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# Hypertensive Crisis, its Complications and Medications Used in Hypertensive Crisis

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**Abstract:** In clinical practice, patients with hypertensive emergencies, malignant hypertension, and acute severe hypertension are managed differently. Important considerations that vary slightly across different diagnoses and clinical contexts are necessary when starting antihypertensive therapy and setting blood pressure goals in acute settings. The British and Irish Hypertension Society's position paper aims to give clinicians a framework for diagnosing, evaluating, and managing patients with hypertensive crisis, based on the critical appraisal of available evidence and expert opinion. Only a small percentage of hypertensive patients will experience a hypertensive crisis, despite the high prevalence of hypertension (HTN). In actuality, some hypertensive crisis patients do not disclose a history of hypertension or prior antihypertensive medication use. While heart-related symptoms (dyspnea, chest discomfort, arrhythmias, and syncope) are less common, most patients with hypertensive crises frequently describe non-specific symptoms. Depending on whether there is acute target organ damage or not, hypertensive crises can be classified as either hypertension emergencies or hypertensive urgencies. Since a different approach to therapy is required, which has a substantial impact on the morbidity and mortality of these patients, this differentiation is a very helpful classification in clinical practice. Therefore, in order to prevent additional injury or deterioration of the target organs, it is extremely important for the emergency department physician to recognize hypertensive situations and treat them with blood pressure-lowering drugs. In an attempt to enhance the understanding, identification, risk assessment, and management of hypertensive crises in patients sent to the emergency room, this narrative review aims to provide an overview of the most recent data.

**Keywords:** Systolic blood pressure, antihypertensive medication therapy, hypertensive emergencies, malignant hypertension, hypertensive urgencies, chronic hypertension.

**Introduction.** When immediate target organ damage is present and the systolic blood pressure is greater than 180 mmHg or the diastolic blood pressure is greater than 120 mmHg, hypertensive crises are diagnosed. A person with a systolic blood pressure of 180 mmHg or a diastolic blood pressure of 120 mmHg who is otherwise stable and shows no clinical or biochemical signs of immediate target organ damage is diagnosed with hypertensive urgencies. Antihypertensive medication therapy needs to be intensified for these individuals [1,2,3]. Patients with a dissecting aortic aneurysm, acute pulmonary edema, acute myocardial infarction, unstable angina pectoris, acute renal failure, acute intracranial hemorrhage, acute ischemic stroke, hypertensive encephalopathy, eclampsia or pre-eclampsia, peri-operative hypertension, a pheochromocytoma crisis, or a sympathomimetic hypertensive crisis brought on by cocaine, amphetamines, phencyclidine, or monoamine oxidase inhibitors, as well as by stopping clonidine or other sympatholytic medications suddenly, are all considered hypertensive emergencies. These patients require safe, fast-acting intravenous medication to lower their high blood pressure, preserve the function of their target organs, alleviate symptoms, minimize complications, and enhance clinical results [4,5,6]. In this position paper, we aim to provide a framework for diagnosing, evaluating, and managing patients with hypertensive crisis, based on the available evidence. There is a lack of robust outcome data specifying BP targets, the speed of BP reduction, and specific medications in patients with hypertensive crises (NICE, 2019). As expected, there is considerable heterogeneity and

inconsistency in how severe HTN is managed in clinical practice, and national and international HTN guidelines often cover very little [7,8]. Depending on whether there is acute target organ damage or not, hypertensive crises can be further classified as either hypertension emergencies or hypertensive urgencies. Acute injury and the ensuing malfunction of the brain (hypertensive encephalopathy), the heart (acute pulmonary edema), the kidneys (acute renal failure), or the eyes (fundoscopy abnormalities, such as hemorrhages, exudates, or papilledema) are all considered target organ damage. Given that a different approach to therapy is required, which has a substantial impact on the morbidity and mortality of these patients, this differentiation is a very helpful tool in clinical practice. More precisely, blood pressure (BP) should be lowered in hypertensive emergencies in order to prevent irreversible damage to target organs, while in hypertension urgencies, it should be lowered within 24 to 48 hours [9-12]. Notwithstanding this distinction, a patient who presents with hypertensive urgency may have chronic hypertension and a history of end-organ damage without current or impending target organ impairment. In an attempt to enhance the understanding, identification, risk assessment, and management of hypertensive crises in patients sent to the emergency room, this narrative review aims to provide an overview of the most recent data [13-17].

**The main purpose** of this analytical manuscript is to summarize scientific research on hypertensive crisis, its complications, and medications used in hypertensive crisis.

**The clinical profile and epidemiology.** Out of 333,407 patients who were continuously brought to the emergency room, 4.6/1,000 instances (n = 1,546) were diagnosed with hypertensive crises in a recent large multicenter Italian research (6). 25.3% (n = 391) of the 1,546 hypertension cases were classified as hypertensive emergencies. Remarkably, patients with unexplained HTN accounted for 23% of the emergency (27.9% of men and 18.5% of women). Even among emergency cases (49.3%), the majority of hypertensive crisis patients (55.6%) reported non-specific symptoms such as headache without neurological deficit, dizziness, vomiting, palpitations, etc. Furthermore, the less frequent symptoms in hypertensive crises were heart-related ones, such as syncope, arrhythmias, chest discomfort, and dyspnea. In terms of hypertensive emergencies, acute pulmonary edema was the most common complication, followed by stroke (22%), and myocardial infarction (17.9%) [1,2,8,9,10]. Studies comparing hypertensive emergencies and urgencies have indicated different symptoms and a different clinical picture. In particular, hypertension emergencies had greater diastolic pressure and age than hypertensive urgencies. Headache and chest discomfort were the most common signs and symptoms in hypertensive situations, followed by dyspnea. Acute pulmonary edema, cerebral infarction, and hypertensive encephalopathy were more commonly linked to end-organ damage in hypertensive emergencies. Similarly, a recent research of 73,063 hypertension patients who visited the ER between 2005 and 2010 found that headache and chest discomfort were more common among patients experiencing a hypertensive crisis [4-11].

**Differential Diagnosis and Workup for Hypertension.** Based on a potential causative link between the patient's presentation and acutely raised blood pressure, the differential diagnostic process in an emergency department environment starts with determining whether the patient is actually suffering a hypertensive emergency. The focus should be on identifying or excluding conditions like stroke syndromes, acute heart failure, and pre-eclampsia that are associated with high blood pressure, as well as the presence of a systemic illness as opposed to elevated blood pressure brought on by pain, anxiety, a temporary physiological condition, or medication [11-17].

When evaluating a patient with severe hypertension, the following steps are taken: comprehensive examination of the optic fundi (for papilledema, exudates, or acute hemorrhages);

evaluation of mental health; thorough examination of the heart, lungs, and nervous system; monitoring for symptoms such radial-femoral delay, striae, or abdominal bruit that could point to secondary hypertension; and laboratory tests to evaluate renal function [11,12,13,14].

**Tests for Hypertensive Crises.** The secret to differentiation and the right course of treatment is diagnostic imaging and laboratory tests. These could consist of the following: electrocardiogram (to check for arrhythmias, acute ischemia, and left ventricular hypertrophy);

urine analysis and a basic metabolic profile to assess renal damage;

Perform a peripheral smear and complete blood cell count to check for hemolytic anemia symptoms; screen for urine toxicity; pregnancy test using urine in women who are capable of bearing children; measurement of troponin in patients who may have heart failure or acute coronary syndromes;

CT scan of the brain for individuals with sudden acute headache, encephalopathy, or focal neurologic impairments; and chest radiograph to assess for mediastinal enlargement, cardiomegaly, and pulmonary edema [14-18].

**Management of Hypertensive Crisis.** In order to prevent or restrict further end-organ damage, a patient with a hypertensive emergency should be hospitalized to the critical care unit and treated with intravenous medicine. The degree of hypertension and the resulting end-organ damage determine which antihypertensive medication is best. Treatment for hypertension urgency is not well characterized, in contrast to therapies for hypertensive emergencies. Rapid blood pressure-lowering techniques in the emergency room and referrals from outpatient clinics to the ED have not been shown to enhance outcomes for patients with hypertensive emergencies, according to retrospective research. The following are some interventions for hypertensive urgency symptoms in patients: recommending continuous out-of-office blood pressure monitoring with home and ambulatory monitoring equipment; prescribing a suitable antihypertensive medicine on an outpatient basis; and administering a short-acting hypertensive medication.

Patients should get education on lifestyle choices, including food, exercise, smoking, diabetes, obesity, alcohol usage, sodium intake, and concomitant or underlying disorders that affect their hypertension. Antihypertensive medications, such as thiazide diuretics, calcium channel blockers, angiotensin-converting enzyme (ACE) inhibitors, and angiotensin receptor blockers, are advised for patients with persistent, poorly controlled blood pressure because patients who have a hypertensive crisis are at risk for both chronic hypertension and another episode [9-17].

**Therapy.** Regardless of whether they are the emergency or urgent subtype, patients with hypertensive crises appear to undergo therapy in a somewhat varied and empirical manner. Nonetheless, emergency department doctors have access to significant therapy alternatives. Low dosages of oral antihypertensive drugs should be used to regulate blood pressure in cases of hypertensive urgency, where a gradual drop in blood pressure over the course of hours to days is anticipated. Oral labetalol (3:1 ratio of antagonism of non-selective β-adrenergic and a1 receptor) and clonidine (central a-2 agonist) are medications that can be used to treat hypertensive urgencies. The patient should be admitted to the intensive care unit in cases of hypertensive emergencies, however, where quick blood pressure control with parenteral antihypertensive medicine is necessary. Within minutes to an hour, the blood pressure should drop to roughly 20–25% in the first hour and then to 160/100 or 160/110 mmHg in the next two to six hours. Blood pressure shouldn't be brought back to normal, though [1,2,3,14,15]. This is because further lowering of blood pressure in these patients may result in brain ischemia because of aberrant cerebral flow autoregulation. An exception to this rule would be in the event of an aortic dissection, where it is imperative that the patient get a parenteral β-blocker initially in order to reduce blood pressure quickly and immediately within 5 to 10 minutes. Often used in hypertensive crises, nitroglycerine is a venodilator that primarily lowers preload and cardiac oxygen needs. Along with other antihypertensive regimes, this drug is mainly used to treat acute myocardial infarction and acute pulmonary edema. Other medications that can be used in hypertensive emergencies include clevidipine, a novel short-acting intravenous dihydropyridine calcium channel blocker, and nicardipine (dihydropyridine calcium channel blocker), which is helpful for patients with coronary artery disease because of its positive effect on coronary blood flow. Since it can worsen renal blood flow and increase the risk of renal failure in patients with hypertensive emergencies, enalaprilat, an angiotensin-converting enzyme inhibitor, is not advised [2-9]. With the exception of acute pulmonary edema, diuretics are not typically advised as treatments for hypertensive situations. In contrast, 59 patients with acute pulmonary edema brought on by a hypertensive crisis were randomly assigned to receive either furosemide or a placebo in a recent small randomized controlled trial. Researchers came to the

conclusion that giving a loop-diuretic to individuals with hypertensive pulmonary edema had no effect on their subjective experience of dyspnea. This could be because patients with hypertensive heart failure frequently have euvolemia or relatively modest hypervolemia, and loop diuretics, particularly furosemide, initially cause vasodilation of the venous capacitance after being administered intravenously [14-21].

**The prognosis for hypertensive emergencies** appears to differ from that of hypertensive urgencies. According to epidemiological data, the mortality rate from hypertensive emergencies has gradually declined from 80% in 1928 to 10% in 1989 since a number of drugs can be used to treat these crises. Researchers recently discovered that the total fatality rate for hypertensive crisis patients admitted to a coronary care unit was 3.7%. The death rate was higher for patients with hypertensive emergencies than for those with hypertensive urgencies. Other researchers looked for prognostic factors of major adverse cardiac or cerebrovascular events (MACCE), which are defined as a composite of myocardial infarction, unstable angina, hypertensive crisis, pulmonary edema, stroke, or transient ischemic attack, despite the fact that patients with two entities had different prognoses. In a recent 2-year retrospective analysis, individuals with increased cardiac troponin-I (c TnI) and hypertensive crises were 2.7 times more likely to experience MACCE at the 2-year follow-up than patients with normal c TnI levels. To stratify the patients based on baseline clinical and demographic characteristics, a prognosis score derived from extensive epidemiological studies may be highly beneficial [15-20].

**Discussion.** The most common and significant modifiable risk factor for cardiovascular disease and disability globally is high blood pressure (BP), and the disease burden is even higher in low- and middle-income countries. Strong evidence supports the use of antihypertensive medications in lowering the risk of cardiovascular disease and other organ damage, while acute severe elevations in BP are much less common now than they were decades ago. This may be due to improved management and care models for chronic hypertension, particularly in developed nations, as well as more widespread screening [1-7]. However, patients continue to present with hypertensive crises, which can be fatal, leading to rapid end organ damage and/or death. The prognosis of the patient is greatly impacted by the possibility of end-organ damage in hypertensive crises. Diagnostic imaging and laboratory tests are the key to distinction and the appropriate treatment plan. These could include a basic metabolic profile and urine analysis to evaluate renal damage, an electrocardiogram to screen for arrhythmias, acute ischemia, and left ventricular hypertrophy, Do a total blood cell count and peripheral smear to look for signs of hemolytic anemia; check for toxicity in the urine; pregnancy test in women who are able to conceive using pee; Troponin levels in patients with acute coronary syndrome or heart failure; A chest radiograph to check for mediastinal enlargement, cardiomegaly, and pulmonary edema; and a CT scan of the brain for people with localized neurologic deficits, encephalopathy, or abrupt acute headaches. If the patient has a hypertensive emergency, they should be hospitalized to the intensive care unit so they can get intravenous medication to stop or lessen further damage to their end organs. The degree of end-organ damage and hypertension determine which antihypertensive medication is best [8-14]. The prognosis varies significantly depending on whether the patient presents with an urgent or hypertensive emergency. There are a number of successful treatment regimens for hypertensive emergencies and urgencies; however, the patient's clinical presentation determines which regimen is best. In the emergency room, it is critical for the doctor to recognize hypertensive situations promptly and to treat them with blood pressure-lowering drugs to prevent further organ damage and degradation [21,22].

**Conclusions.** The prognosis of patients with hypertensive crises is significantly impacted by the possibility of end-organ damage. Whether the patient presents with hypertensive emergency or urgency has a significant impact on the prognosis. Both hypertensive emergencies and urgencies can be effectively treated with a number of regimens; however, the patient's clinical presentation will determine which treatment is best. In order to prevent additional injury and degeneration of the target organs, it is imperative that the emergency room physician promptly recognize hypertensive situations and take action using BP-lowering drugs.

A severe rise in blood pressure is linked to end-organ damage, including myocardial infarction, stroke, kidney damage, or heart failure, in hypertensive emergencies. Hypertensive encephalopathy, myocardial infarction, ischemic stroke, intracerebral hemorrhage, dissecting aortic aneurysm, eclampsia, left ventricular failure with pulmonary edema, and unstable angina pectoris are among the symptoms.

Numerous case studies show that managing hypertensive emergencies in the short term can be successful, but the long-term effects are yet unknown. Frequent changes to the pharmaceutical regimen and patient loss to follow-up are contributing factors. Numerous studies show that untreated hypertensive emergencies have extremely high morbidity and fatality rates. This trend is likely to continue unless medical professionals make a concerted effort to inform patients about the seriousness of hypertension.

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