

Clinical Considerations of Drug Management in Chronic Cardiovascular and Respiratory Disorders in Perioperative Healthcare

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SUMMARY

Introduction: Perioperative healthcare represents the care of the patient’s health, before, during and after surgical intervention. There is a lot of clinical studies that confirm high incidence of cardiovascular and respiratory events during perioperative period, especially in patients who already suffer from chronic disorders of these organs and organ systems, which can be successfully prevented or minimized by adequate drug management.

Methods: This paper is based on information from other reviews, clinical studies and textbooks, along with clinical experience, professional and theoretical considerations about cardiovascular and respiratory disorders’ drug management in perioperative healthcare.

Topics: This manuscript contains clinically relevant information about effects and adverse effects of intravenous and inhalational general anesthetics on the cardiovascular and respiratory system, as well as general and special recommendations for perioperative drug management in patients with hypertension, angina pectoris, cardiac arrhythmias, bronchial asthma, and chronic obstructive pulmonary disease (COPD).

Conclusion: Postoperative recovery process may be seriously slowed down by perioperative cardiovascular and respiratory events, especially those which can directly endanger the patient’s life before, during and after general anesthesia and surgery. The take-home message of this article is that most of the potential perioperative cardiovascular and respiratory complications can be successfully prevented by rational and individually tailored drug management in perioperative period.

Keywords: perioperative period, drug management, general anesthesia, cardiovascular disorders, respiratory disorders

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INTRODUCTION

The perioperative period consists of three closely related clinical stages: preoperative, intraoperative and postoperative. Viewed from the professional side, perioperative healthcare includes two professional areas that interact each other: perioperative medicine and perioperative nursing care, as part of clinical care [1]. In the broadest sense, perioperative healthcare represents the care of the patient's health, before, during and after surgical intervention. In a narrower sense, this is a period of the patient's general condition stabilization and recovering, in order to endure traumatization from anesthetic and surgical procedures, and also prevent intraoperative and postoperative complications [2].

As in any other clinical discipline, individually tailored drug management takes one of the most important places in the entire treatment of a surgical patient. Application of pharmacotherapy is very complex process during which all members of the perioperative interdisciplinary health team participate equally, each within their own formal qualifications and professional competencies - physicians prescribe, nurses are applying therapy according to the established standardized procedures of drug administration [3]. Professional activity of all these healthcare professionals, surgeons, anesthesiologists and critical care nurses is directed towards the same goals - to stabilize health condition of the operated patient and contribute to its faster recovery.

A patient undergoing surgical treatment is very vulnerable in medical and psychological sense; numerous clinical studies indicate a high incidence of various health complications during perioperative period. Cardiovascular and respiratory disorders represent most of these complications, whose occurrence during perioperative period is closely related to the previous health condition, type of surgery, use of intravenous and inhalational anesthetics, use of pharmacotherapeutic agents for chronic cardiovascular and respiratory diseases treatment, as well as the interaction of these drugs with general anesthetics [4]. Occurrence of perioperative complications is especially noticed in patients who were already suffering from chronic cardiovascular and respiratory diseases before undergoing general anesthesia and surgery: arterial hypertension, angina pectoris, cardiac dysrhythmias,

as well as in patients with bronchial asthma and chronic obstructive pulmonary disease (COPD) [5-7].

Based on above, controlled drug management is one of the most important factors in implementation of effective perioperative healthcare. At the same time, this is the main reason why this topic is equally important in both clinical and nursing pharmacology; accordingly, the aim of this paper is to provide reader with important information from this field of hospital pharmacology and primarily useful practical knowledge for everyday professional engagement in perioperative healthcare of patients with chronic cardiovascular and/or respiratory disease.

METHODS

This paper is based on information from other reviews, clinical studies and textbooks, along with clinical experience, professional and theoretical considerations about cardiovascular and respiratory disorders' drug management in perioperative healthcare; professionally important information are given to both physicians and nurses. As a source of information, printed references were used as well as those that were available through searching engines of electronic bibliographic databases (PubMed, Medline and Google Scholar). Database search strategy was based on specific search terms related to topic of this manuscript. In selection and use of remaining literature were followed next criteria: journal impact factor, credibility of the author(s), number of citations, year of publishing and educative significance of available information in a particular manuscript. In addition to information and research findings from manuscripts published in the last five years, scientific achievements from longer ago published manuscripts that are still present in contemporary perioperative clinical practice are also cited in this article.

TOPIC

General anesthesia and its effect on the cardiovascular and respiratory system

In clinical sense, general anesthesia is a temporarily, deliberately induced central nervous system (CNS) depression, caused in order to

create a reversible and harmless patient's insensitivity to pain and trauma, manifested by sleep, analgesia, muscle relaxation and transient loss of reflex [8,9]. The basic purpose of general anesthesia for surgical operations is to eliminate consciousness and pain and to prevent motor (muscle tension, defense movements), autonomic, and cardiovascular reflex responses (rise in blood pressure and heart rate) [10]. All clinical manifestations of general anesthesia are achieved by the action of drugs - intravenous and inhalational anesthetics on the CNS, as well as central muscle relaxants. However, anesthetics have a systemic effect on the patient's organism, causing different clinical manifestations on other organs and organ systems. From the very beginning of anesthesiology to the present time, no ideal anesthetic agent has been found, in sense of causing an appropriate effects on the CNS and minimal effects on other organ systems, at the same time. Therefore, it is very important that patients are adequately (pre)medicated before inducing to general anesthesia, in order to reduce or eliminate side effects of anesthetics, as well to support faster postoperative recovering.

Besides central nervous system (CNS), the effect of general anesthetics is particularly expressed on the respiratory and cardiovascular system [9]. All general anesthetics, in sufficient concentrations, depress the respiratory center and reduce its sensitivity to carbon dioxide, but during this process there may

be phases of stimulation [11]. During general anesthesia, various changes in the breathing process can be noticed - from apnea to tachypnoea, depending on the type, dose and method of administration of the anesthetic agent (Table 1 and 2).

Although there are significant differences between anesthetics regarding cardiovascular system activity, deeper general anesthesia always causes a stronger depression of the vasomotor center [8,13,14]. Anesthetics in higher doses may cause progressive myocardial depression, reduction of contractile force, and decrease in minute volume. During anesthesia, blood pressure can remain relatively unchanged or slightly reduced. In the introduction to anesthesia, hypotension may be more prominent due to the depressive action of intravenous barbiturates. In very deep anesthesia all anesthetics lead to hypotension [8]. Blood pressure may be also elevated during general anesthesia due to carbon dioxide accumulation or excessive release of adrenaline and noradrenaline from adrenal glands [15,16]. The clinical effects of anesthetic drugs on the cardiovascular system are also shown in Tables 1 and 2.

Intravenous anesthetics and analgetics	Respiratory system	Cardiovascular system
thiopentone	respiratory depression (possible apnea), bronchospasm, laryngospasm	reduction of heart contractility, generalized vasodilatation, reduction of minute volume, heart failure
propofol	respiratory depression, coughing (rare), decreased breathing volume, decreased respiration rate (apnea), bronchodilation	reduction of systemic blood resistance, decreased systemic arterial pressure, hypotension, tachycardia, reduction of cardiac output
diazepine	respiratory depression (dose dependent)	reduction of systemic blood resistance, hypotension
flunitrazepam	respiratory depression (dose dependent)	reduction of systemic blood resistance, hypotension
midazolam	respiratory depression	reduction of systemic blood resistance, hypotension
ketamine	minimal respiratory depression, strong bronchodilation	hypertension, tachycardia, increase in peripheral blood resistance
fentanyl	strong respiratory depression	bradycardia, hypotension
etomidate	coughing, hiccupping (rare)	/

Table 1. Adverse effects of intravenous anesthetic on the respiratory and cardiovascular system [12]

Table 2. Adverse effects of inhalational anesthetics on the respiratory and cardiovascular system [12]

Inhalational anesthetics	Respiratory system	Cardiovascular system
nitric oxide	tachypnea	minimal reduction of heart contractility, minimal hypotension
halothan	respiratory depression, tachypnea, irritating effect	minimal hypotension, myocardial depression, reduction of heart contractility and minute volume
enflurane	irritating effect, respiratory depression, bronchodilation	vasodilation, hypotension, myocardial depression, reflex tachycardia, arrhythmia
isoflurane	strong respiratory depression, bronchospasm, laryngospasm	tachycardia, vasodilation, strong hypotension
sevoflurane	minimal respiratory depression, decreased breathing volume	reduction of systemic arterial pressure

Adverse effects of anesthetics on the cardiovascular and respiratory system

The use of general anesthetics can lead to different complications, both in cardiovascular and respiratory system, especially in patients with increased risk due to the existence of previously diagnosed disorders of these organs. Most of anesthetics lead to more or less manifest respiratory depression, and even to apnea, so the use of mechanical ventilation machine is a prerequisite for the application of general anesthesia, except for shallow, short-term anesthesia for performing short-term interventions [17,18]. The risk of laryngo and/or bronchospasm is very high during application of some anesthetics (for example, isoflurane), so, consequently, choosing of appropriate anesthetic is very important in patients with chronic lung disease [19]. However, hypersalivation and increased bronchial secretion can lead to exacerbation of bronchial asthma and, especially, chronic obstructive pulmonary disease (COPD) [20]. This is the main reason for the use of bronchial secretion inhibitors (atropine) in anesthesiological premedication very significant, especially in cases where is planned application of anesthetics that may increase bronchial salivation.

In cardiovascular system, adverse effects of anesthetics are usually manifested in the form of decreased myocardial contractility and minute volume, as well as the occurrence of hypotension during anesthesia [9,21]. The most dangerous complications of general anesthetic' application include malignant heart rhythm disorders, which sometimes may result in acute heart failure. Stabilization of coronary disease in the preoperative period, as well as monitoring of cardiac electrical activity (ECG)

and blood pressure, represents the imperative of cardiovascular complications' prevention during general anesthesia [22].

General aspects of drug management in perioperative period and control of medication

Optimal use of pharmacotherapy in perioperative period can significantly affect the incidence of postoperative complications or decrease their intensity, reduce postoperative pain and accelerate the recovery [11,14].

The basic rule in the application of therapy in clinical care is well-known "Rule of the five R", which implies application of the right drug, to the right patient, at the right dose, in the right way, and at the right time [23]. Providing adequate, individually tailored pharmacotherapeutic support to the patient is one of the most important tasks of all physicians and nurses who participate in administration and application of therapy at all stages of the perioperative period [24]. It is important to keep in mind that many drugs used for preoperative stabilization of chronic diseases, as well as those which are used for anesthetic premedication, significantly affect the clinical effect of drugs used for general anesthesia, and vice versa. On the other hand, continuation of chronic therapy after surgery often requires concentration analysis of some drugs in the blood (for example, cardiotonic glycosides) [8,24].

The general rules for drug management in the perioperative period are as follows:

- review the medication history, consider accurate, verified data about preoperatively used drugs, especially chronic therapy;

- make decision to continue or discontinue use of certain medications prior to surgery;
- provide information on use of herbal and complementary medications, alcohol, nicotine and illicit drugs;
- strictly adapt application of drugs to the individual needs of patients;
- use additional medications, if necessary;
- observe effects of prescribed medications, in order to determine the moment of indication discontinuation for a particular drug;
- avoid polypharmacy (the simultaneous use of five or more drugs) [24-26].

Unfortunately, well-being and healing of the patient are not the only guidelines in the choice of drugs and way of pharmacotherapy application in clinical practice these days, but also its economic cost-effectiveness and application costs. By reducing incidence of complications and shortening the length of hospitalization, rationalization and control of medication helps the patient to overcome perioperative period faster and more easily, but faster recovery of patients also saves consumption of drugs and medical devices. Economically, this is a very important aspect of the whole healthcare process, and only acceptable from a medical and humanistic point of view, since reduction of treatment direct costs is not the right way to rationalize costs in perioperative healthcare [27].

Therapy of chronic cardiovascular and respiratory diseases in the perioperative period

The management of a patient's chronic medication is an important component of perioperative healthcare, since at least fifty percent of patients undergoing surgery take regular medications [28]. Regarding the treatment of chronic diseases, in clinical practice there is always a dilemma about whether and what chronic therapy should be discontinued, and which should continue in the perioperative period [25,29]. The perioperative period is a high-risk setting for medication errors, both for the drug selection and way of its administration [30]. "Medication errors are a major safety problem in hospitalized patients, and inappropriate withdrawal or continuation of medication in the perioperative period is associated with an increased risk for adverse events" [31]. Professional errors related to drug administration are the most common

type of critical situations in anesthesia that are cited in literature. The American prospective observational study found that approximately one in twenty perioperative drug administration resulted in a medication error and/or an adverse drug event; most of them had the potential to patient harm [32]. Potential medication errors in perioperative healthcare may be related to non-application of prescribed therapy, application of non-prescribed medication, application of wrong pharmaceutical form of some drug, incorrect way of drug administration, wrong technique of drug administration, as well as application of drug in incorrect dose or in the wrong time [33]. Keeping mentioned in mind, it is clear that regular updating of pharmacological knowledge and clinical skills improvement represent the key of medication errors' prevention during perioperative period [34].

However, although the application of therapy should always be adapted to the current clinical condition and individual needs of each patient, there are some general guidelines for the cardiovascular and respiratory disorders' drug management during perioperative period. According to these recommendations, therapy by antihypertensives, antiarrhythmic drugs, anti-anginal agents, but also corticosteroids and other agents which are used for asthma treatment, should be always continued in perioperative period. At the same time, it is not recommended to use oral anticoagulants (these medications should be replaced by parenteral administration of heparin), non-steroidal anti-inflammatory drugs (NSAIDs) and those based on acetylsalicylic acid, as well as diuretics that may interact with anesthetics and cause hypokalaemia with consequent increase in digitalis toxicity (administration of diuretics must be discontinued the day before the planned surgical interventions, and continues when the patient is able to take them orally) [24,25, 35]. In addition to these general recommendations, there are special guidelines for the application of antihypertensives, antiarrhythmics anti-anginal and antiasthmatic agents during perioperative period.

Hypertension is potential risk factor for the occurrence or worsening of coronary disease in the postoperative period, so adequate pharmacotherapy and continuous monitoring of blood pressure during preoperative preparation is of exceptional importance in reducing risk of perioperative ischemia and sub-

sequent heart disease [8,36]. However, the use of antihypertensives in perioperative health-care should be treated with extreme caution, not only by physician who prescribes the use of these drugs, but also by nurse who will apply the prescribed therapy [24,37]. Increased caution is especially needed when vasodilators are used for the treatment of hypertension; they can easily lead to hypotension and tachycardia, which should always be kept in mind when selecting anesthetics for general anesthesia induction. The preoperative management of angiotensin converting enzyme (ACE) inhibitors is controversial; there are some authors who state that use of these drugs can lead to prolonged hypotension due compensatory activation of the renin-angiotensin system during surgery [25,38]. Nevertheless, some studies suggest that the use of ACE inhibitors can prevent events related to myocardial ischemia and left ventricular dysfunction, which makes it reasonable to suggest that perioperative treatment with ACE inhibitors can have positive effects on the postoperative outcome [39]. Although there are some authors who recommend caution in perioperative management of beta-blockers, there is a general recommendation to regulate perioperative hypertension by using beta blockers whenever is possible, since these drugs can safely be combined with general anesthetics [9,37,40]. The main reason for perioperative beta blocker use is decrease of myocardial oxygen consumption by reducing heart rate, resulting in a lengthening of the diastolic filling period and decreased myocardial contractility [41]. Perioperative beta blocker therapy can provide a 60-65% reduction in the likelihood of non-fatal myocardial infarction and cardiac death [42]. Caution is needed in

patients with asthma and COPD, since beta blockers can lead to bronchoconstriction or bronchospasm in those patients [43,44]. Due to potential benefits and minimal side effects, it is recommended that beta blockers should be used during perioperative in usual doses and by usual way of administration [25]. The use of diuretics hypertension treatment during perioperative period should be carefully considered, as these drugs may cause hypokalaemia, which is well known to increase significantly the risk of ventricular tachycardia (VT) and ventricular fibrillation in cardiac disease [37]. Recommendations for administration of antihypertensive agents during perioperative period are shown in Table 3.

Angina pectoris is one of the leading risk factors for occurrence of cardiovascular events in perioperative period, especially in patients with an unstable form of angina. However, even patients with a stable form of angina pectoris are not spared from cardiovascular risk in perioperative period, since asymptomatic myocardial ischemia (also known as "silent" ischemia, specific for diabetic patients) can occur very often in this group of patients during perioperative period, even if they are not diabetic [45]. Accordingly, it is extremely important to correctly titrate doses of antianginal drugs, which significantly reduces the risk of myocardial ischemia during and after general anesthesia [46]. In this context, beta-adrenergic blockers are particularly important in reducing myocardial contractility and decreasing blood flow to the heart via venous system, which is clinically manifested by heart rate slowing, reduction of myocardial oxygen consumption and moderation of haemodynamic stress responses [42,47,48]. There

Table 3. Administration of most commonly used antihypertensive agents in perioperative period [12]

Antihypertensive agent	Day before surgery	Day of surgery	During surgery	After surgery
Beta blockers	usual dose	usual dose	IV bolus or infusion, if needed	IV, untill oral administration is possible again
ACE inhibitors	not recommended (must be stopped)	not recommended	IV administration, if needed	IV, untill oral administration is possible again
Calcium antagonists	usual dose	usual dose	not recommended	IV, untill oral administration is possible again
Vasodilators	usual dose (possibly reduction)	usual dose (possibly reduction)	IV infusion, if needed	IV, untill oral administration is possible again
Diuretics	not recommended (must be stopped)	not recommended	strictly not recommended	when oral administration is possible again

is no clinically evidenced preventive effect of preoperative intravenous nitroglycerin administration either on myocardial ischaemia, infarction or cardiac death. However, perioperative use of nitroglycerin may pose a significant haemodynamic risk to the patients [49]. The dosage of nitrates must be carefully estimated, since the irrational use of these drugs can lead to hypotension, as serious problem in perioperative period, as the occurrence of hypertension [50,51]. Intraoperative, nitrates should be used only if clear signs of myocardial ischemia occur [25]. Finally, by choosing cardioprotective anesthetics (such as propofol and sevoflurane, depending on the type of planned surgery), and combining it with recommended antianginal agents, risk of intra or postoperative myocardial ischemia or infarction is reduced to the utmost [52]. Recommendations for administration of antianginal agents during perioperative period are shown in Table 4.

The occurrence of perioperative arrhythmias has been reported in 70% of patients subjected to general anaesthesia for various surgical procedures [49]. Cardiac arrhythmias, both supraventricular and ventricular, represent an independent risk factor for performing general anesthesia and potentially one of the most dangerous cardiovascular events in postoperative period, at the same time. Electrical conduction defects and arrhythmias can occur as a consequence of surgery and general anesthetics application, but this possibility is multiplied in patients suffering from heart rhythm disorders prior to surgical intervention [53]. Finding of cardiac arrhythmia in preoperative patient examination must be a reason to search for underlying cardiopulmonary disease, ongoing myocardial ischemia or infarction, toxicity of drugs that are used in therapy, or development of some metabolic disorders [54]. Arrhythmias, which are common in elderly and patients with structural heart disease, represent one of po-

tential causes of postoperative morbidity and mortality, especially in non-cardiac surgery [55,56]. Thus, cardiac arrhythmias should be wholly diagnosed before surgery, in order to assess risk degree of anesthesia, apply adequate pharmacotherapy and minimize the identified risk. However, as many antiarrhythmic agents interact with general anesthetics, therapy of existing cardiac rhythm disorders in perioperative period is practically reduced to the cautious use of several medications: beta blockers, digitalis preparations (digoxin), amiodarone and verapamil [56-58]. Perioperative use of beta blockers is suggested to reduce occurrence of supraventricular arrhythmias after surgery [58]. Furthermore, it is necessary to continue digoxin therapy for control of atrial fibrillation and supraventricular tachycardia. Bioavailabilities differ with oral and parenteral preparations; therefore, appropriate dosages must be carefully administered. Due to the existing risk of digitalis toxicity and perioperative arrhythmias, dose of digoxin should be reduced on the day of surgery, or even a day before [24,25]. In some patients amiodarone can cause postoperative acute respiratory distress syndrome. Because of this, amiodarone should be discontinued on the night before surgery; this agent has a long half-life (30-60, averaging 58 days); therefore therapy by amiodarone can be restarted safely after surgery, when oral administration is possible again. If arrhythmia develops in the perioperative period, the intravenous preparation may be used in conjunction with conventional intravenous drugs (eg, procainamide, lidocaine) [25,59]. Recommendations for the administration of antiarrhythmic agents during perioperative period are shown in Table 5.

Bronchial asthma increases risk of developing complications during general anesthesia, primarily bronchospasm and laryngospasm [60,61]. The risk of postoperative complications and mortality is significantly higher in patients with chronic obstructive

Anti-anginal agent	Day before surgery	Day of surgery	During surgery	After surgery
Nitrates	usual dose	usual dose	I.V. infusion (signs of myocardial ischemia occurs)	I.V., if needed, until oral administration is possible
Beta blockers	usual dose	usual dose	/	usual dose
Calcium antagonists	usual dose	usual morning dose	/	I.V., until oral administration is possible

Table 4. Administration of anti-anginal agents in perioperative period [12]

Table 5. Administration of antiarrhythmic agents in perioperative period [12]

Antiarrhythmic agent	Day before surgery	Day of surgery	During surgery	After surgery
Digitalis preparations	usual/reduced dose	reduced dose	/	when oral administration is possible again
Beta blockers	usual dose	usual dose	//	when oral administration is possible again
Amiodarone	usual morning dose, reduced or no evening dose	/	I.V., according to indication	when oral administration is possible again
Verapamil	usual dose	usual dose	I.V., according to indication	when oral administration is possible again

pulmonary disease (COPD). A potential problem in patients with asthma or COPD may be increased airway hyperresponsiveness during the perioperative period. Life-threatening perioperative complications can be seriously reduced by using leukotriene antagonists (montelukast, zileuton) in perioperative management of patients with asthma or COPD [62]. Medication of patients with asthma in perioperative healthcare depends on whether asthma is well controlled or not. All asthma control definitions includes the following asthma outcomes: PEF, rescue medication use, symptoms, night-time awakenings, exacerbations, emergency visits, and adverse events [63]. One of the most important factors in the uncomplicated perioperative asthma course is individualized management of anti-inflammatory and bronchodilate agents during the perioperative period [60]. In patients with well controlled asthma, beta agonist and long-acting corticosteroid aerosol therapy is used in usual dosages before and after surgery. However, in some patients, postoperative pain can pose a problem to use aerosol therapy after surgery [64]. In that case, application of the same or similar antiasthmatic agent by using ultrasonic or jet nebulizers is indicated [65]. Particularly, there is high risk of bronchospasm in patients with uncontrolled asthma, especially if they are smokers. In order to reduce or minimize perioperative pulmonary complications, at least one month of smoking cessation is required. If the patient didn't quit smoking before surgery, premedication by high doses of intravenous systemic corticosteroids (prednisolone or methylprednisolone acetate) is recommended [62,66,67]. "Furthermore, patients who have received systemic glucocorticosteroids within the past 6 months

should have systemic coverage during the surgical period (i.e., 100 mg hydrocortisone every 8 h intravenously) and rapidly reduced within 24 h following surgery. Prolonged glucocorticosteroid therapy inhibits wound healing" [68]. It should be always considered that corticosteroids show a full therapeutic effect within one hour of parenteral administration, so it is necessary to apply corticosteroid therapy for an hour before induction in general anesthesia; otherwise, the therapeutic effect we wanted to achieve would not be sufficiently expressed, or even completely absent [69]. Finally, corticosteroid therapy can cause one more health problem: the association between high doses of corticosteroids and peptic ulcer is well known [70]. This adverse effect of corticosteroid therapy can be multiplied by stress due to the upcoming operation, so patients on corticosteroid therapy should always be perioperative protected by using some of gastro-protective agents which are approved for prophylaxis, usually by oral administration of proton pump inhibitors (PPI) - esomeprazole, pantoprazole, lansoprazole, omeprazole or rabeprazole, or even parenteral administration of pantoprazole, [71].

CONCLUSION

Perioperative medicine is a highly demanding clinical discipline, both for physicians and nurses. High level of professional knowledge about specific perioperative risk in relation to existing chronic diseases, possible events related to general anesthesia, surgical technique, drug management and other methods of medical treatment represent the imperative of professional work in perioperative health care. There is a lot of clinical studies which

confirm that presence of chronic cardiovascular and respiratory diseases prior to surgery is a potential risk factor for the occurrence of adverse events during perioperative period. Postoperative recovery process may be seriously slowed down by these disorders, especially those which can directly endanger the patient's life before, during and after general anesthesia and surgery. Perioperative risk depends on health condition prior to surgery, co-morbidities type and prevalence, type and duration of surgery procedure and anesthesia, but also quality of chronic diseases' drug management, as an integral part of perioperative healthcare. The take-home message of this article is that most of the potential perioperative cardiovascular and respiratory complications can be successfully prevented by rational and individually tailored drug management during the perioperative period.

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Klinička razmatranja o primeni lekova za hronične kardiovaskularne i respiratorne poremećaje u perioperativnoj zdravstvenoj nezi

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KRATAK SADRŽAJ

Uvod: Perioperativna zdravstvena zaštita predstavlja brigu o zdravlju pacijenta, pre, tokom i nakon hirurške intervencije. Postoji puno kliničkih studija koje potvrđuju visoku incidencu kardiovaskularnih i respiratornih neželjenih događaja u perioperativnom periodu, naročito kod pacijenata koji već pate od hroničnih poremećaja ovih organa i organskih sistema, a koji se mogu uspešno sprečiti ili ublažiti adekvatnom primenom lekova.

Metod: Ovaj rad je zasnovan na informacijama iz preglednih radova, kliničkim studijama i udžbenicima, kao i kliničkom iskustvu i stručnim i teorijskim razmatranjima o primeni lekova za tretman kardiovaskularnih i respiratornih poremećaja u perioperativnoj zdravstvenoj nezi.

Tema: Ovaj rukopis sadrži klinički relevantne informacije o dejstvu i neželjenim efektima intravenskih i inhalacionih opštih anestetika na kardiovaskularni i respiratorni sistem, kao i opšte i posebne preporuke za perioperativnu primenu lekova kod pacijenata sa hipertenzijom, anginom pektorisom, srčanim aritmijama, bronhijalnom astmom i hroničnom opstruktivnom bolesti pluća (HOBP).

Zaključak: Postoperativni proces oporavka može biti ozbiljno usporen perioperativnim kardiovaskularnim i respiratornim komplikacijama, naročito onima koji mogu neposredno ugroziti život pacijenta pre, tokom i nakon opšte anestezije i operacije. Glavna poruka ovog rukopisa je da se većina potencijalnih perioperativnih kardiovaskularnih i respiratornih komplikacija može uspešno sprečiti racionalnom i individualno prilagođenom primenom lekova u perioperativnom periodu.

Gljučne reči: perioperativni period, primena lekova, opšta anestezija, kardiovaskularni poremećaji, respiratorni poremećaji

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