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Urgent Management of Uncontrolled Hypertensive Crisis in Emergency Department

[1]Alenazi, Ahmad Awad R, [2]Alsomali,Hassan Mohammed I,
[3]Alsomali,Matar Mahmoud Y, [4]Numan,Mohammad Saud S,
[5]Zein Elabidin,Mohammad Radi, [6]Alanazi, Khaled Alnashmi F,
[7]Alanazi, Raed Khalid R, [8]Alanazi Saad Madallah T, [9]Alanazi , Yasir Wadi A

Abstract: **Hypertension, if uncontrolled, can lead to hypertensive crisis and very life threatening condition, therefore this review aim to determine the prevalence of hypertensive crisis, emergency management of uncontrolled hypertensive crisis in Emergency department. Detailed searched was performed through MEDLINE/PUBMED, and EMBASE databases search was conducted using the following Mesh terms; "hypertensive crisis", "hypertensive urgency", hypertensive emergency", "uncontrolled hypertension", and "malignant hypertension" AND "Treatment" and "Emergency medicine" and "Emergency department". We then retrieved the references of all the articles and searched the for additional relevant articles. Searched of published studies were included all dates up to January,2016. Restriction to English language was applied with human subjects. Patients with hypertensive crises may need immediate decrease in elevated high blood pressure to prevent and apprehend progressive end-organ damage. The best medical setting in which to achieve this high blood pressure control is in the intensive care unit, with the use of titratable intravenous hypotensive representatives. There are a number of antihypertensive agents offered for this function, including esmolol, fenoldopam, labetalol, and nicardipine.**

Keywords: **Hypertension, Treatment" and "Emergency.**

1. INTRODUCTION

It is a crucial modifiable risk factor for cardiovascular morbidity and mortality, particularly for stroke (accounting for 51% of all stroke deaths worldwide), ischemic heart disease (45% of all deaths), chronic kidney disease, heart disease, aortic aneurysm, and peripheral arterial disease [(1)]. Prevalence of high blood pressure (systolic blood pressure > 140 mm Hg or diastolic high blood pressure > 90 mm Hg, or on antihypertensive medications) in Pakistan has increased from 17% in 1980 to 35% in 2008 in grownups aged 18 years and older [(2)]. The increasing prevalence of hypertension together with a lacking control makes this one of the regular conditions that require immediate medical attention [(3)].

The frequency of unchecked high blood pressure differs around the world, with the most affordable occurrence in rural India (3.4% in guys and 6.8% in ladies) and the highest prevalence in Poland (68.9% in men and 72.5% in women) [(4)]. Hypertensive crisis can be further classified as a hypertensive seriousness or hypertensive emergency situation depending upon end-organ involvement consisting of cardiac, renal, and neurologic injury. "Hypertensive urgency" describes severe hypertension without evidence of brand-new or getting worse end-organ injury while "Hypertensive emergency" describes an extreme hypertension that is related to progressive or new end-organ damage [(5)]. Hypertensive crises (76% urgencies, 24% emergency situations) represented more than one-fourth of all medical emergencies. Hypertensive urgencies regularly present with headache (22%), epistaxis (17%), and psychomotor agitation (10%) and hypertensive emergencies regularly provide with chest pain (27%), dyspnea (22%), and neurological deficit (21%) [(6)]. Hypertensive seriousness are serious elevations in high blood pressure without proof of progressive target organ dysfunction and can usually be handled by orally administered medications initiated in the emergency situation department with suitable follow-up within 24 hours, to a number of days relying on private characteristics of the patient. Raised high blood pressure alone rarely needs emergency treatment [(7)]. Many hypertensive urgencies or emergency situations are preventable and are the result of inadequate treatment of mild to moderate high blood pressure or nonadherence to antihypertensive treatment [(8,9)].

❖ **Objective:**

Hypertension, if uncontrolled, can lead to hypertensive crisis and very life threatening condition, therefore this review aim to determine the prevalence of hypertensive crisis, emergency management of uncontrolled hypertensive crisis in Emergency department.

2. METHODOLOGY

Detailed searched was performed through MEDLINE/PUBMED, and EMBASE databases search was conducted using the following Mesh terms; "hypertensive crisis", "hypertensive urgency", hypertensive emergency", "uncontrolled hypertension", and "malignant hypertension" AND "Treatment" and "Emergency medicine" and "Emergency department". We then retrieved the references of all the articles and searched the for additional relevant articles. Searched of published studies were included all dates up to January,2016. Restriction to English language was applied with human subjects.

3. RESULTS

Over time, uncontrolled hypertension results in improvement of the cardiovascular system and increases the risk for end-organ damage, such as myocardial infarction, heart failure, stroke, aortic dissection, and kidney failure (8). Repeated contraction versus increased afterload caused by chronic hypertension results in left ventricular hypertrophy and ultimately impaired diastolic filling as the hypertrophied ventricle fails to totally relax. These cardiac changes may advance to left ventricular chamber dilation and systolic dysfunction due to compression of sub-endocardial vessels and non-coronary artery moderated myocardial ischemia. In the arteries, chronic high blood pressure results in cellular renovation that narrows the lumen of little vessels and atherosclerosis in big vessels, particularly the coronary, carotid, and cerebral arteries; these arterial changes greatly increase the risk of myocardial infarction, stroke, and kidney failure (9). Chronic antihypertensive treatment to keep typical blood pressure decreases the relative risk of myocardial infarction and heart failure by 20% to 25% and of stroke by 30% to 40% (10).

✓ ***Diagnostic symptoms of hypertensive crises:***

The clinical symptoms of hypertensive crises are those related to end-organ dysfunction (**Table 1**). Organ dysfunction is unusual with diastolic blood pressures less than 130 mmHg (except in children and in pregnancy) [(11)]. However, the outright level of high blood pressure might not be as crucial as the rate of boost [(12,13)]. In patients with longstanding hypertension a systolic blood pressure of 200 mmHg or elevations in diastolic pressure approximately 150 mmHg might be well tolerated without the development of hypertensive encephalopathy, whereas children or pregnant females may establish encephalopathy with a diastolic blood pressure of only 100 mmHg [(14)].

The symptoms and signs of hypertensive crises vary from patient to patient. Headache, altered level of consciousness, and/or focal neurologic indications are seen in patients with hypertensive encephalopathy [(14)]. On health examination, these patients may have retinopathy with arteriolar changes, hemorrhages and exudates, in addition to papilledema. In other patients, the cardiovascular symptoms of hypertensive crises may predominate, with angina, acute myocardial infarction, or severe left ventricular failure [(15,16)]. In some patients, serious injury to the kidneys may cause intense kidney failure with oliguria and/or hematuria.

In pregnant patients, the intense elevations in blood pressure may vary from a moderate to a deadly disease process. The scientific functions vary but might include visual field problems, severe headaches, seizures, modified mental status, acute cerebrovascular accidents, serious best upper quadrant abdominal pain, congestive heart failure, and oliguria. In the vast bulk of cases, this procedure can just be terminated by shipment. The decision to continue the pregnancy or to deliver must be made following consultation between obstetric and medical personnel [(17,18,19)].

Table 1: Hypertensive emergencies/crises [(11)]

Hypertensive encephalopathy
Dissecting aortic aneurysm
Acute left ventricular failure with pulmonary edema
Acute myocardial ischemia
Eclampsia
Acute renal failure
Symptomatic microangiopathic hemolytic anemia

Management of hypertensive crises in emergency department:

Specialist viewpoint suggests immediate reduction in high blood pressure for patients with hypertensive emergency situation, normally utilizing parenteral medications. It needs to be kept in mind that there are no data supporting supremacy of one drug over another, and there is no conclusive information that immediate decrease in blood pressure minimizes morbidity or death [(20)]. For that reason, the choice relating to which medication to utilize need to be based upon patient qualities (specifically the type and location of end-organ injury that exists) and clinician familiarity with the drug. In addition, the risks of too rapidly reducing high blood pressure and causing a watershed infarct of the brain or kidney must be taken into account. The option of parenteral antihypertensive medication need to be guided by the ability to offer appropriate supervision of administration, accomplish regulated and progressive reduction in high blood pressure while avoiding target-organ damage, and prevent intrinsic drug toxicity [(21)]. Given these limitations, the use of nitroprusside is not advised in the treatment of hypertensive emergency due to the risk of relative hypotension with significant reduction in cerebral blood flow and boost in intracranial pressure [(22)], throwing up, muscle twitching, and thiocyanate and cyanide toxicity [(23)]. Commonly used parenteral drugs in the treatment of hypertensive emergency situation include nicardipine, esmolol, and labetalol (**Table 2**) (21). Nicardipine is a dihydropyridine calcium channel blocker that results in stable, progressive blood pressure reduction with little change in heart rate when administered as a constant infusion (24). Esmolol is a fairly cardioselective beta blocker that is quickly metabolized by blood esterases and has a short half-life of around 9 minutes. Labetalol is a beta blocker with some alpha villain activity that is safe and effective when offered by bolus or continuous infusion [(25,26)]. Labetalol should be prevented in cases where left ventricular dysfunction might be intensified by beta blockade.

Table 2: Parenteral drugs for the treatment of hypertensive emergency [(21)]

Drug	Dose	Onset	Duration	Common side effects
Nicardipine	5–15 mg/hour	5–10 min	1–4 hour	Headache, flushing, nausea, tachycardia
Esmolol	250–500 µg/kg/min for 4 min, then 50–300 µg/kg/min	1–2 min	10–20 min	Nausea
Labetalol	20–80 mg q10 min	5–10 min	3–6 h	Nausea, scalp tingling, burning throat, dizziness, heart block
Hydralazine	5–20 mg	10–20 min	1–4 h	Headache, vomiting, worsening angina
Nitroglycerin	20–500 µg/min	2–5 min	5–10 min	Headache, vomiting, methemoglobinemia, tolerance with prolonged use

Hydralazine and intravenous nitroglycerin are also available, though their usage is typically limited to more narrow indicators. Hydralazine is a direct vasodilator that can be given intravenously or intramuscularly. When used alone in older patients, its use can result in countervailing boosts in heart output. Nitroglycerin is also a powerful vasodilator that reduces preload and in higher doses, afterload [(23)]. It is very effective for patients with severe hypertensive heart failure and is frequently utilized as an adjunct for patients with believed intense coronary ischemia. Extra alternatives for the treatment of hypertensive emergency situations consist of phentolamine, clevidipine, and fenoldopam. Fenoldopam is a peripheral Dopamine-I agonist that maintains or increases kidney perfusion while lowering high blood pressure [(27)]. Clevidipine is an ultra-short-acting dihydropyridine calcium channel blocker that lowers blood pressure by selective arterial dilation, decreasing afterload without affecting heart filling pressure or causing reflex tachycardia [(28)]. Phentolamine is an alpha blocker specifically used in the treatment of pheochromocytoma and tyramine-, cocaine-, or methamphetamine-induced catecholamine crises.

✓ ***Treatment of Hypertensive Urgency:***

The treatment of hypertensive seriousness is generally by oral medications, ideally utilizing the same medications patients are currently taking. In fact, the focus in treatment of hypertensive seriousness must be less on the blood pressure and more on identifying the near cause for the abrupt boost in blood pressure. For that reason, treatment needs to also resolve hypoxia, pain, volume overload, bladder distension, disturbed sleep, or other sources of free instability. The objective

must be to prevent quick or sheer reduction in blood pressure, which might precipitate unfavorable occasions such as watershed cerebrovascular infarct.

Oral medications that might be considered include labetalol, clonidine, and captopril. Captopril is a fast-acting oral angiotensin-converting enzyme inhibitor (ACEI) that can be administered sublingually in addition to orally [(29)]. Care needs to be utilized in patients with volume deficiency and kidney insufficiency, and patients with an activated renin-angiotensin system might experience abrupt, marked high blood pressure decrease [(30)].

Labetalol, the alpha and beta blocker, can be given up 100 mg and 200 mg doses every hour. Clonidine is a central alpha agonist that has the adverse effects of sedation. Reliable for severe blood pressure reduction, it is likewise well known to cause rebound high blood pressure with missed doses in chronic use and must not be prescribed to patients with awaited low medication adherence. Diuretics such as furosemide or bumetanide may be used to lower high blood pressure in patients with fluid overload and to prevent the loss of potency of other antihypertensive medications that trigger fluid retention while they lower high blood pressure. Care ought to be taken to avoid causing volume deficiency, which increases renin and trigger vasoconstriction and raise high blood pressure. The use of oral nifedipine is no longer advised because it may induce substantial and quick fall in high blood pressure in an unchecked manner, increasing the risk of cerebral hypoperfusion and watershed infarcts [(31)].

4. CONCLUSION

Patients with hypertensive crises may need immediate decrease in elevated high blood pressure to prevent and apprehend progressive end-organ damage. The best medical setting in which to achieve this high blood pressure control is in the intensive care unit, with the use of titratable intravenous hypotensive representatives. There are a number of antihypertensive agents offered for this function, including esmolol, fenoldopam, labetalol, and nicardipine.

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