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Injections of Caffeine and Adrenalin and Subsequently Staphylococcus Aureus Suspensions on Myocardium and Endocardium.

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Fleisher and Loeb[1] have shown that a single intravenous injection of a mixture of .025 gm. caffeine sodium benzoate and .2 cc. adrenalin chloride causes a gross myocardial lesion in the left ventricle and papillary muscle of the left ventricle in rabbits, in about 60 per cent of cases. We have confirmed their observations, and have in addition observed a lesion in the left auricle which follows these injections in some cases. In order to rule out the possibility that these may be spontaneous lesions, and in order to analyse the functional effects of these myocardial changes, a series of rabbits was examined electrocardiographically before and after these injections.[2] We may only state here that the cardiac condition is not the result of previous spontaneous myocardial disease.

Experiments were carried out to determine whether this lesion produced by caffeine and adrenalin injections would render the rabbit's heart more susceptible to abscess formation when, subsequently, a pyogenic organism in culture is injected intravenously. For this purpose 24 rabbits were injected with a single dose each of the caffeine and adrenalin mixture. Then at varying periods afterwards, each was injected with 1 cc. of a 48 hour bouillon culture of a laboratory strain of living *Staphylococcus aureus* of a sufficient virulence to cause the production of abscesses in the kidneys in a large number of cases without causing the death of the animals within the following three weeks. The rabbits were killed at varying periods following these injections and the organs examined grossly and microscopically. Twenty-three of the 24 animals showed the gross myocardial lesion which usually follows caffeine and adrenalin injections. In addition, 8 had abscesses in the myocardium. Of these 8, 6 showed a single abscess in or in very close proximity to the caffeine and adrenalin lesion in the myocardium of the left ventricle. The other 2 rabbits had both an abscess in or around the caffeine and adrenalin lesion, and in addition one showed an abscess in the normal myocardium near the apex of the left ventricle, and the other vegetation on the mitral valve. Of these 23 rabbits 3 showed gross endocardial lesions, which consisted in 2 cases of a mural thrombus adherent to the endocardium of the left ventricle

adjacent to the lesion produced by caffeine and adrenalin in the myocardium of the left ventricle. The third case, previously described, showed an ulcerated vegetation at the line of closure of the mitral valve.

Eighteen control rabbits received the same dose of *Staphylococcus aureus* culture intravenously without previous injections of caffeine and adrenalin. Only one of these animals showed an abscess in the myocardium, and this rabbit probably had a preexisting spontaneous myocardial lesion, the site of which was also the site of the abscess formation. Furthermore, none of these showed an endocardial lesion.

However, it was found that when a more virulent strain of *Staphylococcus aureus* was used, the rabbits which received merely *staphylococcus aureus* injections also showed myocardial abscesses. Thus in a second experiment in 10 out of these 13 control rabbits such lesions developed. Those animals which had been injected with caffeine and adrenalin and, subsequently, with the more virulent staphylococcus culture, had myocardial abscesses in 10 out of 11 cases. While in this experiment the difference in the number of abscesses in the two classes of rabbits is very slight as compared with the results obtained in the first experiment in which the less virulent strain of staphylococcus was used, there was a definite difference in the localization of the abscesses between the control animals and the caffeine and adrenalin animals. The myocardial abscesses in those animals which had received caffeine and adrenalin in addition to the staphylococcus culture were in most cases situated in or around the caffeine and adrenalin lesion in the left ventricle; while in those which had received only injections of staphylococcus culture the abscesses were more frequent in the right ventricle, and practically never found at the site of the lesion produced by caffeine and adrenalin.

We concluded, therefore, that the myocardial lesion in the rabbit produced by the injection of adrenalin and caffeine influences the localization of abscesses caused by the intravenous injection of staphylococcus cultures, and that under certain conditions these myocardial lesions may also increase the number of abscesses.

This is a preliminary report.

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[1] Fleisher, M. S., and Loeb, Leo, *Arch. Int. Med.*, 1909.

[2] Becke, W. G., and Johnson, Scott, *Am. Heart J.*, 1927.