Clinical Profile of Hypertensive Emergencies in an Intensive Care Unit

Shubhangi V Dhadke¹, Vithal N Dhadke², Dhruv S Batra³

Abstract

Aims and objectives
To study the prevalence of hypertensive emergencies in an ICU set up and to study the clinical presentation of hypertensive emergencies related to cardiovascular, neurological and renovascular system.

Methods: Type of Study: Cross-sectional, descriptive study.
Duration of study: Two years from 1st December 2011 till 30th November 2013.
Sample size: 50 patients of hypertensive emergencies admitted to the intensive care unit of Dr. V.M. Govt. Medical College, Solapur were studied.

Inclusion criteria
1. All patients above 18 years of age.
2. Systolic blood pressure > 180 mmHg
   Diastolic blood pressure > 120 mm Hg

Exclusion criteria
1. Pregnancy
2. Patients with diabetes mellitus

We classified as hypertensive emergencies all cases in which the increase in blood pressure was associated with one or more of the following types of acute or ongoing end-organ damage: hypertensive encephalopathy; stroke (cerebral infarction or intracerebral or subarachnoid hemorrhage, transient ischemic attack); acute pulmonary edema, left ventricular failure; acute myocardial infarction or unstable angina, progressive renal insufficiency features suggestive of retinopathy.

All these conditions were diagnosed clinically or by appropriate diagnostic tests.

Conclusion
The most common presenting complaint in patients was breathlessness seen in 17 patients (34%), followed by neurological deficit in 14 patients (28%). Thirteen patients (26%) had complaints of headache, whereas 12 (24%) patients complained of chest pain on admission. Other symptoms included vomiting, giddiness, psychomotor agitation, and decreased urine output.

Out of a total of 4076 admissions during the study period in the intensive care unit we had 50 cases of hypertensive emergencies with prevalence of 1.22% in our intensive care unit.

Most common organ involvement was the retina followed by cardiovascular system, renal and then the central nervous system.

Editorial Viewpoint

• With increased prevalence of hypertension more number of hypertensive emergencies are encountered.
• This study finds breathlessness and neurological deficit as the most common features.
• Retina was the most commonly involved organ.

Introduction

Hypertension is becoming an important public health problem worldwide. A recent report on the global burden of hypertension indicates that nearly 1 billion adults (more than a quarter of the world’s population) had hypertension in 2000, and this is predicted to increase to 1.56 billion by 2025.¹ Subjects with hypertension are known to have a two-fold higher risk of developing coronary artery disease (CAD), four times higher risk of congestive heart failure and seven times higher risk of cerebrovascular disease and stroke compared to normotensive subjects.²

A hypertensive crisis is classified as hypertensive emergency (HTN-E) or hypertensive urgency (HTN-U). HTN-E is characterized

¹Associate Professor, ²Professor and Head of Dept., ³Senior Resident, Dr. V.M. Government Medical College, Solapur, Maharashtra
Received: 08.05.2016; Accepted: 08.10.2016
by a severe elevation of blood pressure (BP; ≥180/120 mm Hg) with evidence of progressive organ damage or target organ failure. HTN-U is defined as uncontrolled BP without failure or damage to the target organ.  

**Aims and Objectives**

1. To study the clinical presentation of hypertensive emergencies related to cardiovascular, neurological and renovascular system.

2. To study the prevalence of hypertensive emergencies in an ICU set up.

Methods: Type of study: Cross-sectional, Descriptive study.

Duration of study: Two years from 1st December 2011 till 30th November 2013.

Place of study: Dr. V.M. Govt. Medical college, Solapur.

Sample size: 50 patients of hypertensive emergencies admitted to the intensive care unit of Dr. V.M. Govt. Medical college, Solapur were studied during the study period.

**Inclusion Criteria**

1. All patients above 18 years of age.
2. Systolic blood pressure > 180 mmHg.
   Diastolic blood pressure > 120 mm Hg.
3. Both groups of patients, those with past history of hypertension and those without past history of hypertension.

**Exclusion Criteria**

(1) Pregnancy (2) Patients with Diabetes Mellitus

We classified as hypertensive emergencies all cases in which the increase in blood pressure was associated with one or more of the following types of acute or ongoing end-organ damage: hypertensive encephalopathy; stroke (cerebral infarction or intracerebral or subarachnoid hemorrhage Transient Ischemic Attack); acute pulmonary edema, left ventricular failure; acute myocardial infarction or unstable angina, progressive renal insufficiency, features suggestive of retinopathy.

All these conditions were diagnosed clinically and by diagnostic tests (blood and urine chemistry, fundus examination, ECG, roentgenogram, computed tomography, magnetic resonance imaging, and ultrasound imaging) as appropriate. Detailed history taking and examination was done at the time of admission.

**Biochemical Analysis**

- Blood sugar
- Serum electrolytes
- Blood urea / creatinine
- Urine routine and microscopy (for proteins / RBC’s / pus cells)
- Lipid profile
- ECG
- 2D Echo
- Cardiac Enzymes : CPK –MB, Troponin T

**Radiological**

- Chest X Ray.
- USG Abdomen/Pelvis/ Renal Doppler
- CT head plain/contrast
- MRI brain if needed

**Statistical Analysis**

Results were expressed as mean ± SD and median for continuous data. Categorical data are presented as numbers and percentages, were analyzed by chi-square test. p value of 0.05 or less was considered as statistically significant.

**Observations and Results**

50 patients of hypertensive emergencies admitted to the ICU during the study period were studied.

The most common presenting complaint in patients was Dyspnea seen in 17 patients (34%), followed by neurological deficit seen in 14 patients (28%). 13 patients (26%) had headache whereas 12 patients (24%) complained of chest pain on admission, whereas giddiness was seen in 10 patients each (20%). 8 patients (16%) had vomiting (Table 1).

**Prevalence**

There were a total of 4076 admissions in the ICU of our tertiary care centre during the study period of two years from 1st December 2011 till 30th November 2013. During this study period 50 patients of hypertensive emergencies who were admitted to the ICU of our tertiary care centre were studied. This resulted in a prevalence of 1.22%.

**Assessment of Target Organ Damage in Hypertensive Emergencies**

Changes in the retina in hypertensive patients were judged by fundoscopy.

44 out of the 50 patients (88%) of hypertensive emergencies had evidence of retinal damage as judged by fundoscopy by direct ophthalmoscope under mydriasis. Out of these 44 patients with hypertensive retinopathy, 13 patients (26%) had grade I, 17 patients (34%) had grade II, while 10 patients (20%) had grade III and 4 of these patients (8%) had severe grade IV hypertensive retinopathy (Table 2).

Cardiovascular system involvement in hypertensive emergencies is seen in many ways which include, left ventricular hypertrophy (LVH), ischemic heart disease (IHD), acute left ventricular failure (LVF), acute myocardial...
infarction (AMI) (Table 3).

11 patients out of 50, (22%) had only left ventricular hypertrophy, 13 patients (26%) had LVH with ischemic heart disease (IHD), 8 patients (16%) presented in Acute LVF, 5 of the patients (10%) came with Acute Myocardial Infarction (AMI). Hence 64% of the patients presented with cardiovascular involvement.

Transient ischemic attack and hypertensive encephalopathy were diagnosed clinically whereas the rest were diagnosed with the help of imaging (CT Scan/MRI).

Central nervous system involvement is seen in 16 patients (32%) with hypertensive emergencies. 2 patients (4%) came with transient ischemic attack, 7 patients (14%) came with cerebral infarction, 5 patients (10%) presented with intracerebral bleed, 2 patients (4%) came with hypertensive encephalopathy (Table 4). 34 patients (68%) had no evidence of CNS involvement.

Abnormalities on Ultrasonography

Out of a total of 50 patients, 10 patients (20%) had medical renal parenchymal disease, 6 patients (12%) had chronic kidney disease (Table 5).

Table 3: Cardiovascular system involvement

<table>
<thead>
<tr>
<th>Nature of involvement</th>
<th>No. of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>LVH +Ischemic heart disease(IHD)</td>
<td>13</td>
<td>26%</td>
</tr>
<tr>
<td>Left ventricular hypertrophy(LVH)</td>
<td>11</td>
<td>22%</td>
</tr>
<tr>
<td>Acute left ventricular failure(LVF)</td>
<td>8</td>
<td>16%</td>
</tr>
<tr>
<td>Acute myocardial infarction(AMI)</td>
<td>5</td>
<td>10%</td>
</tr>
</tbody>
</table>

Chi square test = 4.8, DF = 4, p<0.05

Out the total 50 patients of hypertensive emergencies 12% of the patients (6) had only one organ involvement, 28 patients (56%) had two organ involvement, whereas 32% i.e. 16 patients had more than two organ involvement (Table 6).

Discussion

Fifty patients of hypertensive emergencies admitted to the ICU during the study period were studied.

Clinical Features

The clinical manifestations of hypertensive emergency are directly related to the particular end-organ dysfunction that has occurred.

The most common presenting complaint in our patients was dyspnea seen in 17 patients out of 50 (34%), followed by neurological deficit seen in 14 patients (28%). 13 patients (26%) had complaints of headache, whereas 12 patients complained of chest pain on admission (24%). Other symptoms included vomiting, giddiness, psychomotor agitation, and decreased urine output. These findings were found to be statistically significant. (p<0.05).

The clinical pattern of presentation of hypertensive crises was studied before by Zampaglione et al (1996) where in chest pain (27%), dyspnea (22%), and neurological deficit (21%) were the most frequent signs in hypertensive emergencies. In the STAT registry as reported by Katz et al (2009), the most common presenting symptoms included shortness of breath (29%), chest pain (26%), headache (23%), altered mental status (20%) and focal neurologic deficit (11%).

Prevalence

During this study period, 50 patients of hypertensive emergencies who were admitted to the ICU of Dr. V.M. Govt. Medical College, Solapur, were studied. Out of a total of 4076 admissions during the study period. This resulted in a prevalence of 1.22%.

In the study by Pacheco et al (2013), prevalence of hypertensive emergencies was reported to be 3.75%.

Zampaglione et al (1996) reported a prevalence of 2.29% in the ICU.

JF Martin et al (2010) reported a prevalence of 0.68% of hypertensive emergencies.

The high prevalence rate of hypertensive crises in the study by Zampaglione et al (1996) and other above mentioned studies may result from the inclusion of cases of hypertensive pseudocrisis, which may imitate hypertensive urgency and consequently, distort the final results.
In patients experiencing a pseudocrisis, independent of blood pressure levels, neither evidence of acute target-organ lesions nor an immediate life threat exits, when the patient is assessed by use of usual means (anamnesis, physical examination, fundoscopy, biochemical tests, electrocardiography, chest X-ray, and computerized tomography of the brain). These are usually hypertensive patients, who, although under treatment, are not controlled, being, therefore, referred to the emergency unit of the hospital. These patients are oligosymptomatic or asymptomatic, but their blood pressure levels are very elevated. It is worth noting that, in these cases, new medical counseling and a reassessment are required. Another group of hypertensive patients may have a transient blood pressure elevation caused by any emotional, painful, or uncomfortable event, such as migraine, vertigo, vascular headaches of muscle-skeletal origin, and manifestations of panic disorder, also characterizing a hypertensive pseudocrisis.7

Another possible explanation, which should not be forgotten, is the greater number of hypertensive individuals currently diagnosed and treated, which results in better blood pressure control with a lower rate of complications, and hence a lower prevalence of hypertensive emergencies.

**Target Organ Damage**

**Retinopathy**

Out of these 88% (44 out of 50 patients) with hypertensive retinopathy, 17 patients (34%) had grade II, 13 patients (26%) patients had grade I, while 10 patients (20%) had grade III, 4 patients (8%) of these patients had severe grade IV hypertensive retinopathy. This was statistically significant, p<0.05.

Exudative pattern was more commonly seen with higher grades of hypertension. Lowered incidence of grade III and grade IV may also be due to lesser life expectancy of patients with grade III or grade IV hypertensive retinopathy.

Singh et al (1983) reported similar findings in their study of 200 patients of hypertensive retinopathy. Grade II retinopathy was present in maximum number of cases (50%) followed by Grade I(24%), Grade III (15%) and Grade IV (11%).

Arteriosclerosis emerged as an important factor in causation of local complications of hypertensive retinopathy. Systemic complications were almost always associated with severe changes in retinal vessels.

There was a close correlation between local, ocular and systemic complications of hypertension.8 The ocular exam may show evidence of advanced retinopathy with arteriolar changes, exudates, hemorrhages or papilledema assisting in the identification of hypertensive encephalopathy. It is essential to perform a funduscopic examination in all patients with hypertensive emergencies as the presence of an advanced retinopathy is closely associated with the presence of widespread microvascular dysfunction with renal injury.9

**Cardiovascular System Involvement**

Out of 50, 11 patients (22%) had only left ventricular hypertrophy, 13 patients (26%) had LVH with ischemic heart disease(IHD), 8 patients (16%) of the patients presented in acute LVF, 5 patients (10%) came with acute myocardial infarction (AMI). Hence 64% of the patients presented with cardiovascular involvement. Martin et al (2010) reported 30% patients presenting with acute LVF and 25% patients with acute myocardial infarction, with nearly 59.1% of the patients having cardiovascular involvement.4 Katz et al in the STAT Registry (2009) reported 26% of patients with cardiovascular involvement.2 Zampaglione et al (1996) reported nearly 48% of patients with hypertensive emergencies with cardiovascular involvement.1 These differences could be related to the characteristics of the patients who are admitted to our hospital.

**Renal Involvement**

On ultrasonography, 10 patients (20%) had medical renal parenchymal disease, 6 patients (12%) had chronic kidney disease, one patient had renovascular involvement in the form of renal artery stenosis, 33 patients (66%) had normal ultrasound findings (p<0.05).
patients (56%) had two organ involvement, whereas 16 patients (32%) had more than two organ involvement. This was found to be statistically significant (p<0.05).

Of the patients with three or more target organ involvement 13 patients out of 50 (26%) had three target organ involvement in the form of CNS, Renal and Retinal involvement. Singh et al (1983) reported that changes in retinal vessels go hand in hand with changes in the vessels in the kidneys and nearly 80% of the patients having cerebrovascular and cardiac complications had grade III retinopathy. Of the patients with three or more target organ involvement 13 patients out of 50 (26%) had three target organ involvement in the form of CNS, Renal and Retinal involvement. Singh et al (1983) reported that changes in retinal vessels go hand in hand with changes in the vessels in the kidneys and nearly 80% of the patients having cerebrovascular and cardiac complications had grade III retinopathy.8

Summary and Conclusion

Out of a total of 4076 admissions during the study period in the intensive care unit a total of 50 cases of hypertensive emergencies were studied. This resulted in a prevalence of 1.22% of hypertensive emergencies.

Most common organ involvement in patients was the retina followed by cardiovascular system, renal and then the central nervous system.

Left ventricular hypertrophy with ischemic heart disease was the most common finding in cardiovascular system.

Central nervous system involvement was seen in 16 patients (32%) with hypertensive emergencies. Most common presentation was cerebral infarction.

References