164 (2396)

Operative results of thyroidectomy and thymectomy in the rabbit.

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During the last two years, our study of animal resistance has included investigations on the endocrine mechanism as one of the factors involved in the reaction of the host to disease processes.[1, 2, 3] Operative procedures of various types have been carried out on the thyroid, thymus, and suprarenal glands of rabbits, and the majority of animals have been inoculated with *Treponema pallidum* or a malignant tumor of the rabbit[4] either before or after operation. The rabbits so operated upon have been kept under observation from three to ten months, and at the conclusion of the experiments a complete autopsy was carried out in each instance. In this communication we wish to present a summary of the operative results upon the thyroid and thymus from the point of view of operative mortality, wound infection, and the incidence of residual nodules of gland tissue.

Complete thyroidectomy has been performed in 103 instances with an operative mortality of 3.9 per cent (4 rabbits). These deaths occurred among our early operations and were attributed to over-anesthetization; in one instance there was an acute pulmonary emphysema. We have had no fatalities in the last 54 operations. The only case of wound infection occurred in the one animal in which local anesthesia was used and in which there was also an extensive mange. Up to the present time, 90 of the

[1] Brown, W. H., and Pearce, L., PROC. SOC. EXP. BIOL. AND MED., 1923, xx, 472.

[2] Brown, W. H., and Pearce, L., PROC. SOC. EXP. BIOL. AND MED., 1923, xx, 476.

[3] Pearce, L., and Van Allen, C. M., *Trans. Assoc. Am. Phys.*, 1923, xxxviii, 315.

[4] A description of the original tumor, its successful transplantation, and the studies carried out on subsequent generations will be found in recent issues of the *Journal of Experimental Medicine* beginning with: Brown, W. H., and Pearce, L., *J. Exp. Med.*, 1923, xxxvii, 601.

rabbits have been autopsied, and in four instances (4.4 per cent) tiny nodules of hyperplastic thyroid tissue have been found in close connection with a silk ligature.

A partial removal of the thyroid has been carried out in 30 rabbits. In 24 instances one lobe and the isthmus were removed while in six the operation included the ligation of the blood supply to the remaining lobe. There has been one operative death, or 3.3 per cent, and no instance of wound infection.

The thymus has been completely removed by a transthoracic operation from 50 rabbits with an operative mortality of 10 per cent. One death was due to air embolism, three to an acute pulmonary edema, and the last was probably due to the combination of an injury to the left phrenic nerve with an extensive right pneumothorax. There were 18 instances of unilateral pneumothorax; none of these animals died or appeared to be adversely affected by this complication. A local, well encapsulated, mild or moderate (two cases) infection in the operative region, either inside or outside the chest, occurred in eight rabbits, an incidence of 16 per cent. None of these animals died. Autopsy records of 44 rabbits are at present available—in one instance what appeared to be a few small nodules of thymic tissue were found.

In our last series of 29 thymectomized rabbits which comprised 15 adult, 6 young, and 8 old animals, there was only 1 death occurring in an old animal, or a mortality rate of 3.4 per cent. Older rabbits present more difficulties in this operation than do young or adult animals. The operation in young rabbits from three to four months of age is comparatively easy. Furthermore, in this group of 29 rabbits, our infection rate fell to 6.8 per cent —two rabbits, and in both the infection was of a mild type.

In our experience, rabbits subjected to complete or partial thyroidectomy or complete thymectomy will live for many months in excellent physical condition even with the imposition of the additional stress incident to inoculation with various agents. Complete thyroidectomized animals, however, are definitely more susceptible to spontaneous diseases, such as snuffles, than are normal animals. A similar condition of lessened resistance induced by complete removal of the thyroid, is strikingly shown by the more severe course of experimental syphilis and of a transplantable malignant tumor in such rabbits.[8]