successful, and the remainder of the experimental females gave no litters. This shows that there was no regeneration of functional host ovarian tissue. In the animals of Group II, however, the grafts were unsuccessful in all 5 of the females which gave litters. This, according to the results in Group III, is not due to regeneration of host ovarian tissue at the site of the operation, but is probably due to a physiological block between the host ovary of one side and the grafted ovary, since such a high percentage of successful grafts are obtained when the remaining ovary is completely removed. Thus, it seems evident that the presence in the host of one of its own ovaries changes some reaction which is necessary for graft maintenance.

Since the host agouti females of Group III were first mated approximately 10-15 days after the operations, and since 3 have given second litters, it is quite certain that the ovulations in the successfully grafted ovaries were not due simply to the mechanical stimulation of the operation. Additional experiments of this type are being done at the present time, and it is hoped that the high percentage of successful ovarian grafts can be equalled or increased. This type of operation should be of importance as an aid to the solution of problems in developmental genetics of mammals.

11439 P

Effect of Anterior Chordotomy on Essential Hypertension.

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Within the past 10 years there have been many reports concerning the surgical treatment of essential hypertension.[1, 2] The methods used both in experimental animals and in man may be classified into 4 different groups:[3] (1) Interrupting sympathetic outflow by cutting anterior nerve roots from T_6 to L_2,[4] (2) dividing the splanchnic and the sympathetic chain above the diaphragm,[5] (3) dividing the

1 Braden, S., and Kahn, E. A., *Yale J. Biol. Med.*, 1939, **11**, 449.

2 Craig, W. M., *Surgery*, 1938, **4**, 502.

3 Ascroft, P. B., *Lancet*, 1939, **2**, 113.

4 Page, I. H., and Heuer, G. J., *Am. J. Med. Sc.*, 1937, **193**, 820.

5 Freyberg, R. H., and Peet, M. M., *J. Clin. Invest.*, 1937, **16**, 49.

splanchnic nerves and the lumbar sympathetic chain below the diaphragm,[6] and (4) removing the coeliac ganglion.[7]

These various methods, however, have proved to be only partially successful, and this has stimulated us to attempt a new approach to the surgical treatment of essential hypertension. Goldblatt's[8] ingenious experiments on dogs have shown that total sympathectomy of the thorax and abdomen, and even pithing, have had no effects on the type of experimental hypertension he produced. Based on the consideration that various forms of sympathectomy may reduce the blood pressure of patients with essential hypertension, but that these results were often disappointing, it was at first the intention of one of us (O.H.) to effect a more complete sympathectomy by partially sectioning the autonomic tracts in the cord. We observed, also, that when routine anterior chordotomy was performed for reasons other than hypertension, the operation was usually followed by a prolonged lowering of the blood pressure. Later it was found that, as far as the arterial pressure was concerned, a maximum result could be attained by beginning the section one to two mm anterior to the dentate ligament and carrying it to the anterior median fissure, thus interrupting the anterior and anterolateral columns of the cord. Bilateral sections are made because unilateral sections were found to have little effect on the arterial pressure. It has been found that the optimal location for the section is at the 8th cervical segment.

In women with essential hypertension, chordotomy has been almost uniformly followed by a reduction of blood pressure to the normal figure for 4 to 6 months, after which it tends to return to a higher level, but only occasionally to the preoperative level. Moreover, this operation has not necessarily produced a disturbance in sweating. Most of the subjects on whom this operation has been performed have had advanced hypertension, with subjective symptoms, and all of them have been greatly benefited. Our results in the few male patients so treated have not been as successful as the females. The few male patients whom we have subjected to this operation had more advanced changes in the vascular tree than the females so that the difference in sex was probably not the determining factor.

The authors feel that a dual mechanism (central neurogenic, and peripheral) is probably involved in essential hypertension, and that chordotomy possibly eliminates the central neurogenic factor. Work is being carried out with the idea of proving or disproving this

[6] Allen, E. V., and Adson, A. W., *Am. Heart J.*, 1937, **14**, 415.

[7] Crile, G., *Ann. Surg.*, 1938, **107**, 909.

[8] Goldblatt, H., *Surgery*, 1938, **4**, 483.

hypothesis, and, if it should be correct, then eliminating the central factor would leave only the peripheral (hormone?) mechanism which may become more amenable to drug therapy.

Some physiological effects of anterior chordotomy have been discussed.[9] The result of chordotomy on motor function in some 90 cases will be published in the near future.

11440 P

Occurrence of Strains of Pneumococci Which React With More Than One Type-Specific Antipneumococcal Serum.

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Pneumococci are commonly classed among the best examples of bacterial type-specificity. While cross-reactions frequently occur involving types 3 and 8 and less frequently other types, they have usually been considered from the standpoint of the cross-reacting antibodies that sometimes develop during immunization rather than from the standpoint of the antigenic type-multiplicity which causes them.[1, 2]

Several strains of pneumococci that conspicuously violate the prevailing conception of type-specificity have been isolated recently in this laboratory. Neufeld tests with sera of 3 different manufacturers show that each of these strains reacts with at least 3 type-specific sera.

Table I summarizes the reactions of 6 such strains. It will be noted that each strain shows somewhat greater capsular swelling with one serum (either type 29 or type 24) than with others. However, reaction is only slightly less with a second, and in some strains with a third, serum.

With the exception of the Hoge strain all 6 were isolated from 488 routine specimens submitted to this laboratory for typing between February 16 and April 3, 1940. Fifty-nine of these specimens were reported as containing more than one type of pneumococci, and 18 of them examined for the possible presence of multiple-react-

[9] Hyndman, O., and Van Epps, C., *Arch. Surg.*, 1939, **38**, 1036.

[1] Lyall, H. W., and Odell, H. R., *Am. J. Hyg.*, 1939, **29** (Sect. B), 103.

[2] Noble, A., and Cameron, B. C., *J. Lab. and Clin. Med.*, 1939, **24**, 1.