Anesthesiology
V 42, No 2, Feb 1975

Correspondence

Blood-vessel Distensibility

To the Editor:—Hershey (ANESTHESIOLOGY 41:116, 1974) makes the statement that the greater the amount of elastic tissue in a blood vessel wall, the less distensible the vessel. What is meant by elastic tissue in this context? All the three primary constituents of blood vessel walls, collagen, elastin, and smooth muscle, are elastic tissues in that they manifest varying degrees of reversible deformation following stress. The extent to which any one of the above constituents contributes to overall blood-vessel-wall mechanical properties is a function of many variables, including initial stress (transmural blood pressure); temperature; vessel-wall geometry; the state of the constituent, *e.g.*, vascular smooth muscle tone; the nature of the coupling to other tissues; and the mechanical properties of the constituents themselves.

If by elastic tissue the author means elastin, then an increase in this component would tend to increase blood-vessel distensibility, not decrease it as the author suggests, due to the relatively low static elastic modulus of elastin ($3–6 \times 10^6$ dynes/cm^2).[1] Conversely, collagen has a relatively high static elastic modulus ($10^8–10^9$ dynes/cm^2)[2]; thus, we find that a rising collagen-to-elastin ratio (C/E) such as is found as we pass down the aorta from the ascending portion to the femoral arteries[3] results in a progressive reduction in aortic distensibility.

ROGER J. BAGSHAW, M.D.
Department of Anesthesiology
University of Pennsylvania
3400 Spruce Street
Philadelphia, Pennsylvania 19104

REFERENCES

1. Burton AC: Relation of structure to function of the tissues of the wall of blood vessels. Physiol Rev 34:619–642, 1954
2. Bergel DH: The static elastic properties of the arterial wall. J Physiol 156:445–457, 1961
3. Fischer GM, Llaurado JG: Collagen and elastin content in canine arteries selected from functionally different vascular beds. Circ Res 19: 394–399, 1966

(Accepted for publication September 24, 1974.)

To the Editor:—Dr. Bagshaw introduces structural–physical factors of blood vessel morphology at a level more detailed and basic than I attempted. His facts are correct, as is my statement. I, perhaps, should have related distensibility to the ratio of smooth muscle to (other) elastic tissues in the vessel wall. The higher this ratio is, the greater the distensibility—as holds true progressively for consecutive segments of the arterial system, moving peripherad. I do clarify the point Dr. Bagshaw raises, however, further on in my discussion of the *density* of vessel walls. My long-term orientation toward the small blood vessels probably caused me to overlook the differentiation between elastin and collagen, a factor of much more importance in the very large blood vessels than in the smaller arteries and arterioles. I will try to think "big" henceforth whenever I discuss peripheral circulation.

S. G. HERSHEY, M.D.
Professor of Anesthesiology
Albert Einstein College of Medicine
Bronx, New York 10461

(Accepted for publication September 24, 1974.)