Original Article

Hypertensive Crisis Profile. Prevalence and Clinical Presentation

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Objective

To assess the prevalence of hypertensive crisis, related clinical findings, and the organic lesions involved.

Method

This retrospective study comprised the analysis of the medical records of symptomatic patients with an elevation in diastolic blood pressure levels ≥ 120 mmHg, who sought the emergency unit of a university-affiliated hospital over 12 months. Hypertensive urgency was characterized as the symptomatic elevation of blood pressure levels with no evidence of target-organ lesions, and hypertensive emergency was characterized as the symptomatic elevation of blood pressure levels with evidence of acute or ongoing target-organ lesion.

Results

This study comprised 452 patients with hypertensive crisis, accounting for 0.5% of all clinicosurgical emergencies, of which, 273 (60.4%) were hypertensive urgencies and 179 (39.6%) were hypertensive emergencies. Eighteen percent of the patients ignored their hypertensive condition. Smoking and diabetes were risk factors associated with the development of a hypertensive crisis in 1/4 and 1/5 of the patients, respectively. The patients with a hypertensive emergency were older (59.6±14.8 versus 49.9±18.6 years, $p < 0.001$) and had greater diastolic blood pressure (129.1±12 versus 126.6±14.4 mmHg, $p < 0.05$) than those with hypertensive urgencies. Ischemic stroke and acute pulmonary edema were the most common hypertensive emergencies, being in accordance with the most frequently found clinical manifestations of neurologic deficit and dyspnea.

Conclusion

Hypertensive crises accounted for 0.5% of all emergency cases studied and for 1.7% of all clinical emergencies, hypertensive urgency being more common than hypertensive emergency. Ischemic stroke and acute pulmonary edema were the most frequent target-organ lesions in hypertensive emergencies.

Key words

hypertensive crisis, prevalence, hypertensive emergency, hypertensive urgency

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Cardiovascular diseases are an important public health problem in our country, being, in 2000, the major cause of death in Brazil [1]. Among the cardiovascular diseases, systemic arterial hypertension stands out with an estimated prevalence around 20 to 30% of the adult population older than 18 years [2]. However, it is worth noting that in Brazil, the elderly population has increased drastically. Such that, a 200% increase in the number of individuals older than 65 years is expected in the next 2 to 3 decades. This will result in a proportional increase in the prevalence of hypertension in the Brazilian population [3].

One form of presentation or even complication of arterial hypertension is a hypertensive crisis, characterized by a rapid, inappropriate, intense, and symptomatic elevation in blood pressure, with or without the risk of rapid deterioration of target-organs (heart, brain, kidneys, and arteries), which may represent an immediate or potential life threat. When blood pressure levels are elevated, diastolic blood pressure should be looked at (in these cases, diastolic blood pressure levels are usually > 120 mmHg) [4-8]. However, in some cases of sudden onset, such as acute glomerulopathies and pregnancy toxemia, the crisis may occur with a relatively slight elevation in blood pressure levels, presenting a diastolic blood pressure of around 100 to 110 mmHg.

A hypertensive crisis may be manifested as a hypertensive emergency or urgency. A hypertensive emergency is characterized by rapid deterioration of target-organs and poses an immediate threat to life, a situation not found in hypertensive urgency [5,6]. A condition requiring a rapid reduction in blood pressure, within minutes, is also considered an emergency, while in an urgent situation, blood pressure may be reduced more slowly, within hours.

An important fact of frequent occurrence is the so-called hypertensive pseudocrisis [5,9]. 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, funduscopy, 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.

The incidence/prevalence of hypertensive crises in the population is very scarcely discussed in the medical literature, the references being usually old articles or studies carried out in populations of little significance. Approximately 1% of the hypertensive individuals may have a hypertensive crisis, in the form of malignant hypertension [10,11]. Brizio-Molteni et al [12] studied the incidence of hypertensive crises in patients with second- and third-degree burns. Sobrino et al [13] assessed the prevalence, the forms of presentation, and the treatment of hypertension in an emergency unit for 37 randomly chosen days from a period of 3 months. Tonies [14] studied the frequency of cardiovascular diseases in a medical emergency service in Vienna and reported that arterial hypertension was the second major cause of cardiovascular emergency. Zampaglione et al [15] carried out a prospective study for 1 year and reported that 27.5% of the cases treated in the clinical emergency unit of an Italian referral hospital were hypertensive crises.

After the availability of the new generation of antihypertensive agents, which are long lasting and better tolerated, the incidence of accelerated hypertension with papilledema has become less common, with a decline from 7% to 1% [16]. However, the incidence of hypertensive crises seems to be increasing. From 1983 to 1992, the hospital admissions due to malignant hypertension increased from 16,000 to 35,000 in the United States [17]. Hypertensive emergencies occur more frequently in patients previously diagnosed with primary hypertension, who do not comply with appropriate treatment.

Despite the previous definitions, the approach to a hypertensive crisis has controversies mainly related to the correct diagnosis, the differentiation between emergency and urgency, the difficulties of assessment, and the choice of the appropriate therapy. This fact assumes greater importance when one considers that correct diagnosis and appropriate treatment prevent the appearance of severe lesions resulting from this medical condition. In addition, no information on the prevalence of such a significant complication of arterial hypertension exists in our country, which justified the present study. The objectives of this study were as follows: 1) at a regional referral university-affiliated hospital, to assess the prevalence of hypertensive crises, which were divided into hypertensive urgency and emergency; 2) to analyze the profile and clinical presentation (signs and symptoms) of the patient with a hypertensive crisis during treatment in the emergency unit of that hospital; and 3) to assess the frequency of the several clinical presentations of hypertensive emergency and the profile of the patients with that condition.

Method

This retrospective study comprised the assessment of the medical records of patients treated in the emergency unit of a university-affiliated hospital during the year 2000. This university-affiliated hospital is a referral center for secondary and tertiary treatment, providing 24-hour medical care for a population of approximately 2 million inhabitants, who have free access to medical care through direct contact or through referral from other medical services in the city and region.

The study comprised all patients older than 18 years, who sought the emergency service of the Sistema Único de Saúde (Brazilian public health care system) during the year 2000. The cases of hypertensive crises, including the obstetrical ones (preeclampsia and eclampsia), were selected from the hospital statistics in the data processing center and computed for analysis as clinical treatments. The study was submitted to and approved by the Committee on Ethics and Research of the institution. The criteria used for defining a hypertensive crisis and hypertensive emergency and urgency were those of the VI Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure [4] and the Brazilian Meeting on Hypertensive Crises [5]. A hypertensive crisis was considered the situation in which the patient is symptomatic and has a diastolic blood pressure ≥ 120 mmHg. A hypertensive emergency occurred in the presence of acute or ongoing target-organ lesions, or of an immediate life threat, a condition requiring immediate intervention for blood pressure reduction within minutes. Hypertensive urgency was defined as an elevation in diastolic blood pressure ≥ 120 mmHg with no evidence of target-organ lesion, and, therefore, a reduction in blood pressure can be obtained in hours, not minutes.

All cases in which blood pressure elevation was associated with 1 or more types of acute or ongoing target-organ lesions were classified as hypertensive emergencies, with their respective codes according to the International Classification of Diseases – ICD 10th revision, shown in table I.

The conditions were diagnosed based on clinical history, physical examination, and diagnostic tests (blood and urine biochemical tests, funduscopy, electrocardiography, chest X-ray, computerized tomography of the brain) when necessary. In the absence of target-organ lesions, all hypertensive crises were considered, by exclusion, hypertensive urgencies.

The blood pressure level of each patient was measured according to the recommended standard technique, using a mercury-column sphygmomanometer. The mean of at least 2 consecutive measurements taken at 1-minute intervals was used according to instructions provided by the service.

The prevalences of the hypertensive crises, urgency and emergency, are expressed as the percentage of the total number of clinical emergencies treated at the hospital and the percentage of all medical urgencies and emergencies treated at the clinico-surgical emergency unit (the obstetrical cases were included as clinical treatments).

Table I - Situations characterized as hypertensive emergencies and their respective codes according to the International Code of Diseases (ICD 10)

Diagnostic	ICD
Hypertensive encephalopathy	I.67.4
Stroke	I.64
Ischemic stroke	I.63
Intracerebral hemorrhage (hemorrhagic stroke)	I.61
Subarachnoid hemorrhage	I.60
Acute pulmonary edema (APE)	J.81
Congestive heart failure (CHF)	I.50
Left ventricular failure (LVF)	I.50.1
Dissection of aorta	I.71
Acute myocardial infarction (AMI)	I.21 / I.22 / 1.23
Unstable chest angina	I.20 / I.24
Progressive renal failure	N.17 / N.19
Eclampsia	O.14 / O.15
Acute glomerulonephritis	N.00 / N.05

Descriptive analysis of the qualitative variables and the results are shown as mean and standard deviation. For comparing the characteristics of the patients with hypertensive urgencies with those of patients with hypertensive emergencies, the Student *t* test was used for the quantitative variables, and the "χ^2" and proportions tests were used for the qualitative variables. All statistical analyses were performed using SigmaStat Statistical Software, version 1.0 for Windows. A P value < 0.05 was considered statistically significant.

Results

In 2000, 76,723 patients > 18 years were treated in the clinicosurgical emergency unit, and 26,429 patients were treated in the clinical emergency unit, corresponding to 34.4% of all treatments in the emergency unit of the hospital. The prevalence of hypertensive crises corresponded to 1.7% of all clinical emergencies and 0.5% of all clinicosurgical emergencies. Four hundred and fifty-two cases of hypertensive crises met the inclusion criteria of the VI Joint National Committee [4], 179 (39.6%) cases being emergencies and 273 (60.4%) cases being hypertensive urgencies. Of the hypertensive urgencies, 38% occurred in men and 62% in women. Of the hypertensive emergencies, 55.3% occurred in men and 44.7% in women, and, therefore, hypertensive urgencies prevailed in women. Two hundred and twenty-eight (83.5%) cases of hypertensive urgency and 155 (86.6%) cases of hypertensive emergency occurred in white individuals. Forty-five individuals with hypertensive urgency and 24 with hypertensive emergency were black (including those of mixed heritage).

Patients with a hypertensive emergency had a significantly greater mean age and mean diastolic blood pressure than those with a hypertensive urgency, as seen in table II, which also shows that approximately 18% of the patients ignored their hypertensive status prior to the study. In regard to the risk factors that affect patients with a hypertensive crisis, 23.7% were smokers, and approximately 20% were diabetic. It is worth noting that diabetes was a statistically significant risk factor for the development of hypertensive emergencies.

The distribution of hypertensive crises according to age group showed a greater prevalence of patients with hypertensive urgency from 31 to 60 years for males and from 21 to 60 years for females.

Table II - Profile of the patients with hypertensive crisis

	Total of hypertensive crises	Hypertensive urgencies	Hypertensive emergencies
Number	452	273	179
Age	53.7 ± 17.8	49.9 ± 18.6	59.6 ±14.8 *
Male/ Female	203/249	104/169	99/80
Systolice BP	191.6 ±26.5	191 ±26.9	192.6 ± 26
Distolic PA	127.6 ±13.6	126.6±14.4	129.1 ±12.0**
Unknown hypertension (%)	18.2	19.8	15.6
Smoking (%)	23.7	22	26.4
Known diabetes (%)	19.6	15.4	26.4**

* p < 0.001; ** p < 0.05 vs hypertensive urgency, Student t test and χ^2 test; BP - blood pressure.

On the other hand, a greater number of patients with hypertensive emergency were observed from 41 to 70 years for males and from 61 to 70 years for females (fig. 1).

In regard to the time of day, the onset of hypertensive crises was divided into 4 periods of 6 hours. The greatest number of crises were observed in the period between 6 AM and 12 PM, although no statistically significant difference was observed in relation to those between 12 PM and 6 PM and between 6 PM and 12 AM (fig. 2a). In regard to seasonal distribution, a greater incidence was observed in autumn and winter (mainly in May and June) with statistical significance as compared with that in summer and spring (fig. 2b).

Figure 3 shows the distribution of cases of hypertensive emergency in the population studied. Most cases of hypertensive emergency corresponded to cerebrovascular lesions (58%), including ischemic stroke, hemorrhagic stroke, and subarachnoid hemorrhage (HS), independent of sex. Thirty-eight percent of the patients with a hypertensive emergency corresponded to cardiovascular

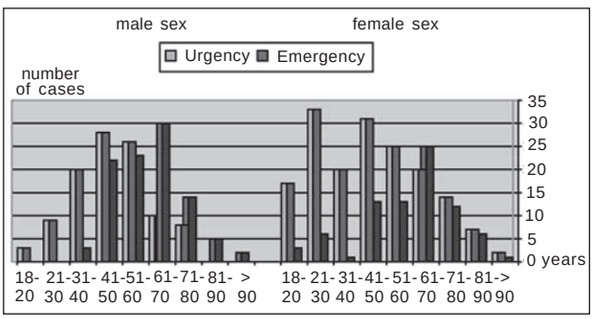


Fig. 1 - Distribution of hypertensive crisis according to age group and sex.

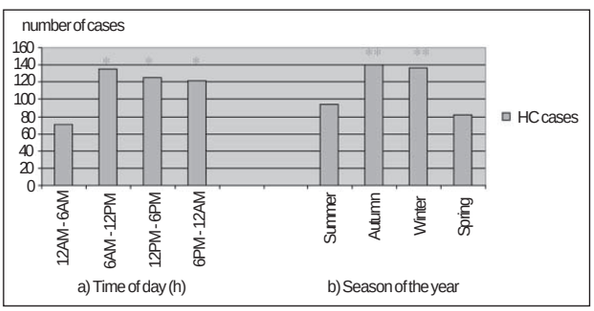
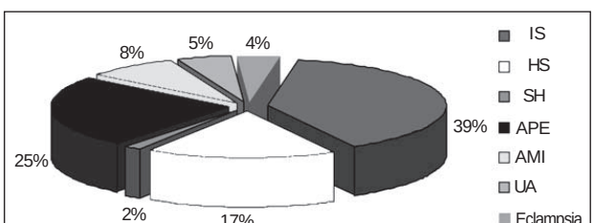


Fig. 2 - Distribution of the cases of hypertensive crisis according to the time of day (a) and season of the year (b). a) * p < 0.0001 vs period 12AM - 6 AM; no statistically significant difference between the other periods of the day. b) ** p < 0.01 vs summer and spring (test of proportions).



IS - ischemic stroke; HS - hemorrhagic stroke; SH - subarachnoid hemorrhage; APE - acute pulmonary edema; AMI - acute myocardial infarction; UA - unstable angina

Fig. 3 - Profile of hypertensive emergencies. Statistical distribution of the target-organ lesions associated with hypertensive emergency. Note that approximately 58% of the emergency cases correspond to cerebrovascular complications and 38% to cardiovascular lesions.

complications, including left ventricular failure with acute pulmonary edema, acute myocardial infarction, and unstable angina.

The clinical presentation of the hypertensive crises in the first 24 hours after the diagnosis varied a lot. The most common signs and symptoms, in decreasing order, were as follows: headache, dizziness, dyspnea, neurologic deficit, and chest pain. In hypertensive urgency, headache and dizziness were the most common symptoms, while in hypertensive emergency, the most frequent clinical manifestations were neurologic deficit and dyspnea, in accordance with the target-organ lesions found in the present study. Table III shows the frequency of the signs and symptoms found in the 1-year assessment of hypertensive crises.

Discussion

This study aimed at estimating the prevalence of hypertensive crises in a university-affiliated hospital for regional referrals during the year 2000. In the medical literature, especially the Brazilian literature, few data exist on this complication of arterial hypertension, a disease whose high prevalence in the population ranges from 20% to 30% (more than 34 million Brazilians) in the different epidemiological studies analyzed.

Our data showed that the prevalence of hypertensive crises accounted for 0.5% of the treatments in the clinicosurgical emergency unit of our hospital and for 1.7% of the clinical emergencies. These data differ from those of the Italian study by Zampaglione et al [15], in which the estimated prevalence of hypertensive crises was 3% of the treatments in the emergency unit and 27.5% of the number of clinical emergencies. However, in a recent study, Rodriguez Cerrillo et al [18] reported figures similar to ours, with a prevalence of hypertensive crises of 0.6% of the treatments of the clinical emergency in a Spanish university-affiliated hospital. The high prevalence rate of hypertensive crises in the study by Zampaglione et al [15] may result from the inclusion of cases of hypertensive pseudocrisis, which may imitate hypertensive urgency, and, consequently, distort the final results. This fact was observed by Nobre et al [19], who reported that 64.5% of the hypertensive patients, characterized as having hypertensive pseudocrisis, were inappropriately treated in the emergency unit as having a hypertensive crisis. 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. This justification may be extrapolated to the smaller number of hypertensive individuals with hypertensive crises who ignored their condition, 18% in our study and 12.7% in the study by Rodriguez Cerrillo et al [18], as compared with those in the studies by Sobrino et al [13] (37.5%) and Zampaglione et al [15] (25%). On the other hand, these findings confirm the evidence that hypertensive crises occur more frequently in patients with known hypertension, who do not correctly use the prescribed antihypertensive agents or who receive inappropriate treatment [20].

Table III - Frequency of signs and symptoms found in hypertensive crises

Signs and symptoms	Hypertensive crisis (%) (n=452)	Hypertensive urgency (%) (n=273)	Hypertensive emergency (%) (n=179)	p
Headache	34.5	44.3	19.8	<0.0001
Dizziness	21.5	29.3	9.9	<0.0001
Dyspnea	19.8	16.5	24.7	<0.05
Neurological deficit	28.8	15.7	48.3	<0.0001
Chest pain	13.6	11.0	17.6	NS
Vomits	10.8	13.9	9.3	NS
Paresthesia	9.0	8.4	9.9	NS
Arrhythmia	5.0	7.7	2.0	<0.05
Syncope	2.8	2.9	2.7	NS
Sleepiness	3.5	2.5	5.0	NS
Coma	1.7	0.7	3.3	NS
Epistaxix	0.4	0.7	-	NS
Others	31.4	38.0	21.4	<0.05

NS = nonsignificant.

The limitations of our study should now be considered. First of all, it is a retrospective study; therefore, the demographic data obtained through the review of medical records lead to lower accuracy than those obtained in a prospective study. Second, the study comprises cases from a single institution with its own peculiarities of treatment, which limits the extrapolation of the findings to other situations. However, the present study had a longer period of observation (1 year) than that of some other studies that assessed hypertensive crises for a period no longer than 3 months [13,18].

We found a greater prevalence of hypertensive urgencies than hypertensive emergencies, with approximately 2/3 of the cases corresponding to hypertensive urgency. Despite its lower incidence, hypertensive emergency is much more important because of its severity due to target-organ lesions, a fact verified by the significantly greater mean diastolic blood pressure as compared with that of hypertensive urgency. Smoking and diabetes, 2 cardiovascular risk factors, were associated with hypertensive crises in 1/4 and 1/5 of the patients, respectively.

The involvement of tobacco as a risk factor for hypertensive crises found in the present study may be justified by its several acute and chronic hypertensive actions [21-23], such as inhibition of endothelial cyclooxygenase, leading to a reduction in the production of prostacyclin and an increase in the synthesis of thromboxane, a situation that may cause chronic vasoconstriction and damage to the endothelial cell.

Diabetes mellitus was another risk factor present in approximately 20% of the patients with hypertensive crises and in more than 26% of the patients with hypertensive emergencies. The prevalence of arterial hypertension in diabetic patients is greater when compared with that in nondiabetic patients (40-50% x 20%, respectively) [24, 25]. Although hypertensive disease is multifactorial, the etiological link between insulin resistance and arterial hypertension becomes progressively greater [26]. Metabolic abnormalities (hyperglycemia, hyperinsulinemia, and dyslipidemias) may play a role in the pathogenesis and complications of arterial hypertension, as in the present study [27]. The vascular endothelium of diabetic individuals shows a reduced synthesis of vasodilators and an increased release of procoagulants and vasoconstrictors, defects that coexist in hypertensive individuals and could explain the greater incidence of atherosclerosis and hypertension in this group [28]. Diabetes mellitus is one of the major risk factors associated with the development of cerebrovascular (ischemic stroke) and cardiovascular (ischemic coronary disease) complications, as in the population in the Framingham study, in which a 2 times greater

occurrence of cerebral stroke and coronary events and a 3 times greater occurrence of peripheral vascular disease and congestive heart failure were observed in diabetic individuals [29]. These data may be correlated with the presence of more than 26% of diabetic individuals in our sample, and, consequently, with our case series of 58% of cerebrovascular lesions and 38% of cardiovascular lesions in hypertensive emergencies.

In regard to the seasons, a greater occurrence was observed in autumn and winter. In regard to the time of day when patients with hypertensive crises sought medical care, a greater number of events were observed in the morning (between 6 AM and 12 PM). These findings are similar to those reported in the Italian study [15], and, although circadian and annual rhythms of hypertensive crises are not known, the Framingham study correlated sudden cardiac death with a circadian variation occurring between 7 AM and 9 AM [30]. Recently, Kario et al [31] reported an association between morning surge in blood pressure and a greater risk of cerebrovascular disease in the hypertensive elderly.

Women had a greater frequency of hypertensive crises than did men, mainly in regard to hypertensive urgencies, probably reflecting a greater number of women in the hypertensive population [32]. The greater number of hypertensive emergencies among men suggest that they are more susceptible to target-organ lesions than women are, as revealed in the Framingham study, which showed that the incidence of coronary arterial disease in men increased in an almost linear mode as age increased [33], differently from that observed in women, who are protected until menopause [34,35]. In other words, one can say that the morbidity and mortality rates associated with any level of blood pressure are lower in women than in men up to 45 years of age [36]. It is worth noting that, in our study, a greater frequency of hypertensive urgencies was observed among women in younger age groups (greater number of cases of preeclampsia), and that a greater frequency of hypertensive emergencies was observed among women of more advanced age groups. This fact may be justified by the differences found in the hemodynamic pattern between men and women, because the latter, until menopause, have lower peripheral vascular resistance and lower blood pressure levels than men at the same age. After menopause, the female hemodynamic profile is not significantly different from the male profile in regard to blood pressure behavior [37,38]. Evidence has shown that the incidence of coronary arterial disease and cerebral stroke is relatively low until menopause, when it increases, women showing an increased susceptibility to organic lesions after menopause, especially to cerebrocardiovascular diseases, a situation found in our case series of hypertensive emergencies.

The present study showed that, among hypertensive emergencies, cerebrovascular lesions were the most common, and, among the latter, ischemic stroke was the most frequent, followed by hemorrhagic stroke and cardiovascular lesions (left ventricular failure with acute pulmonary edema and acute ischemic coronary disease). The patients with hypertensive emergencies were older and had a greater mean diastolic blood pressure. More than 25% had associated diabetes, possibly a longer time of disease evolution, and most were under medical follow-up. Diastolic blood pressure was significantly greater in hypertensive emergencies than in hypertensive urgencies, indicating greater peripheral vascular resistance in these cases and greater severity. In comparison with the study by Zampaglione et al [15], we found no case of hypertensive encephalopathy, which is currently becoming increasingly rare, due to better blood pressure control and available therapeutic options.

The most frequent clinical manifestations of hypertensive emergencies corresponded with organic impairments, such as neurologic deficit and dyspnea. In hypertensive urgencies, the most common clinical complaints were headache and dizziness, symptoms of lesser apparent severity, compatible with a lower risk setting. These manifestations were similar to the results of the Italian study and represent 1 of the first studies in our country on the clinical pattern of hypertensive crisis presentation.

In conclusion, in our country, this is 1 of the pioneering studies on the prevalence of hypertensive crises, showing their importance in medical emergencies, the associated risk factors, the most frequent types of target-organ lesions, and their clinical setting. These characteristics lead to better knowledge of the natural history of that complication of arterial hypertension.

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