

Acute Pseudohypertensive Crisis

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Since the development of the sphygmomanometric technique by Riva-Rocci in 1896,¹ determination of blood pressure has become one of the most important aids in patient care. More advanced indirect methods have since been described, and direct techniques perfected.^{2,3} Along with this improvement in monitoring, advances in treatment of hypertensive and shock states have also occurred. There are isolated reports of errors in measuring blood pressure, including one case of a patient falsely thought to have hypertension for more than five years.⁴ No one has reported a case in which a previously normotensive patient was falsely thought to be in acute hypertensive crisis. Following is such a report.

REPORT OF A CASE

A thin 58-year-old black man was admitted to the Medical University Hospital after developing acute urinary retention at another institution. He had initially been hospitalized for treatment of a cerebral concussion which had occurred following a syncope episode.

Past medical history was unremarkable except for syncope episodes increasing in frequency over ten years and complaints of progressively decreasing urinary stream over the past two years. Physical examination revealed a grade II/VI systolic ejection murmur along the left sternal border, a large left inguinal hernia, and an enlarged firm prostate gland. Blood pressure was 100/70 torr; on the ward it fluctuated from 100/70 to 130/80 torr, with one reading of 180/100 torr. Laboratory data were within normal limits except for blood urea nitrogen, 30 mg/100 ml, 4+ proteinuria, and 4+ hemoglobinuria. Urinary specific gravity was 1.010 and serum creatinine 1.3 mg/100 ml. Roentgenogram of the chest revealed blunting of the

left costophrenic angle and a cardiothoracic ratio of 11.4/25.5. An electrocardiogram revealed increased QRS voltage with possible atrial hypertrophy. Cardiology consultation led to the conclusion that the patient had no significant heart disease.

The patient was scheduled for a suprapubic prostatectomy. He received premedication consisting of meperidine, 50 mg, hydroxyzine, 50 mg, and atropine 0.4 mg, im, 75 minutes prior to arrival in the operating room. Upon arrival the patient appeared relaxed. The heart rate was 80 beats/min and regular. However, despite palpable pulses, blood pressure was not measurable in either arm by the auscultatory method. The pulsations in the radial and brachial arteries could not be damped even with the blood pressure cuff inflated to 300 torr. Korotkoff sounds could be heard with the same intensity over the complete range of the manometer. Thus, the systolic blood pressure appeared to be more than 300 torr in the left arm and more than 280 torr in the right arm. The patient appeared comfortable and was receiving oxygen (F_{iO_2} , 1.0) by mask. Various blood pressure cuffs, manometers, and cuff placements were tried, with similar results. Chlorpromazine, 1 mg, was given iv. After 5 minutes the systolic pressure in the left arm was still greater than 300 torr, and that in the right arm greater than 220 torr. An additional 1 mg of chlorpromazine was given. After another 5 minutes, blood pressures remained unchanged. At this time the operation was cancelled and the patient scheduled for thorough medical evaluation. By the next morning, his blood pressure was normal (100/60 torr). The medical evaluation included thyroid studies, serum epinephrine levels, and a thorough cardiology evaluation. All were negative. The patient was rescheduled for operation 8 days later.

The patient arrived in the operating room 15 minutes after receiving secobarbital, 100 mg, and atropine, 0.4 mg, im. He appeared relaxed and in no discomfort. Heart rate was 70 beats/min and regular. The electrocardiogram appeared normal. However, accurate blood pressure was again not possible to obtain, in that neither radial or brachial pulses could be occluded with cuff pressures of 300 torr in either arm. Attempts to obtain blood pressure with the Doppler[¶] technique failed.

In view of the earlier operating room experience and the unremarkable medical evaluation, the inability to occlude the radial or brachial pulses was thought to be the result of severe arteriosclerotic vascular disease, labile hypertension, and apprehension. Direct arterial pressure monitoring was thought to offer the solution to this dilemma.

An 18-gauge Teflon catheter (Jelco) was placed

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¶ Parks Electronics.

percutaneously in the left radial artery with aseptic technique. This catheter was connected to a Statham P23 strain gauge and Travenol oscilloscope, calibrated against a mercury manometer. Blood pressure was 120/80 torr. The Doppler and auscultatory devices were left in place and an Infrasonde** instrument placed over the left radial artery.

Blood pressure was then determined at approximately 5-minute intervals during anesthesia and operation. The results of direct and indirect measurements are shown in table 1.

DISCUSSION

Anesthesiologists devote much time to monitoring acutely ill patients. Most are aware of the established causes of artifactual hypertension.⁵ Severe arteriosclerosis had been more of a theoretical than an actual cause of blood pressure error until the report of Taguchi and Suwangool in 1974. Their 82-year-old patient had been thought to have had pseudohypertension continuously for five years due to Monckeberg arteriosclerosis of the brachial arteries.⁴

The presence of arteriosclerosis alone does not fully explain our experience, since our patient was normotensive interoperatively. Although he did not appear apprehensive, excessive anxiety should have been reflected by increases in the intra-arterial pressures measured.

The Doppler and auscultatory techniques, which depend on occlusion of the vessel, were not accurate in the operating room. The Infrasonde technique, utilizing an electronic sphygmomanometer that depends on subsonic arterial-wall oscillations, yielded results comparable to that of intra-arterial measurement.

In conclusion, we have reported a case of acute artifactual hypertension. Despite a thorough evaluation of the patient, a precise

TABLE 1. Comparison of Blood Pressures Obtained with Different Techniques*

Trial	Intra-arterial	Infrasonde†	Auscultation‡	Doppler§
1	120/80	>300*	>300	>300
2	110/70	>300*	>300	>300
3	95/58	100/60	>300	220
4	110/60	112/60	>300	>300
5	110/70	118/70	>300	>300
6	110/65	116/70	>300	>300
7	116/70	112/70	>300	>300
8	96/50	98/50	>300	>300
9	98/60	90/52	>300	>300

* All values obtained simultaneously and expressed in torr.

† Determined in left arm at the radial artery.

‡ Determined in left arm at the brachial artery.

§ Determined in right arm at the radial artery.

¶ Sensor over the left brachial artery.

etiology could not be determined. Severe arteriosclerosis alone does not adequately account for our observations. Both the direct intra-arterial and indirect Infrasonde techniques appear to be adequate means of measuring blood pressure in such a case.

REFERENCES

- Riva-Rocci S: Un nuovo sfigmomanometro. Gazz Med Torino 47:981-988, 1896
- Coakley CS, Klingenstein CH, Rudman HL, et al: Advances in monitoring in the past 10 years. Clinical Anesthesia, A Decade of Clinical Progress. Volume 3. Edited by L Fabian. Philadelphia, F. A. Davis, 1971, pp 132-138
- Brown AE, Sweeney DB, Lumley J: Percutaneous radial artery cannulation. Anaesthesia 24:532-536, 1969
- Taguchi JT, Suwangool P: "Pipe-stem" brachial arteries—A cause of pseudohypertension. JAMA 228:733, 1974
- Kirkendall WM, Burton AC, Epstein FH, et al: Report of a subcommittee of the postgraduate education committee, American Heart Association: Recommendations for human blood pressure determination by sphygmomanometers. Circulation 36:980-988, 1967

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