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Biological Sciences

SURGICAL REMOVAL OF CANINE HEARTWORMS (DIROFILARIA IMMITIS)

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It is a common belief that the mammalian heart is a very delicate organ. However, recent developments in cardiac surgery have shown the heart to be highly resistant to operations, if the latter do not interfere too much with the ability of the heart to pump an adequate supply of blood to itself and to the rest of the body.

In view of the considerable experience in surgery of the heart that has been gained thus far, it seemed to us that surgical removal of heartworms was a feasible procedure. Since northern dogs are not infected with heartworms, it was necessary to obtain animals from the South. Through the kindness of Dr. Charles Bild, of Miami, Florida, a sufficient number of infected dogs were sent to us for exploration of this interesting possibility.

Surgical Procedures

The animals were prepared by fasting twelve to eighteen hours. They were anesthetized with pentobarbital sodium (25 to 30 mg. per kilogram of body weight). A sterile technic was used throughout; the thorax was opened on the right side through the fourth or fifth intercostal space, artificial insufflation being supplied.

The ribs were widely retracted by means of a self-retaining rib retractor. In 3 of the 5 operations done on the right side, umbilical tape was placed around the anterior and posterior venae cavae in readiness for interruption of the return of blood to the heart when the ventricle was incised. After the heart had been isolated with moist towels, the pericardium over the operative site was opened and retracted. The tapes about the venae cavae were drawn up to occlude the flow of blood. A short incision was made through the right myocardium and a curved hemostat was thrust through the incision. The right ventricular cavity and the pulmonary artery were explored and the heartworms grasped by the instrument were removed. When further attempts failed to yield additional worms or when the effort was unproductive, as occurred in one operation, the incision through the myocardium was closed with a continuous silk suture. The pericardium was repaired and the thorax was closed in layers in the usual manner.

In two additional operations on the right side, the return of blood was not interrupted but, instead, a running suture was passed on each side of the site of the incision. By tying the ends of each suture together they were looped, and were crossed so that traction exerted on them closed the incision, which was 15 to 20 mm. in length. The other features of the operation were the same.

It is fortunate that the anatomic relationships of the heart and thorax of the dog are such that the right ventricle can be explored from either the right or left side. If it is desirable to inspect the pulmonary artery, the approach through the left side is preferable.

The operation has been done on the right side in five animals. In all operations except one, worms were removed. Larvae were present in the blood smears of all animals before and after the operation. A second operation was done on the left side of the thorax in all of the dogs. A few worms were removed from each of two animals. In two others worms were not found. The fifth dog did not yield any worms at either operation. After the second operation this dog was killed. Thorough examination of the heart and pulmonary vessels did not disclose any heartworms. Three other dogs of the series were killed. Six worms were found in one dog at necropsy; examination of the other dogs gave negative results.

One of the series of five dogs is still alive after nearly three years, and still has larvae of *Dirofilaria immitis* in the blood.

This work has amply demonstrated that the surgical removal of heartworms is a feasible procedure. It remains to be seen whether the operation will become a practical method of removal of the worms from a heavily infected valuable animal to which the administration of a vermifuge might be considered too great a risk. A combination of the operation with a vermifuge might offer certain advantages, since most of the worms could be removed by surgical means and the small number that might be missed at operation could be killed with anthelmintic agents without too serious risk to the animal:

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THE PRESENT STATUS OF THE SEARCH FOR ANTITUBERCULOSIS SUBSTANCES

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The demonstration by Robert Koch almost three fourths of a century ago that tuberculosis is caused by a micro-organism provided reason for belief that a specific treatment of the disease could be found. During the following years a great deal of effort and