

**CRISIS OF HYPERTENSION AND OVERVIEW OF HYPERTENSIVE EMERGENCY**

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**ABSTRACT**

Hypertension is very common clinical problem. Approximately 1% patients will develop acute elevations in blood pressure at some point in their lifetime. A severe hypertension in diastolic blood pressure is above 110 including hypertensive crises, hypertensive emergencies, and hypertensive urgencies. By definition, acute elevations in blood pressure that are associated with end-organ damage are called hypertensive crises. Immediate reduction in blood pressure is required only in patients with acute end organ damage. This article reviews current concepts, and common misconceptions and pitfalls in the diagnosis and management of patients with acutely elevated blood pressure.

**KEYWORDS:** IV: intravenous; BP: Arterial Blood Pressure; HTN: Hypertension; HE: Hypertensive Emergency; ED: Emergency Department; SBP: Systolic Blood Pressure; DBP: Diastolic Blood Pressure; SVR: Systemic Vascular Resistance; SV: Stroke Volume; CO: Cardiac Output; CCB: Calcium Channel Blocker; BB: Beta-Blocker

**INTRODUCTION**

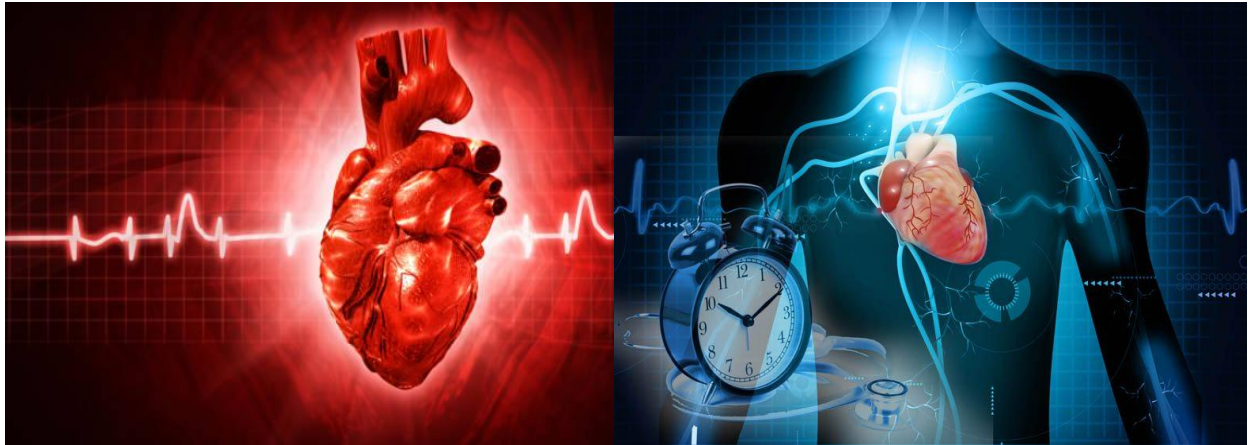
For almost two decades, the prevalence of hypertension among adults 20 years of age and older increased from Overall prevalence of hypertension was 30.7% (95% confidence interval [CI]: 30.5, 30.9) and the prevalence among women was 23.7% (95% CI: 23.3, 24).<sup>[1]</sup> The classification of hypertension has been the same throughout the years, and includes categories from

prehypertension (systolic blood pressure (SBP) between 120-139mmHg and diastolic blood pressure (DBP) between 80- 89mmHg, to the most severe form of the disease: hypertensive crisis. This last category can be divided into hypertensive urgency and hypertensive emergency (HE), both entities have an elevation in SBP >180mmHg and a DPB >120mmHg, but HE also involves end-organ damage.<sup>[2-4]</sup>

**Table 1: Classification of Blood Pressure for Adult.<sup>[4]</sup>**

Category	Systolic blood Pressure (mmHg)	Diastolic Blood Pressure(mmHg)
Normal	<120	<80
Pre-hypertension	120-139	80-89
Hypertension-Stage I	140-159	90-99
Hypertension-Stage II	≥160	≥100
Hypertensive Urgency	>180	≥110
Hypertensive Emergency	>180 with end organ damage	≥120 with end organ damage

**General concepts of Hypertensive crisis: It is more common history in hypertensive patients.** Another factor consideration is that patients with a previous diagnosis of HTN are more likely to develop HE during their life course even if they haven't reached the BP criteria for it (systolic BP>180 and Diastolic BP 120 mmHg with end organ damage).<sup>[5]</sup>



**Figure-1: Heart & Rhythm.**

The 2014 guidelines for the management of high blood pressure (BP) in patients'  $\geq 59$  years of age, states that the BP should be  $< 150/90$ mmHg, and patients' that surpass this BP values should initiate treatment. The same recommendation goes for patients'  $\geq 18$  years of age with the diagnosis of chronic kidney disease; with the difference that the BP goal should be  $<140/90$  mmHg.<sup>[6]</sup>

Blood pressure goals of treatment should be a based on non-modifiable (e.g. age, race), as well as modifiable (e.g. diabetes, dyslipidemia) factors. The clinician should continue to assess BP and adjust treatment regimen until the desired BP is reached. It is estimated that approximately 1% of patients with hypertension will develop a hypertensive crisis.<sup>[3,7]</sup> and it has been estimated that HE account for 25% of all patient visits to the emergency department, with HE detected in one-third of these cases.<sup>[8,9]</sup> The main difference between hypertensive crisis and HE is that the latter presents with end organ damage. The most common signs of end-organ damage is encephalopathy, congestive heart failure, cerebral infarction, among others.<sup>[10]</sup>

**Pathophysiology of hypertensive crises:** Hypertensive crises pathophysiology is not easily understood.<sup>[3,11,12]</sup> Although, it is well known that endothelium reacts to injury by releasing vasoactive mediators which under continuous stimulation would lead to a vicious cycle of clotting cascade activation, tissue death and accumulation with oxidative stress responses. Under these conditions and after auto-regulatory systems failure, elevated systemic vascular resistance will occur.<sup>[3]</sup>

Patients with Hypertensive crises could be found not only in the ICU but in operating rooms, inpatient hospitalization or other clinical settings; so it is very essential that every health care provider knows how to identify and how to treat these patients from the first stages of the disease. Guidelines by the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure for treating hypertensive crises include immediate pharmacological intervention through achieve a reduction in systolic blood pressure of 10 to 15%, but no more than 25% within the first hour.<sup>[13,14]</sup>



**Figure-2: Hypertensive emergency.**

**Treatment:** Once the diagnosis of HE is established, one of the major challenges faced by physicians, is to achieve immediate lower BP values without causing any further increase in end-organ failure. Autoregulation plays an

important role in preventing end-organ damage, heart, brain and kidney are very sensitive to mean blood pressure changes, and high blood pressure values may

cause a reduction in blood flow to the tissues with subsequent injury and ischemia.<sup>[14]</sup>

Several therapies have been described for treatment of Hypertensive Emergency. The ideal pharmacological agent should have vascular selectivity, be an intravenous infusion that is easy to prepare, easily titratable, predictable, of rapid onset and short duration, as well as have minimal side effects.<sup>[15]</sup> Nitrates,  $\beta$  blockers,  $\alpha$  blockers (direct arterial vasodilators),  $\alpha/\beta$  blockers, Dopamine-1 (D1) agonists and Calcium Channel Blockers (CCB), as well as other agents such as Hydralazine, and Phentolamine have been amply studied and used in these clinical settings. Major disadvantages of most of these drugs have been reported and include: difficulty for titration, rebound hypertension, ceiling effect, side effects in other systems (e.g. respiratory) and marked effects on preload and afterload that can lead to organ hypo perfusion.<sup>[16-18]</sup>

## DISCUSSION AND CONCLUSION

Most of incidence of hypertension is continues to increase and it is very a major risk factor for developing cardiovascular disease in the adult population. when there's considerable elevation of BP (>180/>120 mmHg) leading to irreversible organ damage if not properly treated BP promptly. The treatment goal is based on decreasing the BP levels through using medications that, ideally, should have the following characteristics: selectivity, rapid onset, high clearance, small volume of distribution, and a very short half-life. Recently found in Clevidipine, which is the only iv antihypertensive drug currently approved for the treatment of hypertensive crisis. It is an ultrashort-acting vasoselective calcium antagonist that has shown its reliability and helped reaching the blood pressure control in a reasonable timeframe as shown in multiple studies. Nonetheless, if this medication is not available, multiple drug classes have been studied and are widely recognized for the treatment of HE; taking into consideration their undesirable effects is important to be prepared in such circumstances. For example, CCBs such as Nicardipine, have a good and very similar profile to nitroprusside, however, it has a long onset of action and longer half-life, which should be taking into account on specific patient population, such as patients with kidney disease.

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