BLOOD PRESSURE MEASUREMENT

I. INTRODUCTION

The campaign to increase awareness of hypertension has no doubt caught your attention. Blood pressure measurement is routinely taken in medical offices, but it is offered at health fairs, in dental offices, in pharmacies and even department stores.

Blood pressure is recorded in two numbers; the higher systolic pressure followed by the lower diastolic pressure. The units are mm Hg (millimeters of mercury). Both figures represent the force of blood against the wall of the arteries. The higher systolic figure reflects the force of the left ventricle as it contracts—the systole. The lower figure reflects the pressure of the blood during the brief time between “beats,” the ventricular diastole. While the pressure in the left ventricle at this time drops essentially to 0, the pressure in the aorta normally drops to about 80 mm Hg in an adult. This pressure keeps the blood moving between beats. It is maintained by the elasticity of the large arteries, which recoil between systolic pressure waves.

II. CLINICAL SIGNIFICANCE (See “Clinical Focus: Hypertension” (p. 759 [763])

A. Definition of hypertension: Blood pressure varies in the same individual under different conditions. Activity, emotional states, and posture all affect it. To obtain an accurate baseline blood pressure reading, the person is measured in a relaxed sitting position. The so-called normal or average is 120/80. Repeated resting readings over 140/90 are considered above normal. Higher pressures mean higher risks.

B. Risks of hypertension: Blood pressure affects a number of body systems. The left ventricle pushes against the diastolic pressure; if the diastolic pressure is elevated, it increases the work necessary to move the blood. This increases the risk of heart disease. High pressure increases the risk of a cerebrovascular accident (stroke), in which the blood vessels of the brain burst or are blocked. Hypertension gradually damages the kidneys.

C. Causes of hypertension: Excess blood volume caused by fluid retention is one cause. Obesity, which raises the peripheral resistance, is another. Atherosclerosis (hard deposits within the large arteries) can cause hypertension. Constant stress is another factor, since the sympathetic nervous system can raise blood pressure through vasoconstriction. The actual cause is frequently unknown. Salt restriction, weight loss, a heart-healthy diet, and stress reduction are the self-help strategies that are recommended first.
II. TAKING THE BLOOD PRESSURE (Fig. 21.31)

A. Put the deflated cuff around the arm of the subject, about 2-3 cm above the crease in the elbow. Allow two fingers of space between the arm and the cuff. The stethoscope surface should face the anterior, medial arm, so that you will hear the brachial artery. Insert the ear pieces. Have the pressure gauge in view.

B. Close the valve on the air pump and rapidly inflate the cuff until it is about 150 mm Hg, or higher if you expect hypertension.

C. Now, open the air valve so that the cuff deflates slowly as you listen and look at the gauge. As the pressure drops, note and remember the pressure at which you hear the first sound. This is the systolic pressure.

D. Continue to listen to the series of “thumps” (Korotkoff sounds) as the pressure drops. Note the pressure when the last sound is heard. This is the diastolic pressure.

E. Release the pressure; repeat in the other arm. As your skill improves, blood pressures can be taken more rapidly, which is more comfortable to the subject.

IV. RATIONALE

A. The brachial artery is used because it is at the level of the heart and close to it. Gravity affects the blood pressure, as does distance from the heart.

B. Blood normally flows silently through the arteries. Silence also occurs if no blood flows through the artery. If blood is impeded, it squirts through the artery in bursts which are heard as a thumping sound with each heartbeat.

C. The blood pressure cuff is pumped up to a pressure higher than the systolic pressure, so that the artery is collapsed and no blood flows. When the blood pressure cuff drops to the pressure equal to that of the artery, the first squirt of blood can flow through; that sound is recorded as the systolic pressure.

D. During the time of rhythmic thumps, the pressure in the cuff is lower than the systolic pressure, but higher than the diastolic pressure. Only during systole is the pressure high enough to open the artery to allow the blood to squirt through.
E. When the pressure in the cuff drops low enough that it equals the diastolic pressure in the artery, the vessel will stay open as usual. Silence indicates that this has occurred; the pressure in the cuff at the time of the first silence is equal to the diastolic pressure.

V. REVIEW QUESTIONS

A. Name four possible causes of hypertension.
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   ___________________________________
   ___________________________________
   ___________________________________

B. Name three organs that are affected by hypertension.
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   ___________________________________
   ___________________________________

C. What is considered average or normal blood pressure? Give the units.
   ___________________________________

D. You are to take the blood pressure of three adults. Each actually is at the blood pressure listed below as you take it. For each one, what sound would you hear when the blood pressure cuff is at 100 mm Hg? Why?

<table>
<thead>
<tr>
<th>Pressure</th>
<th>Sound heard</th>
<th>Rationale for the sound</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 98/65</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. 118/78</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. 155/106</td>
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</tbody>
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E. Which of the above is an example of obvious hypertension? 1. 2. 3.

F. Do you expect children to have on average higher or lower blood pressure compared to adults? Why?
Notes and Sketches