

Clinical case

UDC 616.12-008: 615.015

ESSENTIAL ARTERIAL HYPERTENSION WITH INSUFFICIENT DEGREE OF NOCTURNAL BLOOD PRESSURE REDUCTION: THE NEED OF CHRONOBIOLOGY APPROACH

Petrenko O. V., Yabluchansky M. I.

V. N. Karazin Kharkiv National University, Kharkiv, Ukraine

A clinical case of chronotherapy in hypertension with insufficient degree of nocturnal blood pressure (BP) reduction was described. Patient M., average 24-h BP according to ambulatory blood pressure monitoring was 160/98 mm Hg, systolic and diastolic blood pressure profile had non-dipper pattern. Taking into account individual circadian BP profile, the patient was recommended to take antihypertensive drug – lisinopril – at bedtime. As a result of this treatment, after 3 months the target levels and normalization of circadian rhythm of BP were achieved.

KEY WORDS: hypertension, chronotherapy, ambulatory blood pressure monitoring, non-dipper

ГІПЕРТОНІЧНА ХВОРОБА З НЕДОСТАТНІМ СТУПЕНЕМ НІЧНОГО ЗНИЖЕННЯ АРТЕРІАЛЬНОГО ТИСКУ: НЕОБХІДНІСТЬ ХРОНОТЕРАПЕВТИЧНОГО ПІДХОДУ

Петренко О. В., Яблучанський М. І.

Харківський національний університет імені В. Н. Каразіна, м. Харків, Україна

Описано клінічний випадок хронотерапії при гіпертонічній хворобі з недостатнім ступенем нічного зниження артеріального тиску (АТ). Пацієнт М., середньодобовий АТ за даними добового моніторингу артеріального тиску 160/98 мм рт. ст., порушення добового ритму систолічного і діастолічного артеріального тиску за типом «недостатня ступінь нічного зниження АТ». Пацієнту рекомендовано час прийому антигіпертензивних препаратів з урахуванням добового індивідуального профілю АТ: лізиноприл ввечері перед сном. В результаті проведеного лікування через 3 місяці досягнуті цільові рівні і нормалізація добового ритму АТ.

КЛЮЧОВІ СЛОВА: гіпертонічна хвороба, хронотерапія, добове моніторування артеріального тиску, недостатня ступінь нічного зниження АТ

ГИПЕРТОНИЧЕСКАЯ БОЛЕЗНЬ С НЕДОСТАТОЧНОЙ СТЕПЕНЬЮ НОЧНОГО СНИЖЕНИЯ АРТЕРИАЛЬНОГО ДАВЛЕНИЯ: НЕОБХОДИМОСТЬ ХРОНОТЕРАПЕВТИЧЕСКОГО ПОДХОДА

Петренко Е. В., Яблучанский Н. И.

Харьковский национальный университет имени В. Н. Каразина, г. Харьков, Украина

Описан клинический случай хронотерапии при гипертонической болезни с недостаточной степенью ночного снижения артериального давления (АД). Пациент М., среднесуточное АД по данным суточного мониторирования артериального давления 160/98 мм рт.ст., нарушение суточного ритма систолического и диастолического артериального давления по типу «недостаточная степень ночного снижения АД». Пациенту рекомендовано время приёма антигипертензивных препаратов с учётом суточного индивидуального профиля АД: лизиноприл вечером перед сном. В результате проводимого лечения через 3 месяца достигнуты целевые уровни и нормализация суточного ритма АД.

КЛЮЧЕВЫЕ СЛОВА: гипертоническая болезнь, хронотерапия, суточное мониторирование артериального давления, недостаточная степень ночного снижения АД

INTRODUCTION

A disorder of circadian rhythm of blood pressure (BP) with insufficient degree of its night-time reduction is one of the unfavorable variants of the essential hypertension (EH) course. [1, 2]. The incidence of this disorder, according to different authors, ranges within 40-70 % [3, 4]. Many studies have been proven relationship between insufficient degree of blood pressure reduction at night-time, and an increased incidence of fatal and nonfatal cardiovascular events [5]. Antihypertensive therapy according to circadian blood pressure profile is particularly important in these patients, as illustrated by our clinical case.

CLINICAL CASE

Patient M., male, born in 1956 (57 years) complained of increase in blood pressure to 200-220/110-116 mmHg, accompanied by headache in the occipital region, pressing retro-sternal pain, nausea, a significant worsening of overall health.

Retired engineer, does not smoke, alcohol abuse. The living conditions are satisfactory. Physical activity is average - every day working in the garden. Anamnesis vita is unremarkable.

Increased blood pressure numbers - about 150/90 mm Hg - were first recorded in 2004 while passing a routine examination. Nowhere was examined, was not treated. In December 2013 the first time increased blood pressure to 200/106 mm Hg was noted, and therefore patient sought medical advice to the outpatient clinic. The treatment was prescribed: Vasar (valsartan) 160 mg 1 time, Nebikard (nebivolol) 1 tablet (dosage can not specify) 1 time daily. Prescribed medications took about 3 months. According to home monitoring (HBPM) BP stabilized at 130-140/80 mm Hg. Due to the improvement of general health and a reduction in blood pressure patient stopped taking the prescribed treatment. In May 2014 periodic BP ups to 150-160/90 mm Hg reappeared. 20/05/14 there was an increase in blood pressure to 206/119 mm Hg, accompanied by headache in the occipital region. Patient didn't seek medical care. Took captopril 25 mg sublingually twice

with an interval of 1 hour by himself. 2 hours after the last dose of captopril blood pressure was fixed at 145/88 mm Hg. Over the next 4 days no antihypertensive agents have been taken, blood pressure according to HBPM was 150-160/90-98 mm Hg, well-being was satisfactory.

24.05.14 patient came to the Department of Internal Medicine of the Karazin Kharkiv National University Medical School to consult a doctor.

At the time of the examination were no complaints. Overall state of the patient was relatively satisfactory. Patient was of normal constitution, proper nutrition, BMI 23.8 kg/m². Peripheral edema wasn't found. Over the entire surface of lung vesicular breathing has been auscultated, no wheezing. Cardiac activity was rhythmic with a heart rate of 62 beats/min. Cardiac sounds were clear, sonorous, accentuate 2 tone over the aorta. Borders of the relative cardiac dullness are not expanded. BP_{dex} was 164/90 mm Hg and BP_{sin} was 166/91 mm Hg. Abdominal while palpation was soft and painless. Liver was at the edge of the costal arch, painless while palpation. Pasternatsky's sign was negative bilateral.

Taking into account the absence of antihypertensive therapy in the preceding days, the BP monitor was set. Further examination according to current standards [6-8] was prescribed. In the study of quality of life (QOL) using the SF-36 questionnaire revealed significant difficulties in performing the ordinary work or other daily activities due to emotional status and physical health – 0 points on a scale of Role-Physical (RP) and Role-Emotional (RE). Also decline in general and mental health was noteworthy (tab. 1).

The other obtained results:

- Full blood count, urinalysis, fasting blood glucose, serum creatinine, urea, serum electrolytes, ALT, AST, total cholesterol – within normal ranges, ECG, renal ultrasound – unremarkable.

- Ultrasound of the heart – left ventricular hypertrophy (left ventricle wall thickness in diastole 1.3 cm), ejection fraction is 58 %.

Table 1

Health-related quality of life (in points by SF-36 scale)

Scale	Baseline	3 months later
Physical Functioning (PF)	80	85
Role- Physical (RP)	0	50
Bodily Pain (BP)	74	100
General Health (GH)	45	57
Physical Component Summary (PCS)	43,04	51,92
Vitality (VT)	50	60
Social Functioning (SF)	75	87,5
Role- Emotional (RE)	0	33,3
Mental Health (MH)	48	64
Mental Component Summary (MCS)	32,59	42,39

- Ambulatory BP monitoring (ABPM) – the daily means of systolic blood pressure (SBP) and diastolic blood pressure (DBP) were increased. Indicators of pressure load – 24-h SBP percent time of elevation (24h SBP PTE) and 24-h DBP percent time of elevation (24h DBP PTE) were increased – recorded stable systolic and diastolic hypertension during the

entire 24 hours. Values of BP variability for SBP and DBP were increased both in daytime and at night. Circadian rhythm violation of SBP and DBP was by type of «insufficient degree of nocturnal blood pressure reduction» – non-dipper. Pulse pressure (PP) daily mean was increased (tab. 2, fig. 1).

Table 2

ABPM indices

Indices	Baseline	3 months later
SBP, daily mean, mmHg	160	127
SBP, awake mean, mmHg	160	131
SBP, asleep mean, mmHg	160	116
24h SBP PTE, %	95,5	27,5
Awake SBP variability, mmHg	19.0	12,2
Asleep SBP variability, mmHg	22.5	13
DBP, daily mean, mmHg	98	84
DBP, awake mean, mmHg	100	88
DBP, asleep mean, mmHg	96	74
24h DBP PTE, %	82	66,4
Awake DBP variability, mmHg	27.0	10,4
Asleep DBP variability, mmHg	23.4	13
The sleep-time SBP decline, %	0,3	11,6
The sleep-time DBP decline, %	4,0	16,0
SBP circadian index	1	1,13
DBP circadian index	1,04	1,19
Pulse pressure daily mean, mmHg	62	43

Based on the obtained data the following diagnosis was made:

Arterial hypertension II degree, stage 2, violation of BP circadian rhythm by type of

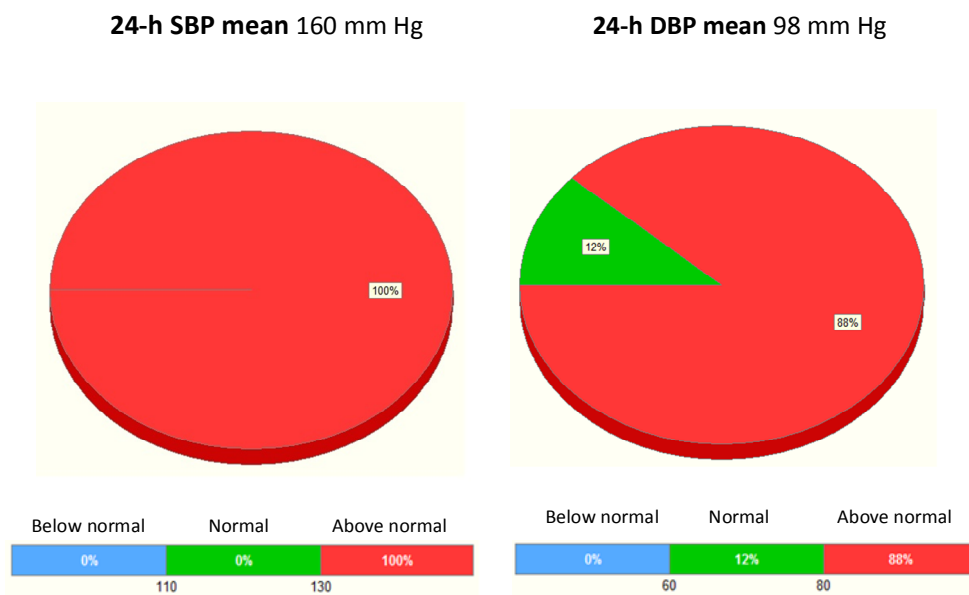
«insufficient degree of nocturnal blood pressure reduction» – non-dipper. Moderate additional cardiovascular risk. Heart failure, stage 0.

Moderate physical activities and diet low in salt, animal fat, easily digestible carbohydrates and rich in fibers were recommended.

Taking into account the circadian blood pressure profile lisinopril in dose of 10 mg at

bedtime under the control of HBPM was prescribed. Three weeks later, the patient was examined repeatedly to control the therapy efficacy. According HBPM blood pressure was within 150/90 mm Hg. On physical examination any changes were detected. $BP_{dex} = BP_{sin} = 154/88$ mmHg. Lisinopril dose increased to 20 mg/day at bedtime.

Patient M. Blood pressure means at baseline



Patient M. Blood pressure means after 3 month of treatment

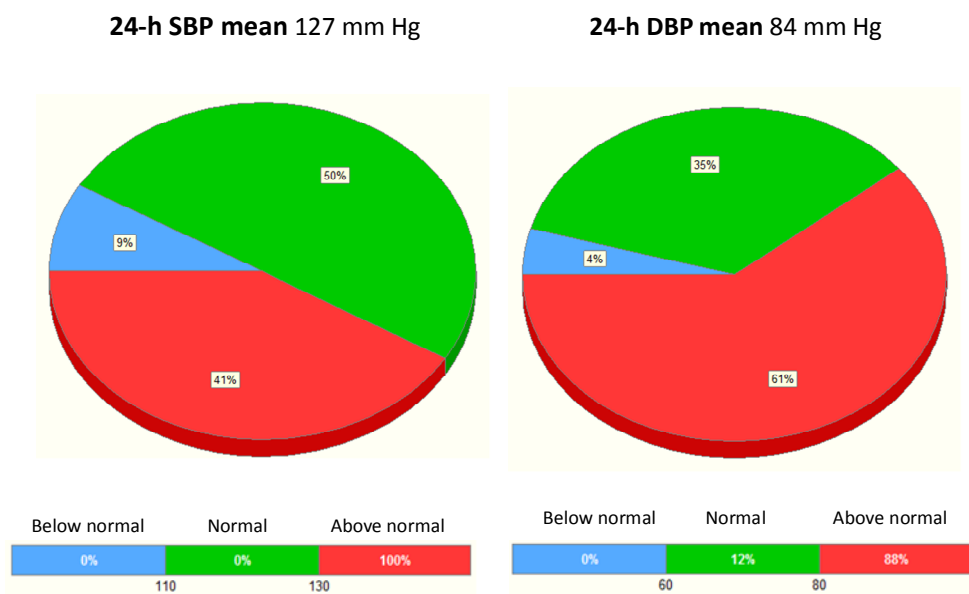


Fig.1. Blood pressure means at baseline and 3 months after

Due to the treatments regimen the patient's condition was significantly improved: headaches regressed, BP according to HBPM was stabilized at the level of 130/80 mm Hg, and overall health status was also improved. Repeated evaluation of QOL found an increase in quality of life on all scales of the questionnaire of various degrees (tab. 1). A clinically significant improvement in role and emotional functioning was marked – increase readings by more than 20 points; pronounced increase in the scale « Bodily Pain» to the maximum possible score, indicating the absence of any restriction of daily activity due to pain. In general, there is a moderate clinically significant improvement of physical and mental health components. After three months of treatment with lisinopril, a repeated blood pressure monitoring was performed. Daily blood pressure means were 127/84 mm Hg - 131/88 mm Hg awake and 116/74 mmHg asleep (tab. 2, fig. 1). Circadian indices of systolic and diastolic blood pressure increased

to 1.13 and 1.19, respectively. 24h SBP and DBP PTE stayed increased, however, in comparison with the entering data showed a significant - up to border values - reducing 24h SBP PTE and less pronounced decrease in 24h DBP PTE. SBP variability was within the normal ranges during entire 24 hours. Awake DBP variability was in the normal ranges, but asleep DBP variability showed a slight increase. A decline in PP daily mean to normal levels was registered. Physiological degree of nocturnal blood pressure reduction was recorded - the blood pressure profile by type of «dipper». Patient was recommended to take lisinopril 20 mg / day in the same mode.

Thus, this clinical case shows the practical value of chronobiology approach in arterial hypertension management without nocturnal BP reduction. Prescription to the patient an antihypertensive drug at bedtime allowed reaching during 3 months target blood pressure levels using the drug in small doses.

REFERENCES

1. European Society of Hypertension Position Paper on Ambulatory Blood Pressure Monitoring // *Journal of Hypertension*. – 2013. – Vol. 31. – P.1731–1768.
2. 2013 Ambulatory Blood Pressure Monitoring Recommendations for the Diagnosis of Adult Hypertension, Assessment of Cardiovascular and other Hypertension-associated Risk, and Attainment of Therapeutic Goals // *Chronobiology International*. – 2013. – Vol. 30, Is. 3 – P. 355–410.
3. Alejandro de la Sierra. Prevalence and Factors Associated With Circadian Blood Pressure Patterns in Hypertensive Patients / Alejandro de la Sierra, Josep Redon, Jose' R. Banegas [et al.] // *Hypertension*. – 2009. – Vol. 53. – P.466–472.
4. Łukasz J. Krzych. Blood pressure variability: Epidemiological and clinical issues. / Łukasz J. Krzych, Andrzej Bochenek // *Cardiology Journal*. – 2013. – Vol. 20, №. 2. – P. 112–120.
5. Ramón C. Hermida. Sleep-Time Blood Pressure: Prognostic Value and Relevance as a Therapeutic Target for Cardiovascular Risk Reduction / Ramón C. Hermida, Diana E. Ayala, José R. Fernández [et al.] // *Chronobiology International*. – 2013. – Vol. 30. – P. 68–86.
6. Petrenko E.V. Clinical case of chronotherapy of arterial hypertension / E.V.Petrenko, L.V. Bogun, N.I. Yabluchansky // *The Journal of V. N. Karazin Kharkiv National University. Series «Medicine»*. – 2014. - № 27 (in print).
7. 2013 ESH/ESC Guidelines for the management of arterial hypertension: The Task Force for the management of arterial hypertension of the European Society of Hypertension (ESH) and of the European Society of Cardiology (ESC) // *Journal of Hypertension*. – 2013. – Vol. 31, Is. 7. – P. 1281-1357.
8. Unifikovanyy klinichnyy protokol pervynnoyi, ekstremoyi ta vtorynnoyi (spetsializovanoi) medychnoyi dopomohy «Arterial'na hipertenziya». – 2012. – 72 stor.