

A Case of a Young Man with False Systolic Hypertension

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Abstract

Isolated systolic hypertension is uncommon in young adults and requires different pathophysiological and clinical considerations. This case report explores this innovative diagnostic approach, emphasizing the necessity of effective management strategies to reduce related problems and improve patient outcomes. Case Report: Here, we present a case of elevated isolated systolic blood pressure. The 24-year-old young male was admitted to our hospital because of high blood pressure. The patient underwent clinical studies in accordance with the National Hypertension Protocol. Differential diagnosis was made with secondary hypertension. Since no obvious pathology was observed, a new non-invasive blood flow study was performed, which included a comparison of postischemic blood flow and normal blood flow in the radial artery and brachial arteries. All of the listed parameters corresponded to normal values. All of the listed parameters corresponded to normal values. **Conclusion:** This report reminds us to pay close attention to the likelihood of isolated systolic hypertension as a low-incidence disease. In such cases, it is recommended to perform additional blood flow studies to confirm the diagnosis and exclude false systolic hypertension.

Keywords: blood flow, isolated systolic hypertension, hemorheology.

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Introduction

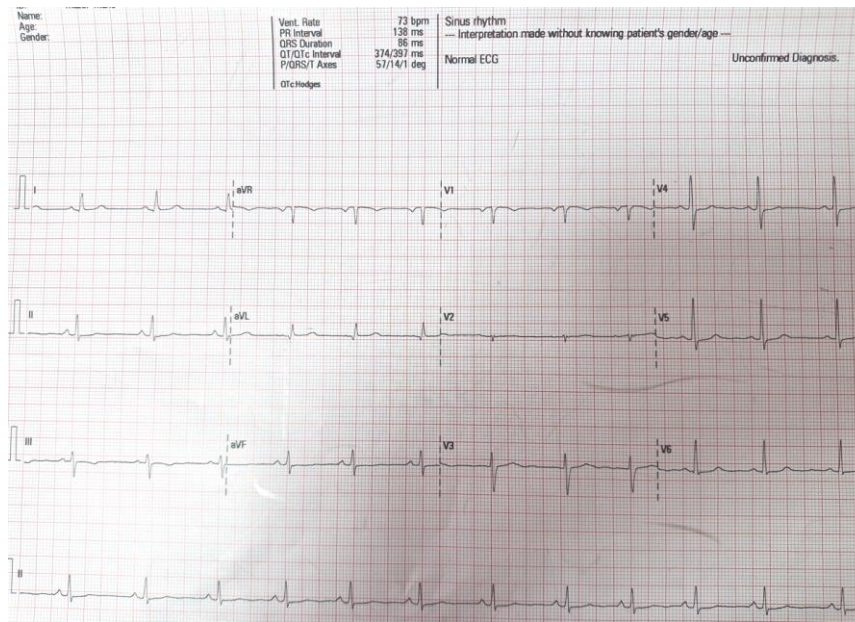
Isolated systolic hypertension is typically defined as systolic BP of ≥ 140 mmHg with a diastolic BP of < 90 mmHg [1]. Opinions in cases of isolated systolic hypertension are ambiguous. On the one hand In young patients with isolated systolic hypertension, arterial stiffness and relative risk of CVD events appear to be similar to those without isolated systolic hypertension and lower than young adults with

combined systolic-diastolic hypertension and isolated diastolic hypertension [2]. However, it should be noted here that according other studies Young adults with stage 1 or stage 2 ISH have at increased risk of cardiovascular death than those with normal BP [3]. Indeed, younger patients with isolated systolic hypertension appear to comprise a heterogeneous group. For these reasons, it may be appropriate to measure central BP and arterial stiffness in these individuals, as advised by scientific associations. Out-of-office BP measurement is indicated to rule out white-coat hypertension, which is frequently associated with isolated systolic hypertension in the young. (daytime BP<135/85 mmHg on 24 hour ABPM). There is much debate on the physiology and prognostic importance of isolated systolic hypertension (ISH) in youth. The clinical significance of isolated systolic hypertension is yet to be determined. In addition, it is hypothesized that ISH with normal central blood pressure (BP) in young patients is a benign phenomenon and was hence labeled spurious hypertension (sHTN). Compared with adolescents with WCH patients with ISH, including the sHTN subtype, have more pronounced markers of cardiac end-organ damage, higher aortic stiffness and stroke volume [4]. Pulse pressure amplification is prevalent in youth. In cardiology, amplification refers to a rise in arterial pressure relative to central aortic pressure at the measurement site. In young people, blood pressure measured traditionally on the brachial artery may be high, while central aortic pressure may fluctuate within normal limits. This is a very important fact that could lead to an incorrect diagnosis. This fact is harmful to the patient and is a factor causing violations of occupational hygiene and healthcare regulations.

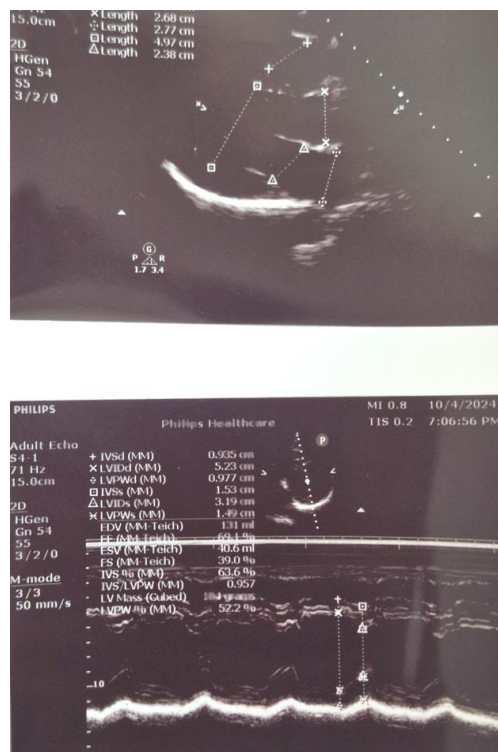
Case: Information is provided based on patient consent. A young man, age 24, decided to continue his studies at a specialized university to become an aircraft pilot and visited our facility for examination. Prior to his visit to the doctor, he had no health-related complaints; however, over the past 4 years, he had experienced systolic blood pressure elevations in the range of 150-160 mmHg. The patient did not present obvious symptoms like headache, dizziness, palpitation, arrhythmia, or hyperhidrosis. He did not receive antihypertensive drugs. In his medical history, there were no congenital pathologies, genetic predispositions, or cardiovascular risk factors. He had no harmful habits. Based on a family physician's referral, he visited a cardiologist. According to objective data, his average arterial pressure fluctuated from 155/85 mmHg to 165/85 mmHg (average from three measurements). BMI=24 kg/m².

Ankle Brachial index was 1.10 (1-1.4). On auscultation, heart and lung sounds were clear. No murmur was heard in the carotid artery, and no enlargement of the thyroid gland was detected. No abnormalities were found in the rest of the physical examination.

According to a complete blood count and biochemical analyses, the ratio of blood-formed elements, ESR, hemoglobin, glucose, cholesterol, creatinine levels, urea, liver function, immunity tests, and electrolyte levels, thyroid hormones, as well as urinalysis, were within normal ranges. Urinary cortisol: 18.62 (normal: 21 µg/24 h to 110 µg/24 h), urinary Vanillylmandelic Acid (VMA): 6.2 (normal: <13.6 mg/24 h), blood catecholamines, and metabolites were normal. ACTH-was normal, and the aldosterone-to-renin ratio in both positions (dorsal and vertical) was normal. The electrocardiogram showed (**pic 1.**) sinus rhythm at 75 beats/minute with an electrical axis of 53 degrees. Bilateral carotid artery ultrasound was normal.

Pic. 1 The electrocardiogram of the patient.

24-hour ambulatory monitoring was used to assess hourly blood pressure levels. 24-hour blood pressure was measured with the same validated oscillometric upper arm device, using a transfer function and ARCSolver algorithms for determination of central pressures (using mean BP calibration), pulsatile (Pressure Augmentation-AP, amplitudes of forward (Pf) and backward (Pb) waves), and steady state (Cardiac Output-CO, Total Peripheral Resistance-TPR) hemodynamics. The average arterial pressure during the day was 150/80 mmHg and at night 125/70 mmHg. During central aortic pressure analysis, it was found that the pulse wave contours had characteristic shapes typical for a healthy young person, while both day and night central aortic pressures did not exceed those of healthy controls of the same age. Echocardiography was used to quantify left ventricular mass, which was then indexed to body surface area (LVMI). The echocardiogram did not reveal left ventricular hypertrophy (**Pic. 2**).

Pic. 2 The echocardiogram of the patient.

Based on the conducted clinical studies, secondary causes of hypertension were ruled out. Thus, despite no clinical manifestations and normal central aortic pressure values, the patient belongs to the isolated systolic hypertension group. Accordingly, he was diagnosed with isolated systolic hypertension. Despite the fact that the patient's file contained positive health assessments from family physician, endocrinologist, ophthalmologist, neurologist, narcologist, and psychiatrist, he was denied continuation of studies in this direction. The patient underwent a new non-invasive blood flow test, which involved comparing post-ischemic blood flow with normal blood flow in both radial and brachial arteries [5]. This test reveals the resistance of resistant arteries, which was normal in this patient's case. Additionally, he underwent complete rheological status testing: erythrocyte deformability capacity, erythrocyte aggregation ability [6,7], plasma viscosity, blood viscosity [8], and leukocyte deformability capacity were evaluated. All listed parameters corresponded to normal values.

Thus, it was determined that the case described above represented a case of pseudosystolic hypertension. At this stage, the patient was advised to undergo lifestyle modification, which included self-management of the disease and self-measurement of blood pressure, diet, exercise, restriction of alcohol, fluid, and salt intake in the context of hypertension (including health behavior and social context).

Discussion.

In most cases, isolated systolic hypertension in young people is associated with high amplification of arterial pulse wave pressure. Let's examine the physiology and biomechanics of pulse pressure amplification. It is higher in young people. Also, there are differences in pulse wave contours, most prominently expressed during wave analysis in the aorta. In cases of isolated systolic hypertension with unusually high amplification, patients not only show correct pulse wave form in the aorta but often don't manifest any symptoms.

Is it worth considering including hemorheological status assessment in the list of diagnostic tools in such situations? Such an approach would eliminate many inaccuracies and diagnostic errors. This is one of the significant issues in modern biomedicine and practical cardiology. That's why in this specific case, the patient was evaluated from a rheological perspective.

Conclusion:

Undoubtedly, it is essential for practicing cardiologists to examine the pathophysiological aspects of such clinical cases in detail. Such a multidisciplinary and personalized approach will provide valuable conclusions regarding the diagnosis and management of systolic hypertension.

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