

An Unusual Case of Hypertension



by

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Part I – That’s Odd ...

Mr. Smith was a 50-year-old, otherwise healthy, white male who presented with no signs or symptoms of acute distress or complaints. He was the owner of a very busy and popular restaurant and led a very active and healthy life including regular exercise and a well-balanced diet. He had no history of smoking although he occasionally drank no more than one glass of red wine with dinner. For the past year he had noticed his blood pressure was higher than usual when he checked at the machine in the local supermarket. He wondered why his blood pressure was higher despite the fact that he took good care of his health and did not have a family history of hypertension. He had no history of any previous and/or current use of medication.

He made an appointment with his primary care physician and told him of his observation and concern. The doctor’s examination revealed a blood pressure of 190/110 mmHg and a heart rate of 90 bpm. The rest of the physical examination was completely unremarkable during that visit. Mr. Smith was instructed to return to the clinic for additional blood pressure measurements to be taken on two separate occasions. The subsequent readings were comparable with the initial elevated values and a clinical diagnosis of hypertension was made. With no other remarkable findings the doctor recommended that he continue with his active and healthy lifestyle along with monitoring his diet. In addition, the doctor prescribed hydrochlorothiazide (HCTZ), a potassium sparing thiazide diuretic at an initial dose of 12.5 mg orally once a day as monotherapy in order to help manage the elevated blood pressure. Mr. Smith followed his doctor’s advice and was very compliant with his treatment.

Questions

1. What is the normal blood pressure value range and what do the numbers mean?
2. List some risk factors of hypertension.
3. What are some lifestyle change recommendations for a person with hypertension?
4. Name four different target organs which may be used to treat hypertension.
5. What are some major categories of pharmacological agents that can be used to treat hypertension?

Part II – The Next Two Years

During a follow-up period of two years, Mr. Smith's asymptomatic hypertension persisted despite aggressive attempts with initial monotherapy followed by combination therapy using several different pharmacologic agents. All medications were gradually introduced by his physician, one agent at a time in an orderly fashion with incremental dosages over a period of time. In addition to the HCTZ (thiazide diuretic) now at a newer dose of 25 mg orally once a day, his latest regimen included enalapril (ACE inhibitor) at 20 mg orally once a day, and amlodipine (calcium channel blocker) at 10 mg orally once a day.

Meanwhile, Mr. Smith's restaurant had expanded and he had spent the last two years working on managing his larger and more successful business. He had observed that his blood pressure was still elevated despite his medication and he felt thirstier than usual and frequently urinated. He also noticed a new onset of gradually recurring headaches. Mr. Smith suspected diabetes and returned to the doctor's office.

His doctor performed blood work and a physical examination, which revealed a blood pressure of 145/85 mmHg, a heart rate of 80 bpm and mild peripheral edema. The results from the blood tests showed that his blood glucose levels were normal; however his renal function test values were borderline high and the potassium level was slightly low at 3.1 mEq/L, which prompted his physician to add to his medication regimen K-Dur (a potassium supplement) at 10 mEq orally twice daily. With diabetes mellitus ruled out, his doctor made the recommendation for Mr. Smith to continue with the current medications and placed him on a low sodium/low cholesterol diet. Subsequent office follow up visits (at three-month intervals) along with corresponding lab work remained relatively stable with minimal change when compared to previous parameters.

Questions

1. How do diuretics, ACE inhibitors, angiotensin receptor blockers and calcium channel blockers help to treat hypertension?
2. Name the hormones that regulate the balance of sodium and potassium levels and explain how they work.
3. Why did the doctor advise a diet low in sodium and cholesterol?
4. What may be the reasons for the recurring headaches Mr. Smith is experiencing?
5. What are the reasons for Mr. Smith's polyuria and polydipsia?

Part III – One Year Later

About a year later, Mr. Smith suddenly began to experience increasing muscle weakness, cramping and tingling, palpitations, generalized fatigue and recurrent headaches. One day he felt very uneasy and asked his coworkers to take him to the emergency room. On physical examination the only significant findings were a documented blood pressure of 210/120 mmHg, a heart rate of 110 bpm and moderate peripheral edema. The rest of his evaluation at the ER revealed the following:

<i>Mr. Smith</i>	<i>Normal Values</i>
Na = 149 mEq/L	135–145 mEq/L
K = 2.8 mEq/L	3.5 – 5.0 mEq/L
Cl = 108 mEq/L	98–108 mEq/L
CO ₂ = 16 mmol/L	20 to 29 mmol/L
Blood urea nitrogen = 27 mg/dL	7–20 mg/dL
Creatinine = 2.1 mg/dL	0.8 to 1.4 mg/dL
Glucose = 123 mg/dL	64 to 128 mg/dL
Mg = 1.3 mEq/L	1.5–2.0 mEq/L

Additional routine tests which included a complete blood count (CBC), a chest X-ray and a 12 lead EKG were all unremarkable. An arterial blood gas (ABG) analysis was consistent with a mild metabolic alkalosis with some degree of compensation. An abdominal ultrasound study revealed a suspicious small mass at the level of the right adrenal cortex. Further imaging evaluation with high-resolution CT scan confirmed an adrenal adenoma of the right adrenal cortex.

Based on the CT scan results Mr. Smith underwent surgery for removal of the adrenal tumor. Post-operatively, Mr. Smith recovered well without complications and with significant improvement of all his symptoms. His blood pressure began to normalize gradually and after just a few weeks, his doctor was able to completely discontinue all blood pressure medications with no further complaints.

Questions

1. What is the proper name for this medical diagnosis? List some of the possible causes.
2. Describe the renin-angiotensin-aldosterone pathway.
3. List some common signs and symptoms of hyperaldosteronism.
4. What is the main pathophysiologic process responsible for this patient's symptoms?
5. Would you classify this type of hypertension as primary (essential) or secondary?
6. What other important blood test could be used to diagnose this condition?
7. What is the treatment of choice for this particular case?