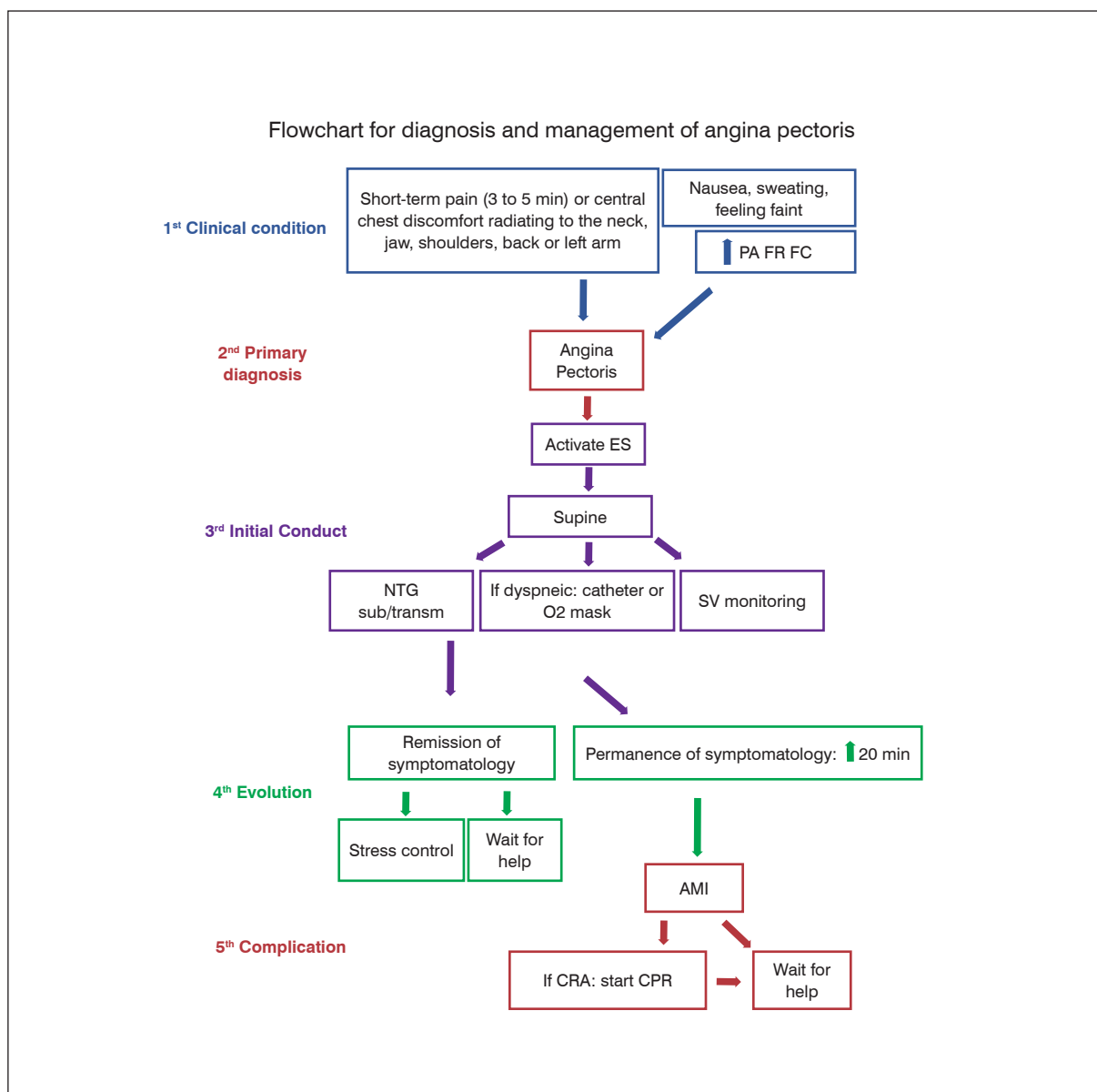


Figure 2. Diagnosis and management of Angina Pectoris.

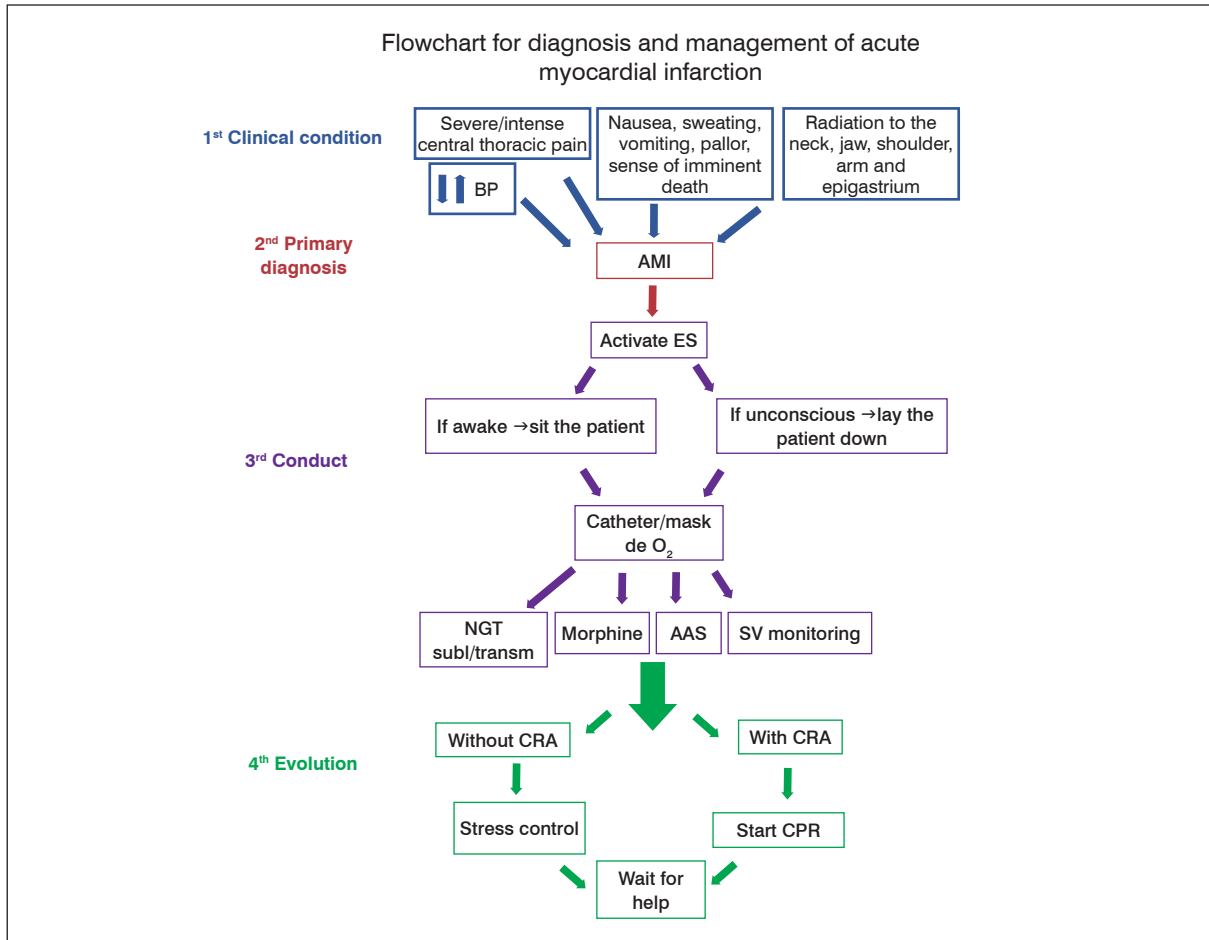


Figure 3. Diagnosis and management of acute myocardial infarction.

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