

15 Hypertensive Crisis

Abstract: Hypertension is a frequent disorder. Less than 1% can present to emergency room with hypertensive crisis. The management of hypertensive crisis requires urgent physical examination, including a detailed history. After categorizing the type of hypertensive crisis, management should be done either in emergency ward or at the ICU setup. Several rapid acting intravenous antihypertensives are available, which will control the blood pressure to reasonable levels and prevent fatal complications.

Description of blood pressure appeared in 1700 BC when Chinese were aware that *"If large amounts of salt are taken, the pulse will stiffen or harden."* Stephen Hales measured the blood pressure in 1773 and Fredrick Mahmud incorporated measurement of blood pressure routinely.¹

The prevalence of blood pressure globally is one billion. In India prevalence rates vary from 10 to 25% in rural and urban population respectively. An untreated hypertension is vulnerable to target organ damage with its attendant complications.²

*Hypertensive crisis is defined as a systolic blood pressure of over 200 mm Hg and diastolic of over 120 mm Hg.*³

Hypertensive crisis occur in less than 1% of hypertensive; 62.5% are due to non compliance of therapy.

The predisposing risk factors for hypertensive crisis in vast majority are due to:

1. Decrease compliance in prescribed medication.
2. Long standing hypertension.
3. Sudden withdrawal of drugs like β -blockers, clonidine or MAO inhibitors.
4. A small percentage could be due to drug abuse.
5. Associated disorder like vasculitis, renal parenchymal disease are prone for hypertensive crisis (Table 1).

Hypertensive crisis is differentiated into:

- a. Emergencies
- b. Urgencies depending on the presence or absence of target organ damage and on rapidity of increase in blood pressure.⁴

Hypertensive emergencies require immediate admission to "intensive care unit" since blood pressure should be reduced by 25% within minutes to hours. The speed of reduction in blood pressure in urgencies is more gradual.⁵

PATHOPHYSIOLOGY

Hypertensive crisis causes extensive endothelial damage and fibroid necrosis of the arteriole.

There is a widespread breakdown in auto-regulation and this result in ischemia. Ischemia in turn releases various vasoactive substances like endothelin-1 and causes extensive endovascular damage.⁶

APPROACH TO HYPERTENSIVE CRISIS

A detailed history prior to episode is essential. History regarding:⁷

- a. Duration of hypertension
- b. Medication
- c. Earlier episode of hypertensive crises
- d. Symptoms prior to crisis like headache, vomiting, transient muscle weakness, sweating, visual disturbances and effort dyspnea will help in indicating target organ dysfunction.

A diagnosis is established by accurate recording of blood pressure and relevant investigations, to document presence or absence of target organ damage. Fundoscopy, CBC, BUN, creatinine and urine analysis are done. In selected subsets vinyl mandelic acid, serum potassium, peripheral rennin and serum aldosterone need be done. In reno-vascular hypertension, angiogram, Doppler, ultrasound, MRI are required. An echocardiogram will be useful to assess cardiac pathology.

VIDT⁸ in 2000 AD developed a triage system to evaluate whether a hypertensive crisis requires an ICU admission or only emergency room management.

Severely raised hypertension: > 180/110 mm Hg with headache, anxiety with no target organ damage may be dealt by reintroducing old medication or introducing better combinations. It is not necessary to increase the dosage of monotherapy. Adding a diuretic to regime will be helpful.

In hypertensive urgencies: After adequate observation, blood pressure may be lowered with beta blocker, ACE inhibitor, calcium channel blocker. Occasionally clonidine may be used. Urgencies can be tackled in emergency ward.

Hypertensive emergencies: Hypertensive emergencies require urgent attention as blood pressure should be reduced rapidly, though not to normal levels. As a rule urgencies require oral and emergencies may be require parenteral therapy. Blood pressure reduction in emergencies initially should be reduced by 10 to 15% in 5 to 10 min and later brought down to desired goal within 30 to 60 min. ICU admission is required for close monitoring.⁹ Table 2 shows the drugs available for parenteral use.

Commonly used drugs in hypertensive crisis are nitroprusside, nitroglycerine, fenoldopam, esmolol, and enalaprilat. A special mention is relevant in the usage of nifedipine, nitroglycerine and hydralazine.

Nifedipine: This is a short acting calcium blocker which was used extensively to control of blood pressure, particularly in the setting of:

- a. Preoperative hypertension
- b. Pregnancy induced hypertension.

Nifedipine given sublingually- rapidly decreases blood pressure within 5 to 10 min. With peak effect ranging between 30-60 min. The duration of action is 6 hours. This sudden decrease in blood pressure may trigger vascular insufficiency to renal, cardiac and cerebral circulation. Currently, the use of nifedipine sublingually is strongly discouraged.¹⁰

Hydralazine is being used by tradition in eclampsia and other emergencies. The reduction of blood pressure is erratic and prolonged, hence it is not recommended in hypertensive emergencies.

Nitroglycerine is extensively used in ICU and emergency room setup. It is useful in myocardial ischemia. It has to be emphasized that nitroglycerine is not an effective vasodilator unless given in high doses. It causes undesirable side effect which causes cerebral and renal insufficiency.

Table 3 shows recommended combinations in various emergencies.¹¹

Acute myocardial infarction/ischemia: Due to increase sympathetic tone blood pressure is elevated in ischemia event. Transient increases of blood pressure reduce by pain management; otherwise, nitroglycerine (NTG) is the drug of choice. NTG decreases the blood pressure and increases the blood supply by dilating intra- coronary arteries. Nitroprusside can be used in refractory cases.

Aortic dissection: Urgent reduction of blood pressure is mandatory. A combination of nitroprusside with β -blockers like esmolol or propranolol is used.

Hypertensive encephalopathy: Sudden break through in autoregulation of cerebral circulation cause cerebral edema and focal neurological deficit. Blood pressure should be brought down by

25% within 2 hours. The diastolic blood pressure is maintained at 100 mm Hg. The ideal antihypertensive agent is nitroprusside, second line of drugs include labetalol, fenoldopam and nicardipine.

Renal insufficiency: The prognosis with hypertensive and renal insufficiency depends on serum creatinine. An urgent reduction of blood pressure improves the kidney function. Calcium channel blocker (nicardipine) and fenoldopam are useful. Support technology in renal replacement like dialysis and later renal transplant improves the prognosis dramatically.

Postoperative hypertensive crisis: Postoperative hypertensive crisis are rare though elevation of blood pressure are known. Adequate analgesia and volume replacement is enough in most cases. In a small percentage nitroprusside or nitroglycerine can be used. Other effective drugs are nicardipine, β -blockers, fenoldopam.

Eclampsia: This is a syndrome seen in young primigravida. Usually it is observed beyond 20th week of gestation. Proteinuria and edema are part of the syndrome.

A combination of magnesium sulphate with hydralazine is commonly used. Good alternate drugs are labetalol and calcium channel blockers.

SUMMARY

Hypertensive crisis though infrequent is fatal complication. A rapid diagnosis is mandatory. Crucial to management is to differentiate emergencies from urgency to enable admission to ICU.

Hypertensive emergencies need group categorizing as stated earlier to facilitate in reduction of blood pressure. As shown in Figure 1. It must be remembered "*While skating over thin ice, speed is important*"

REFERENCES

1. Mary MW, Peter N, Way Bill. A practical approach to hypertension in 21st century. J Vasc Inter Radiology 2003;14:961-73.
2. Shah SN. Indian hypertension guide lines-II 2007.
3. Calhoun DA, Oparil S. Treatment of hypertensive crisis. New Eng J Med 1990;323:1177-83.
4. Gifford RW Jr. Management of hypertensive crisis. JAMA 266:829-35.
5. Strandgaard S, Paubon OB. Cerebral autoregulation. Stroke 1984;15:413-16.
6. Ault MJ, Ellrodt AG. Pathophysiological events leading to end organ effects of acute hypertension. Am J Emerg Med 1985; 3(6 Supple):10-15.
7. Joseph V, Paul EM. The diagnosis and management of hypertensive crisis: Chest 2000;118:241-47.
8. Vidt DG, Emergency room management of hypertensive emergencies and urgencies. J.Cl. Hypertension (Greenwich) 2001;3:158-64.
9. Banam LT, Beeven DC, Conen D, ABC of blood pressure reduction. BMJ 1980: 281:1120-22.
10. Crossman E, Masserli FH, Crodzicki, et al. Should a moratorium be placed on sublingual nifedipine capsule given for hypertensive emergencies and pseudoemergencies ? JAMA 1996;276:1328-31.
11. Saxena A, Singal RK, Munjal YP. Management of hypertensive crisis, AK Agarwal (Ed) "Emergency in Medicine", Jaypee Brothers, Medical Publishers New Delhi 2005;84.

MULTIPLE CHOICE QUESTIONS

1. The incidence of hypertensive crisis is:

- A. <1%
- B. 5-10%
- C. 10-21%
- D. >21%

2. Criteria to diagnose hypertension emergency depends on all *except*:

- A. Severity of BP
- B. Organ damage
- C. Rate of increase BP
- D. All of the above

3. Hypertension urgencies require:

- A. Admission to ICU
- B. Management in ER
- C. BP reduction achieved gradually mandatory
- D. Use of parenteral preparations
- E. None of the above

4. The speed of reduction in BP during emergencies is achieved in minutes to hour:

- A. By 25%
- B. 50%
- C. 75%
- D. None of the above

5. All the drugs mentioned below are used in hypertensive emergencies *except*:

- A. Nitroprusside
- B. NTG
- C. Nifedipine
- D. Esmolol
- E. Enalaprilat

6. Which drugs are preferred in aortic dissection?

- A. Esmolol
- B. NTG
- C. Nitroprusside
- D. None of the above

7. BP in renal insufficiencies is effectively reduced in order of preference:

- A. Nicardipine
- B. Fenoldopam
- C. Hydralazine
- D. None of the above

8. BP reduction in hypertension encephalopathy is reserved for patient with a diastolic pressure:

- A. 95-110 mmHg
- B. 110-120 mmHg
- C. >120 mmHg

1. A 2. D 3. C 4. A 5. C 6. A, C 7. A, B, C 8. C