ISSN (Online): 2455-3662
EPRA International Journal of Multidisciplinary Research (IJMR) - Peer Reviewed Journal
Volume: 10| Issue: 10| October 2024|| Journal DOI: 10.36713/epra2013 || SJIF Impact Factor 2024: 8.402 || ISI Value: 1.188

HYPERTENSIVE CRISES: HYPERTENSIVE EMERGENCY AND CRISIS MANAGEMENT DURING ANESTHESIA

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Article DOI: https://doi.org/10.36713/epra18659
DOI No: 10.36713/epra18659

ABSTRACT

Introduction: *hypertensive crisis is characterized by an acute and massive increase in blood pressure. Hypertensive crises encompass several clinical situations with different severity and prognosis, including hypertensive urgency and hypertensive emergency. The difference between the latter depends on whether the situation is life-threatening for the affected individual.*
Objective: *to detail current information related to hypertensive crises, especially hypertensive emergency, definition, differentiation, etiology, epidemiology, pathophysiology, histology, clinical history, physical examination, management, differential diagnosis, prognosis and complications.*
Methodology: *a total of 28 articles were analyzed in this review, including review and original articles, as well as clinical cases, of which 15 bibliographies were used because the other articles were not relevant to this study. The sources of information were PubMed, Google Scholar and Cochrane; the terms used to search for information in Spanish, Portuguese and English were: hypertensive crises, hypertensive emergencies, hypertensive emergencies, arterial hypertension.*
Results: *approximately 1-2% of adults with hypertension suffer hypertensive crises. Multiple case series show that short-term treatment of hypertensive emergencies has good results; however, long-term results are unknown. The main drawback is that follow-up of individuals is lost and the medication regimen is frequently modified. Untreated hypertensive emergencies have very high morbidity and mortality and if the patient does not receive adequate education about the severity of hypertension, this trend is likely to continue.*
Conclusions: *given the high prevalence of hypertension, it is crucial that health care professionals are able to differentiate between hypertensive emergencies and hypertensive emergencies to provide appropriate and timely treatment. Rapid blood pressure reduction is critical in the treatment of hypertensive emergencies. The choice of medications should consider both efficacy and safety to avoid further complications. A detailed clinical evaluation can help identify the underlying cause and guide treatment, highlighting the importance of an individualized approach. Lack of timely treatment can lead to severe consequences, emphasizing the need for proper management in critical situations. Constant training in the management of hypertensive emergencies is essential*

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to reduce the morbidity and mortality associated with this condition.The management of hypertension during anesthesia is critical, as its prompt detection and control are fundamental to prevent serious complications. Despite the lack of specific criteria to suspend surgery in hypertensive patients, it is essential to evaluate each case individually, prioritizing target organ damage over blood pressure levels.

KEY WORDS: *crisis, emergency, urgency, hypertension.*

INTRODUCTION

Hypertensive crises encompass a variety of clinical conditions with varying severity and prognosis. The distinction between hypertensive urgency and hypertensive emergency lies in whether this circumstance represents a vital danger to the affected individual. This danger is determined more by the severity of organ damage than by elevated blood pressure levels. Hypertensive emergency does not involve an immediate risk to the patient, so treatment can be completed after discharge. In contrast, hypertensive emergencies is a critical clinical condition that requires hospital care. When faced with a patient with severe hypertension, asymptomatic or with non-specific symptoms, we should proceed with caution. First, it is necessary to verify the blood pressure values by multiple measurements and to examine and treat the factors that provoked this situation. The purpose of medical treatment of hypertensive urgency is to lower blood pressure levels (at least 20% of the initial values) without causing a drastic reduction. In hypertensive emergencies, fast-acting drugs should not be used because of the risk of ischemic stroke, opting instead for drugs with a longer half-life. The cardiovascular risk in these patients is higher than in those who do not experience a hypertensive crisis. Treatment should be individualized for each hypertensive emergency, with the intravenous route being the most appropriate for these patients.

Hypertensive crisis is defined by an acute and considerable increase in blood pressure. Individuals with previous hypertensive disease usually show an increase in systolic blood pressure values > 220 mmHg and diastolic values > 120 mmHg. However, the severity of the condition is not determined by the absolute level of blood pressure, but by the magnitude of the acute increase in blood pressure. Thus, in the presence of mostly normotensive baseline values (as seen in eclampsia), even a systolic blood pressure > 170 mmHg may result in a life-threatening condition(1-3).

METHODOLOGY

A total of 28 articles were analyzed in this review, including review and original articles, as well as cases and clinical trials, of which 15 bibliographies were used because the information collected was not sufficiently important to be included in this study. The sources of information were Cochrane, PubMed and Google Scholar; the terms used to search for information in Spanish, Portuguese and English were: hypertensive crises, hypertensive emergencies, hypertensive emergencies, arterial hypertension.

The choice of literature exposes elements related to hypertensive crises, especially hypertensive emergency, definition, differentiation, etiology, epidemiology, pathophysiology, histology, clinical history, physical examination, management, differential diagnosis, prognosis, complications and crisis management during anesthesia.

DEVELOPMENT

Hypertensive Emergencies

Definition and differentiation

A hypertensive emergency is defined as an acute, noticeable rise in blood pressure that is associated with signs of target organ damage. These may include pulmonary edema, cardiac ischemia, neurologic deficits, acute renal failure, aortic dissection, and eclampsia.

In contrast to this, a hypertensive emergency is characterized by a significant increase in blood pressure without evidence of target organ damage, such as pulmonary edema, cardiac ischemia, neurological deficits, or acute renal failure(4,5).

Etiology

Several triggers can cause a hypertensive emergency. Most of these emergencies occur in patients already diagnosed with chronic hypertension. Lack of adherence to antihypertensive treatment and the use of sympathomimetics are two of the most frequent causes, leading to a rapid increase in blood pressure that exceeds the body's innate capacity for self-regulation(6,7).

The levels of hypertension that define a hypertensive emergency, although frequently mentioned, are not universally fixed and are arbitrary. The rate of increase above baseline is probably a more relevant factor and explains why patients without chronic hypertension may present signs of hypertensive emergency at much lower levels, whereas those with prolonged hypertension can tolerate extremely elevated blood pressure without developing acute organ dysfunction(3).

Epidemiology

About 30% of adults in the United States have hypertension. Of these, approximately 1% to 2% will experience a hypertensive crisis, a term that encompasses both hypertensive emergency and hypertensive emergency. Acute pulmonary edema, cardiac ischemia, and neurologic emergencies are the most common types of acute target organ dysfunction.

Hypertensive emergencies and crises are clinical situations that may account for more than 25% of all emergency medical care. Given such a high prevalence, physicians must be prepared to properly identify these crises and distinguish between urgent and emergent hypertension. Approximately 3% of all emergency room visits are due to a significant rise in blood pressure. Along the spectrum of systemic blood pressure, hypertensive emergencies are the most critical clinical situation and therefore require special attention and care(9).

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Pathophysiology and histopathology

The pathophysiology that causes target organ dysfunction in hypertensive emergencies is not completely understood. However, it is likely that mechanical stress on vascular walls causes endothelial damage and a proinflammatory response. This generates increased vascular permeability, activation of platelets and the coagulation cascade, and fibrin clot deposition leads to hypoperfusion at the target organ tissue level.

Fibrinoid necrosis may be observed in renal arterioles, which is a classic feature of malignant hypertension. Most patients with this feature die within 24 months if the hypertension is left untreated.

Clinical history and physical examination

In patients presenting with markedly elevated blood pressure, a thorough history and physical examination is essential to determine which patient is having a true hypertensive emergency. Symptoms such as headache, dizziness, altered mental status, respiratory distress, chest pain, decreased urine output, vomiting, or visual disturbances warrant further evaluation. The source of the sudden onset of hypertension should also be investigated to direct treatment.

The expected findings of the examination vary according to the specific target organ most affected. In case of cardiac dysfunction, rales may be heard on pulmonary auscultation, jugular venous distension or peripheral edema may be noted, and additional heart sounds may be evident. In case of a very rapid rise in hypertension, often seen with sympathomimetic abuse, severe dyspnea may be found in the absence of peripheral edema due to sudden pulmonary edema.

Neurologic dysfunction may result in altered mental status, blurred vision, ataxia or other cerebellar dysfunction, aphasia, or unilateral numbness and weakness. A thorough neurological examination including cranial nerve evaluation, strength and sensory testing, and cerebellar and gait evaluations is necessary. Ocular examination may show papilledema, as well as flame-like exudates and hemorrhages.

Acute renal failure may also generate signs of pulmonary edema or peripheral edema(4,10).

Evaluation

Evaluation of hypertensive emergencies also depends on the symptoms and signs present. Once it is established that a true hypertensive emergency is present or likely to be present, laboratory tests such as metabolic panels, urinalysis, B-type natriuretic peptide, and cardiac enzymes may be useful. ECG is suggested in any patient with suspected cardiac ischemia. A head computed tomography (CT) scan is also recommended in patients presenting with acute neurologic symptoms or signs during the examination. A chest x-ray may be useful in patients with dyspnea. Also, a chest X-ray may show widening of the mediastinum in the setting of aortic dissection, although this is a relatively insensitive marker; therefore, CT angiography of the chest and abdomen should be performed to rule out or confirm dissection and to determine the extent of intimal tearing(11).

Management

Although the specific target organ affected may influence some aspects of treatment, rapid blood pressure reduction is the mainstay of therapy for hypertensive emergencies. The goal would be to lower mean arterial pressure by 20% to 25% in the first 1 to 2 hours. A variety of agents can be employed, but the common characteristics are that they act rapidly and are easily titrated. For this reason, oral medications, such as clonidine and nifedipine, have no role in the immediate management of a hypertensive emergency. Intravenous infusions of vasoactive agents such as labetalol, esmolol, nicardipine and nitroglycerin are typically effective options(4,12).

The key feature of treatment is that, if there is no evidence of organ damage, blood pressure reduction should be gradual over several days. On the other hand, severe hypertension during pregnancy requires immediate treatment. Patients who become pregnant should be prescribed nifedipine, methyldopa or labetalol during gestation; these women should not be treated with ACE inhibitors or ARA II. During the acute episode, intravenous hydralazine or oral nifedipine can be administered to lower blood pressure.

Patients with a hypertensive emergency require hospitalization with continuous blood pressure monitoring. It is critical to assess for target organ injury and start parenteral medications as needed. If the patient presents with an acute emergency such as aortic dissection, lower blood pressure to less than 140 mmHg in the first hour.

For adults without organ damage, lower blood pressure by 25% in the first hour and then to 160/100 for the next 2 to 6 hours, then gradually lower to normal levels over 2 days.

Differential Diagnosis

- Chronic renal disease.
- Eclampsia.
- Hypocalcemia.
- Hyperthyroidism.
- Acute kidney injury.
- Aortic coarctation.
- Aortic dissection.
- Pheochromocytoma.
- Renal artery stenosis.
- Subarachnoid hemorrhage.

Prognosis

In the past, hypertensive emergencies were usually associated with renal failure, myocardial infarction, stroke or death. With increased awareness and improved blood pressure control, mortality has decreased significantly over the past three decades. However, after acute treatment, more adequate blood pressure control is essential if morbidity and mortality are to be reduced. Unfortunately, the overall long-term prognosis of patients with hypertensive emergencies is uncertain. A substantial number of these patients may experience adverse cardiac events or stroke within 12 months(4,13).

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Complications

Failure to diagnose or treat a hypertensive emergency may result in the following:

- Myocardial infarction.
- Stroke.
- Kidney failure.
- Loss of vision.

Significantly elevated blood pressure is common in acute ischemic stroke and requires a specialized approach. According to AHA/ASA guidelines, patients eligible for thrombolysis should have their blood pressure reduced to an SBP below 185 mmHg and DBP below 110 mmHg, maintained at an SBP below 180 mmHg and DBP below 105 mmHg for the first 24 hours. For patients not receiving thrombolytics, only SBP levels above 220 mmHg or DBP above 120 mmHg should be lowered, as hypertension in acute stroke is usually transient and may have a protective effect. A reasonable target is a reduction of approximately 15% of mean arterial pressure.

In acute hemorrhagic stroke, reducing systolic blood pressure to less than 140 mmHg may improve functional outcomes. This requires an aggressive approach with rapid-dose intravenous antihypertensives, and careful monitoring is necessary to prevent hypotension, which can cause a decrease in cerebral perfusion pressure and aggravate ischemia. Easily titrated drugs with rapid onset and short duration of action, such as nicardipine, are recommended.

Aortic dissection also varies in the degree of blood pressure reduction that is recommended. Traditional teaching suggests lowering blood pressure to the level that the organs can tolerate, with close monitoring of the patient's mental status as a guide. Intravenous beta-blockers, especially esmolol, are first-line treatments because of their ability to lower blood pressure while avoiding reflex tachycardia and increased shear stress on the aortic wall. Traditionally, nitroprusside has been used as an adjunct to beta-blockers in the treatment of aortic dissection, but this has become uncommon due to its association with rapid and profound hypotension, tachyphylaxis, as well as the potential for cyanide toxicity. Nicardipine, in combination with a beta-blocker, would also be a reasonable option.

Preeclampsia is a notably worrisome and complicated hypertensive emergency to manage, as there are two affected individuals to consider. The therapy of first choice is magnesium sulfate, given in a loading dose of 4 g to 6 g, followed by an infusion of 1 g to 2 g per hour. It is important to monitor urine output, osteotendinous reflexes, and respiratory status. If further antihypertensives are required, beta-blockers may be used, but only to treat systolic blood pressure exceeding 160 mmHg. Hydralazine was once considered the preferred agent in pregnant patients; however, its slow onset of action, prolonged duration, and unpredictable hypotensive effects make it a less than ideal choice. Regardless of the drug used, the patient is likely to require intensive monitoring in a critical care setting(4).

Findings

Multiple case series show that short-term treatment of hypertensive emergencies has good results; however, long-term outcomes are unknown. The main drawback is that follow-up of individuals is lost and the medication regimen is frequently modified. Untreated hypertensive emergencies have a very high morbidity and mortality and if the patient is not adequately educated about the severity of hypertension, this trend is likely to continue.

Crisis Management During Anesthesia

Hypertensive crises are important complications that can occur during anesthesia and require a rapid and appropriate response. These crises usually manifest as a sudden increase in blood pressure, which can put the affected individual at risk, especially in those with pre-existing cardiovascular disease.

Hypertension is a common complication during anesthesia and its recognition depends on the correct calibration and operation of the monitors. If not promptly identified and corrected, it can result in significant morbidity or mortality. Once hypertension is confirmed, it should be controlled immediately using volatile anesthetic agents, intravenous opioids, or rapid-acting antihypertensives to prevent serious complications.

Common Causes

Drug reaction: may be caused by anesthetics, analgesics or drugs used during surgery.

Stress: the body's response to surgical stress can cause an increase in blood pressure.

Inadequate anesthesia: insufficient depth of anesthesia may result in increased blood pressure.

Management

Monitoring: Continuous monitoring of blood pressure, heart rate and other vital signs should be performed.

Assessment: Determine the underlying cause, as well as identify whether it is a reaction to medications or an event related to a surgical procedure.

Positioning: Place the patient in a semi-sitting position to facilitate breathing and reduce venous return.

Medications

Antihypertensives: administer intravenous drugs such as labetalol, esmolol, or nitroglycerin, depending on the severity of the crisis. The choice of drug will depend on the patient's clinical situation and blood pressure goals.

Controlled Doses: ensure that blood pressure reduction is gradual to avoid adverse effects.

If hypertension does not respond to adequate treatment, unusual causes such as pheochromocytoma, carcinoid syndrome, or thyroid storm should be considered. Currently, there are no established blood pressure levels that are safe for elective surgery; generally, there is a tendency to postpone surgery if the pressure exceeds 180/110 mmHg. However, each case should be evaluated individually, prioritizing target organ damage over blood pressure per se(14,15).

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The management of hypertensive crises during anesthesia is critical and requires prompt evaluation and effective treatment. Continuous communication with the surgical team and careful monitoring are essential to ensure patient safety.

CONCLUSIONS

Given the high prevalence of hypertension, it is crucial that healthcare professionals are able to differentiate between hypertensive emergencies and hypertensive emergencies to provide appropriate and timely treatment. Rapid blood pressure reduction is fundamental in the treatment of hypertensive emergencies. The choice of medications should consider both efficacy and safety to avoid further complications. A detailed clinical evaluation can help identify the underlying cause and guide treatment, highlighting the importance of an individualized approach. Lack of timely treatment can lead to severe consequences, emphasizing the need for proper management in critical situations. Ongoing training in the management of hypertensive emergencies is essential to reduce the morbidity and mortality associated with this condition. The management of hypertension during anesthesia is critical, as its prompt detection and control are fundamental to prevent serious complications. Despite the lack of specific criteria to suspend surgery in hypertensive patients, it is essential to evaluate each case individually, prioritizing target organ damage over blood pressure levels.

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Conflict of Interest Statement

The authors report no conflicts of interest.

Funding

The authors report no funding from any organization or company.