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Effect of Venostasis on Heart Failure with Particular Reference to Cardiac Asthma.

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Though the etiology of cardiac asthma is unknown, a markedly increased cardiac output and blood velocity throughout the body and especially the lungs are according to Eppinger, Papp and Schwartz[1] significant factors. They explain the attack by a relatively left ventricular insufficiency dependent on the excess of blood brought to the lungs and heart. In view of the convincing nature of their experiments the writer has attempted to check the circulatory overflow in the periphery by the compression of the veins in the four extremities. This is conveniently performed by applying four blood pressure cuffs around the extremities as near to the trunk as possible. These cuffs are all in series and connect with an ordinary blood pressure manometer and rubber bulb. We have called the apparatus the "Venostat." (Fig. 1.)

The cuffs are gradually inflated up to diastolic pressure and maintained at this level for 10 to 12 minutes. They are then very gradually deflated.

The application of this procedure during a cardio-asthmatic attack relieves the symptoms in about 5 minutes, and frequently terminates the attack by the time the treatment has been completed. Objectively sonorous and sibilant rales that may be present over the lungs become very faint or disappear entirely.

During the treatment the extremities become engorged due to compression of the veins. The arteries remain patent. A considerable volume of the blood now collects in all the four extremities.

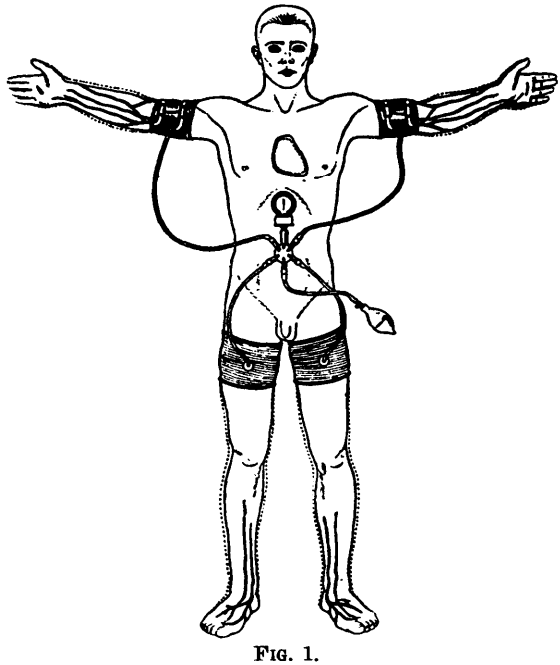

FIG. 1.

The cardiac outline becomes slightly reduced on the X-ray plate. Even the slight diminution in the cardiac silhouette as shown recently corresponds with great changes in the volume of the heart. Thus the heart and lungs are temporarily unloaded. When one recalls the fact that both of these organs are never completely at rest during life—even this partial rest for a relative short time may be sufficient for the heart to recuperate. The possibility that a reflex effect on the heart or the respiration, due to the stasis of blood in the extremities, may also be operative, is not to be denied.

In the belief that venostasis unloads the heart sufficiently for recuperation, its effect was tried on clinical cases of heart failure requiring large doses of digitalis. Only far advanced cases were studied. Digitalis was not given and no other treatment besides the restriction of salt and fluid intake was applied. Venostasis was produced for 10 to 12 minutes every two hours. Marked improvement in the dyspnea resulted. Orthopnea disappeared. The edema lessened and the water excretion increased—in some cases exceeded the fluid intake. After a week, however, digitalis had to be given again because of the return of the edema. These were far advanced cases, however. We were thus led to believe that venostasis is capable of disembarrassing an insufficient heart; only the far advanced cases must, in addition, be given digitalis.

Our results are more intelligible in the light of the experiments of Harrison and Leonard,[2] who have found that digitalis acts by reducing the cardiac output. From their work it appears that digitalis is a cardiac sedative rather than a stimulant. Eppinger observed a case of heart failure with a minute output of 10 liters that was reduced to 5 liters when compensation was restored. The combined findings of these investigators may modify our views on circulatory failure where a reduction of cardiac output was hitherto assumed to exist and treatment was directed towards increasing the systolic discharge. If further study should permit general application of these principles to the conception and treatment of cardiovascular failure, the keynote of therapy may be cardio-sedative measures. It appears to us that venostasis as we apply it, fulfills this requirement.

The difference between the action of venostasis and digitalis is that in the latter the diastolic filling is reduced by an increase of cardiac tonus, while in venostasis the shunting of a considerable volume of blood in the extremities by simple mechanical means partially depletes the heart and accomplishes the same purpose.

Conclusion: Venostasis is an effective procedure in cardiac asthma and heart failure. It can frequently replace digitalis in the treatment of cardiac decompensation. A convenient apparatus called the "Venostat" is presented.

[1] Eppinger, H., Papp and Schwartz, Asthma Cardiale, Julius Springer, Berlin, 1924.

[2] Harrison, T. R., and Leonard, B. W., *J. Clin. Investigation*, 1926, iii, 1.

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Morphological and Chemical Studies of the Blood in Chronic Duodenal Obstruction.

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In the following report we wish to describe our observations of the blood changes in dogs with experimentally produced chronic duodenal obstruction. In the 12 dogs which were studied, the obstruction existed for periods extending from 2 months to 13 months.

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