

# THE SURGICAL TREATMENT OF ESSENTIAL HYPERTENSION

*Report of Progress in 106 Cases*

GEORGE CRILE, M.D.

My experience in the surgical treatment of hypertension began 23 years ago when I performed a unilateral adrenalectomy for this disease. The operation was followed by a temporary fall in the blood pressure which later rose again to the preoperative level. This partial, temporary success suggested adding to the unilateral adrenalectomy the partial resection of the other gland. The blood pressure was affected somewhat more than by the unilateral adrenalectomy alone, but it again rose to the disease level.

The adrenal glands, like the thyroid gland, are endowed with the power of compensatory hypertrophy but since the adrenal glands are essential to life, it is not safe to risk the onset of adrenal deficiency by extending the operation beyond a certain limit. If too much is excised, adrenal deficiency will follow; if too little is removed, restoration of the disease will follow. Therefore, a direct attack upon the adrenal gland would seem to be excluded. However, the marked effect of the removal of adrenal tissue in these early cases of hypertension indicated that the adrenal glands and the sympathetic system, when in a state of pathologic physiology, possess the power of affecting part if not all of the energy possessed by the muscles of the arterial tree from the aorta to the capillary bed. We, therefore, attempted to attack the function of the adrenal glands by denervating the glands in two seances. This procedure improved the effect upon the hypertension, the improvement or cure in some cases having lasted for as long as ~~five years~~ (Fig. 1.)

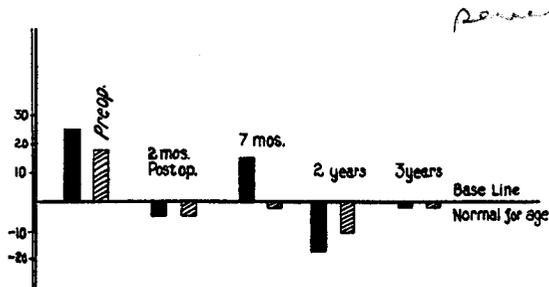


FIGURE 1: Chart showing the postoperative changes in the blood pressure in a patient with hypertension after adrenal denervation and division of the splanchnic nerves.

The cases in which these favorable results have been secured have included especially cases of hypertension in young subjects and cases

## GEORGE CRILE

in which the hypertension has been associated with some disease also due to a pathologic physiology of the energy-controlling system such as hyperthyroidism, polyglandular disease, etc. But still recurrences occurred in too many cases. We, therefore, extended the operative procedure to include resection of the major, minor, and least splanchnic nerves. This operation improved both the immediate and the later clinical results. In view of the gravity of the disease we felt justified in recommending it, especially in view of the fact that headaches and other subjective symptoms were relieved. But it became evident that some other still undiscovered factor in the production of the hypertension must be found. We believed that this factor must be the effect of sympathetic stimulation of the nerves with which the entire arterial tree is so richly supplied; that is, in cases of hypertension the action of sympathin as well as that of the adrenal medulla extends to that part of the sympathetic system which supplies the energy of the arterial tree. The continued maintenance of the high blood pressure day and night with the constant reserve of energy at all times for crisis use indicates the presence of a generative mechanism of no small size and power.

At this point it occurred to us that clarifying evidence could be found by a study of the comparative anatomy and physiology of the energy systems of animals presenting evidences of wide variations in their equipment for the production of energy. The lion and the alligator may be cited as examples of the two extremes. If the ganglia of the sympathetic complex and the complex itself and the adrenal medulla are essential parts of a great power station, then in animals, the size of the adrenal medulla, the celiac ganglia, and the sympathetic complex should correspond with the power generated by each type of animal just as definitely as a motor corresponds with the function of the machine of which it forms a part—an aeroplane, a tractor, a low or a high-powered automobile, etc. Our research in Africa proved this conception beyond question.

Another significant observation indicates the function of the sympathetic system in the production and maintenance of high blood pressure. When, in the course of a denervation of the adrenal glands and division of the splanchnic nerves, the sympathetic nerves are manipulated there is a rise in the blood pressure, both systolic and diastolic, sometimes to such a height that it cannot be measured by a manometer, while on the other hand if the field is first flooded with novocain there is no rise but rather a dramatic fall in the blood pressure (Fig. 2). The adrenal-sympathetic complex is the only tissue in the body, the manipulation of which can thus specifically affect the blood pressure.

## THE SURGICAL TREATMENT OF ESSENTIAL HYPERTENSION

On the basis of these observations we resected the celiac ganglia, broke up the sympathetic complex, and denervated the aorta itself.

If we are right in our interpretation of the large body of facts supplied by our studies of comparative anatomy and physiology and by our clinical experience, we have in effect found a new organ which it would appear supplies the link that has been missing. The operative proce-

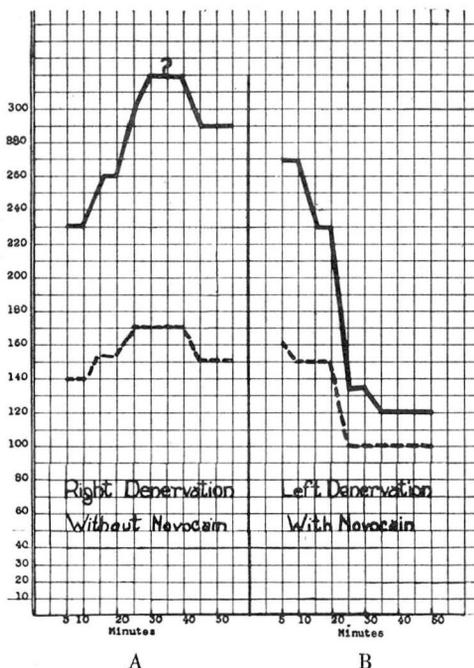


FIGURE 2: Chart showing the effect upon the blood pressure of manipulation of the sympathetic complex. (A) Without novocain and (B) after the operative field has been flooded with novocain.

cedure based on these findings should enable us to reduce the high blood pressure of essential hypertension to normal on the operating table and since the post-ganglionic fibers cannot regenerate, there should follow a corresponding reduction in the blood pressure. There should be no disturbance of any other function, renal, bladder, gastro-intestinal, etc.; and, of considerable importance, the operative procedures can be completed in one seance.

Our experience with this new procedure now includes 25 cases, most of which were cases of malignant hypertension in an advanced stage. Our impressions from these 25 cases may be summarized as follows:

1. During the operation the blood pressure in cases of malignant hypertension is reduced to the normal level.

## GEORGE CRILE

2. There is but a slight degree of shock as would be expected since the procedure is retroperitoneal.

3. The operation is performed in one seance.

4. Being in a painless area, nitrous-oxide oxygen provides ample anesthesia.

5. The clinical results during the operation and during the stay in the hospital show an improvement over those secured by our former procedures comparable to the effects of an adequate bilateral partial thyroidectomy as contrasted with those of ligation of the superior pole and unilateral lobectomy for hyperthyroidism. The present operation gives the impression of being a complete procedure, as during the stay in the hospital the blood pressure is more completely stabilized at a lower level than after the former operations, and there is a greater improvement in the eye grounds and in the kidney function as well as in the general well-being of the patient.