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Blood pressure, a set of data that has been misinterpreted for more than a hundred years

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Abstract

The first and second sound pressures obtained by the Curton blood pressure measurement method are only parameters for calculating blood pressure and cannot directly replace the systolic blood pressure of the heart and diastolic blood pressure. The adult's cardiac aortic blood pressure is a fixed constant of 160mmHg, which corresponds to the Coarse blood pressure value of 120/80mmHg. Childhood bleeding.

The blood pressure is relatively low, but the body is in the growth stage, and the blood pressure is also in the rising stage, and rises with the increase of the Kirin value, which can be called growth-type blood pressure.

After 20 years, the blood pressure stabilizes at a high level of 160mmHg; in old age, due to muscle atrophy, reduced blood flow and blood vessel obstruction etc., the blood pressure also increases with the value of the coronal tone increases and then gradually decreases, which can be called attenuated hypotension.

Introduction

The discovery of the systolic and diastolic sounds of the brachial artery (1~4) laid the foundation for modern blood pressure theory and medicine (1~9).

Koh defined the first tone as systolic blood pressure; the second tone as diastolic blood pressure (3, 4, 5). This set of values: systolic blood pressure/ diastolic blood pressure mmHg, for more than 100 years,

It has become a common standard in the world's medical industry (1,2). Unfortunately, this set of data has been misinterpreted and needs to be reinterpreted.

The formation of blood pressure

The method, process and results of Ke's blood pressure measurement can be expressed in the figure below.

It can be seen from Figure 1 that the external pressure value obtained by the Curf method of blood pressure measurement is a gradually decreasing value; on the contrary, the corresponding brachial artery number

The value is a gradually increasing number. That is to say, the higher the coronal value, the lower the corresponding brachial artery blood pressure; contrary to current understanding, the higher the coronal value, the lower the corresponding brachial artery blood pressure.

The higher the blood pressure, the higher the blood pressure.

When the external force of the first Corinthian tone is Pfirst=120mmHg, the blood pressure in the brachial artery center is Pfirst-d=0; when the external force of the second Corinthian tone gradually decreases to

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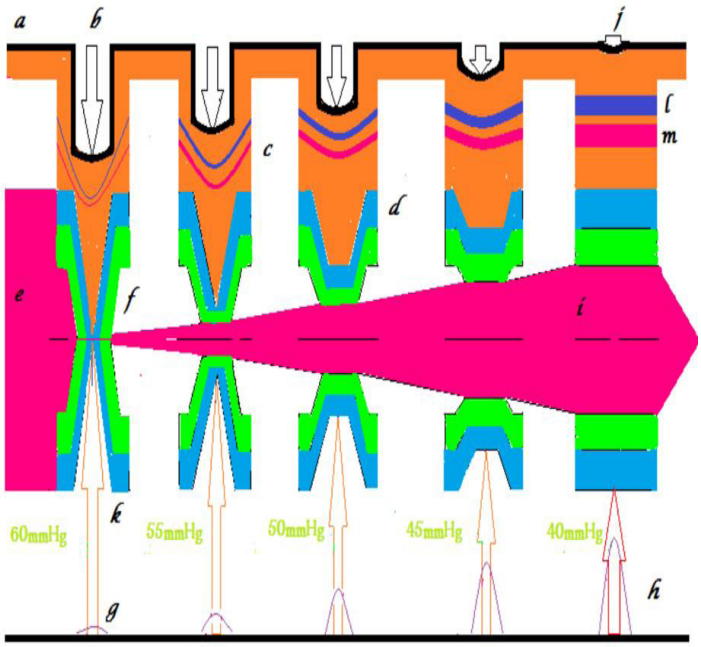

Figure 1: *Shows the blood pressure formation process*

a The epithelium of the arm;

b The external force of the arm tightening depth at Corson point;

c The tissue from the outside of the brachial artery blood vessel wall to the epithelium;

d The wall of the brachial artery blood vessel;

e Momentum blood flow from the heart 100mmHg;

f Brachial artery blood vessel lumen and 0-position blood pressure;

g Blood flow amplitude of blood vessel conduction at the first tone of Corridor;

h: blood flow amplitude of saturated blood vessels at last voice;

i: saturated momentum blood flow in blood vessels: 40mmHg;

j: restoration of arm diameter;

l: venous blood vessels;

m: small arterial blood vessels.

When Pscond=80mmHg, blood vessel momentum blood pressure reaches the maximum Psecond-d=? , at which point the sound ends. According to Bernoulli equation:

Pfirst+Pfirst-d=Psecond+Psecond-d

Psecond-d=Pfirst+Pfisrt-d-Psecond

Pfirst-d=0

Psecond-d=120-80=40mmHg

This Psecond-d=40mmHg is the reduction of external force and the restoration of arm diameter, from point b to j (Figure 1b to j) and the expansion of brachial artery blood vessel diameter with a series of blood vessels.

The flow pulsation sound is enhanced and realized simultaneously from points g to h (Figure 1g to h). The pulsating sound of the blood flow is consistent with the rhythm of the heart, not the friction sound of the blood flow; when the blood flow is in the arm

When the artery is saturated, the disappearance of the coronal sound is not due to the disappearance of the friction sound between blood flow and blood vessels, but the disappearance of the radial expansion force of the outer wall of the brachial artery and the interaction between the outer wall of the brachial artery and the outer muscle layer of the blood vessels.

The resistance of the arm muscles is balanced. This balance force is exactly 2*40mmHg=80mmHg (point i in Figure 1).

The above is the distribution and balance of blood pressure in various parts of the arm in the radial direction. What is the relationship between arm blood pressure and longitudinal heart blood pressure? The first voice is

The systolic blood pressure of the heart. Is the second sound the diastolic blood pressure of the heart? the answer is negative. The coronal pressure value is only a parameter for calculating cardiac blood pressure.

Not the heart blood pressure itself.

After the maximum arm blood pressure value of 40mmHg is determined, the cardiac blood pressure value can be calculated according to Bernoulii equaton (10,11) (Figure 1e):

Parm+1/2ρv

2

arm=Pheart+1/2ρv

2

heart

varm Aarm= vheart Aheart

A = π × r

2

P—pressure, ρ—blood density 1056kg/m3, v—blood flow velocity, A—blood tube area, r—radius

Further moving and combining terms yields:

Pheart=Parm+1/2ρ((rheart/rarm)

4

v

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2

heart-v

2

heart)

Substitute rheart=12.5mm of the aorta and blood flow velocity vheart=0.2m/s, rarm=2.5mm, ρ=1056kg/m3

Pheart=Parm+1/2ρ (25-1)

2

v

2

=525*624*0.04

=Parm+13104N/m2

1mmHg=133N/m2

, so 13104N/m2=99.08mmHg; 99.08mmHg≈100mmHg,

Obtain the momentum, flow and pressure difference between the cardiac aorta and the brachial artery:

Peart-d-Parm-d=1/2ρ((rheart/rarm)

2

-1)v

2

=100mmHg

Once the dynamic pressure difference is obtained, the heart blood pressure can be calculated using Bernoulli's equation.

Pheart-s+Pheaart-d=Parm-s+Parm-d

Pheart-s=Parm-s-(Pheart-d-Parm-d)

As can be seen from Figure 1, when Parm-s=Pfirst=120mmHg, Parm-d=0, Pheard-s=Pfirst-Pheard-d; because Pheart-d=100mmHg, we can get:

Pheart-s=120-100=20mmHg, then the "total blood pressure" of the heart can be obtained:

Pheart=Pheart-s+Pheart-d=20+100=120mmHg, then we get Pheart=Pfirst=120mmHg. At this point, I thought I had proven that Ko

The pressure value is the blood pressure of the heart. But this is an incorrect result. It can be seen from Figure 1 that when Pheart=Pfirst=120mmHg, the blood flow of the heart cannot

Through the Pfirst point, because the axial heart pressure and the radial tightening pressure are in balance, the "threshold door" cannot be opened; only when Pheart > Pfirst

It can break the balance and make the blood flow pass through the Pfirst point; gradually expand the diameter of the brachial artery and gradually increase the blood pressure; when Parm-d=40mmHg, the brachial artery

The diameter stops radially expanding, the second tone Psecond=80mmHg appears, and the heart blood pressure and arm blood pressure reach a dynamic balance, we can get:

Pheart-s+Pheaart-d=Parm-s+Parm-d =20+Pheart-d=120+Parm-d, when Parm-d=40, Pheart-d-Parm-d=100,

Pheart-d=100+40=140mmHg, then:

Pheart=Pheart-s+Pheart-d=20+140=160mmHg or Pheart=Pfirst+Parm-d=120+40=160mmHg.

This shows that the first Corridor tone is not the blood pressure of the heart, let alone the systolic blood pressure of the heart; the second Corridor tone is a true indicator of cardiac blood pressure, not the heart's systolic blood pressure.

Dirty diastolic blood pressure. The first tone of Corridor is an artificially set external pressure and does not exist naturally; the second tone of Corridor can truly reflect cardiac blood pressure. Place

Therefore, 160mmHg is the real blood pressure when the heart contracts, which is much higher than the 120mmHg systolic blood pressure of the first tone of the heart.

Changes in blood pressure

The total cardiac blood pressure Pheart =160mmHg, the brachial artery momentum blood pressure Parm-d =40mmHg, and the value Psecond =80mmHg are important parameters.

Interrelated, balancing each other; proportional to each other, changing with each other. Figure 2 shows the relationship between blood pressure parameters: total cardiac blood pressure 160mmHg by 100mmHg

It consists of two parts: momentum blood pressure and 60mmHg cardiac pressure (Figure 2a), which is a rated cardiac pressure that will not increase (except for individual differences). The arm is normal

The blood pressure and heart balance are also 160mmHg, but the structure is different (Figure 2.A,B). Ke

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Ke's first sound value Pfirst =120mmHg is heart

The lowest value of total visceral blood pressure, consisting of two parts, one part is used to squeeze out the brachial artery with a blood pressure of 40mmHg, and the other part is used to tighten the blood pressure of 80mmHg

The "steel substance" in the blood vessel walls, brachial muscles, and layers of the arm deforms (Figure 2b), independent of blood pressure; this part of the dry substance is affected by aging, hardening, and tension.

The sound will obviously increase the value of the first sound, so it cannot be used for blood pressure calculation. The last sound is 80mmHg, which corresponds to the highest cardiac blood pressure.

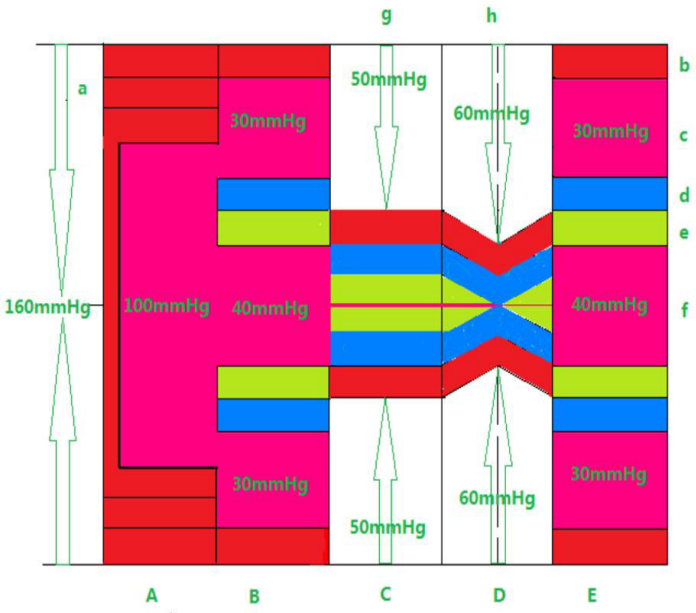

Figure 2: *Shows the blood pressure parameter relationship diagram*

A、cardiac static pressure and aortic momentum blood pressure are 100mmHg;

B、brachial static pressure and brachial artery momentum blood pressure are 40mmHg;

C When the external force is 100mmHg, squeeze out the blood pressure of the arm to 100mmHg;

D When the external force is 120mmHg, tighten the valve and set the arm arterial blood pressure to 0; E Relax the external force and return the arm to normal;

a、Myocardial pressure;

b、Brachial layer and muscle pressure;

c、Brachial layer and intramuscular blood flow pressure;

d、Brachial artery blood vessel wall outer layer pressure;

e: the internal pressure of the arterial blood vessel wall of the arm;

f: the momentum blood pressure of the brachial artery;

g: the external force of tying the arm to squeeze out blood;

h: the external force of tying the arm to flatten the arterial blood vessel wall.

The value is also the radius pressure value after the arm returns to normal, which is exactly twice the momentum blood pressure of the brachial artery (Figure 2d, c returns to Figure 2b). Corinth second tone number

The value is the core indicator of the cardiac blood pressure system, and other indicators change as this value changes. It should be noted that when the final sound of Ke ≥ standard value

At 80mmHg, as the final sound value of Corium increases, the total cardiac blood pressure decreases (Figure 1).

Combining the analysis of Figure 1 and Figure 2, we can get the change pattern of heart blood pressure: Pheart=160mmHg is the rated pressure of the heart.

When the Coron sound value is 80mmHg, it decreases as the Coron sound value increases; when the Coron sound value ≤120/80mmHg, it decreases as the Coron sound value decreases.

When the final sound of Ke is ≥ standard value 120/80mmHg:

Pheart=240-Psecond; Parm-d=120-Psecond

When the final sound value of Ke is ≤ standard value 120/80mmHg:

Pheart=Pfirst+1/2*Psecond; Parm-d=1/2*Psecond

Tightness, hardening and aging of the blood vessel wall, muscle and layer, as well as obesity, have a significant impact on the measurement of the first Corbium tone. Calculation and indication are required:

Hardness coefficient=1/80* (Pfirst+Psecond-120)

>1 means hardened blood vessels or obesity; <1 means soft or thin blood vessels; =1 means standard.

Since the first tone of Curry is not the systolic blood pressure of the heart, and the second tone of Curry is not the diastolic blood pressure, the calculation formulas of the average blood pressure and pulse pressure of the Curry tone are

All are wrong: average blood pressure ≠ 1/2 (Pfirst+Psecond); pulse pressure ≠ Pfirst-Psecond.

Calculated according to the above new method, the change pattern of blood pressure in the population can be obtained: in childhood, growth and development, blood pressure rising from low to high; in adulthood, physical

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strength

When the patient is strong, the blood pressure reaches a high value and enters the platform operation period; in recent years, as the elderly become weak, the blood pressure gradually decreases. For example, an elderly man with high blood pressure, Ke

氏The sound is 165/105mmHg, the calculated real blood pressure is: Pheart/Parm-d=135/15mmHg; hardness coefficient=1.88, the blood vessel wall is hardened, which is attenuation

Type low blood pressure. Another young man has "low blood pressure", with a blood pressure of 90/60mmHg. The calculated real blood pressure is: Pheart/Parm-d=120/30mmHg;

Hardness coefficient = 0.38, the blood vessel wall is softened, which is a growing type of blood pressure and should not be called low blood pressure.

To sum up, when the blood pressure measurement method of Curry is ≥120/80mmHg, the higher the value, the higher the blood pressure, which is a misreading; in fact, it is just the opposite, and the higher the number, the higher the blood pressure.

The higher the blood pressure, the lower the blood pressure. At the same time, it is not correct to define the first tone of Ke as the systolic blood pressure of the heart. The first sound of Ke is the pressure of man-made blocking of blood flow, which is related to

It has little to do with blood pressure; it has to do with the softness, fatness, and tightness of the arm tissue. Brachial artery blood vessel diameter and blood flow are blood pressure limiting factors, so,

When Ko's final tone is heard, the diameter of the blood vessels is the largest, the blood flow is the largest, and the blood pressure is also the largest, which is the core indicator for calculating blood pressure. It is worth noting that heart dirty

There is no diastolic pressure output. Because when the heart relaxes, the ventricular valve is closed, the internal pressure is negative, and the external output value is 0. But any pressure pump will not return

It affects the output of rated pressure during operation. The total cardiac blood pressure is a limited constant of 160mmHg. It will not increase indefinitely during systole; it will not increase during diastole.

Significantly reduces blood pressure. When children are in the growth stage, their blood pressure develops from low to high; in young adults, the total cardiac blood pressure reaches a high value of 160mmHg; as they age,

As the body ages, blood pressure also decreases. In the elderly, decreased cardiac muscle pumping power, reduced blood flow, and blocked blood vessels are all factors that lead to a decrease in blood pressure; this

At this time, the blood pressure rises in reverse, just like the engine power of an "old car" becomes stronger, which is obviously contrary to the basic laws of biology.

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