

In splenectomized animals the tendency to "plethoric anemia" is much more apparent, although a direct connection between the two events has not been established.

In splenectomized animals pigment-bearing phagocytes are especially prominent in the liver, although lymphnodes and bone marrow apparently share in the extra work caused by the absence of the spleen. Lymphnodes with some of the characteristics of hemolymphnodes have been found in various localities in all animals that had been made plethoric.

In rabbits, blood pigment is deposited in the organs in large amounts, but the picture and the experiment has in our hands been constantly complicated by early fatal intravascular agglutination and thrombosis. In the rabbit, as in human hemochromatosis, the pigment is found in 2 forms: Hemosiderin granules, and smaller, dark spicules that do not react to the usual iron stains (probably hemofuscin). The latter pigment is also found seeded through the cells of the liver parenchyma.

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Changes in total peripheral resistance during experimental shock.

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The question as to whether the peripheral resistance is increased or decreased in experimental shock has been submitted to repeated investigations, but with contradictory results.¹ On the basis of changing contours of the aortic pressure curves found during the course of experimental shock, Wiggers¹ came to the conclusion that a reduced peripheral resistance obtained early in shock. Apparently contradictory results were however soon reported by Erlanger, Gasser and Gesell¹ who employed, in modified form, the procedure described by Bartlett²—a method which measures essentially the rate of saline inflow into the main artery of an organ or limb temporarily isolated from the rest of the arterial

¹ For recent review of literature cf. Wiggers, *Amer. J. Physiol.*, 1918, xlvii, 498; Erlanger, Gesell and Gasser, *Amer. J. Physiol.*, 1919, xlix, 103.

² Bartlett, *Jour. Exp. Med.*, 1912, xv, 415.

circulation. In view of the investigations of Dale and Richards³ who found that the normal reactions of capillaries are not maintained when an organ is perfused with saline solution, whereas the reactions of the arterioles are retained, it seemed not impossible that Erlanger, Gasser and Gesell by their method tested largely the reaction of the peripheral arterioles in shock, whereas the optical curves analyzed by Wiggers determined peripheral resistance changes due in part also to alterations in the caliber of the capillaries, viscosity of blood, etc. Since evidence has accumulated that the capillaries are particularly affected in shock it is quite possible that their dilation might decrease the total resistance early in shock in spite of the fact that a contraction of their supplying arterioles occurs. If this be true the discordant finds of Wiggers and Erlanger et al. would be explained.

At the suggestion of Doctor Wiggers, we therefore attempted to determine by direct methods how the *total peripheral resistance* behaved during the course of experimental shock—particular attention being directed to early phases. To do this we employed the method described by Cope⁴ which essentially determines the rate that the animal's own blood flows through a limb temporarily isolated from the rest of the arterial circulation. The results obtained by this method at various times during the course of an experiment were related not only to changes in mean blood pressure and heart rate but to the contours of the optically recorded carotid pulse as well. After preliminary ligation of the pelvic vessels required for the procedure described by Cope, shock was induced by the "gastric massage" method described by Henderson and Haggard.⁵

Results.—Thirteen experiments were carried out on anesthetized dogs. Comparison of the optical curves before and after ligation of the pelvic vessels revealed no changes such as were found by Wiggers in the initial stages of shock. Arterial blood pressure sometimes declined temporarily but recovery to or above normal was usually prompt. Control tests of the total peripheral resistance indicated that it usually increased for a time.

³ Dale and Richards, *Jour. Physiol.*, 1918, lii, 144.

⁴ Cope, *Amer. J. Physiol.*, 1911, xxix, 137.

⁵ Henderson and Haggard, *J. Biol. Chem.*, 1918, xxxiii, 136.

Shortly after opening the abdomen and beginning of the gastric manipulation the total resistance showed pronounced changes. In a few cases (especially those in which there had been a previous hemorrhage), the total resistance was found to increase, for a time. The optical curves in such cases showed no essential variations, however. In the majority of cases, however, the total resistance as measured by the Cope method decreased at once and the optical curves showed typical changes interpreted as characteristic of low peripheral resistance.

During the progressive stages of shock, *i.e.*, where mean arterial pressure begins to fall, wide fluctuations in resistance were found by the Cope method, confirming observations of Erlanger, Gasser and Gesell. In those experiments, however, in which the total resistance was initially decreased, it continued below normal.

We believe, therefore, that direct proof has been supplied that the early changes in contours of the arterial pressure curves during shock are associated with a reduced peripheral resistance. Taken in conjunction with the observations of Erlanger, Gesell and Gasser that the arterioles at this time are constricted these results lend support to the idea that the point of vaso-relaxation in shock is in the capillaries rather than the arterioles.

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Experimental plumbism: therapeutic efficiency of some agents and comparative toxicity of other metals.¹

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Experimental chronic lead poisoning was produced by feeding metallic lead in the form of bullets to pigeons. The symptoms are characterized by a prompt loss of body weight and appetite, gradual depression, loss of equilibrium, diarrhea, increased crop peristalsis with regurgitation of contents, wing drop (anatomically corresponding to drop-wrist in man), paralysis of legs, marked emaciation and death at the end of 21 days (mean). At autopsy,