

tion is more lethal than acriviolet or acriflavine in the same dilution, while mercurochrome is essentially ineffectual. On the other hand hexyl resorcinol in 0.1 and 0.01 dilutions showed a much greater strongyloidicidal capacity than any of the other reagents, and in 0.001 dilution was practically as potent as crystal violet in 0.1 dilution.

Since these *in vitro* results are suggestive only and do not necessarily parallel the *in vivo* action of these reagents, there is need to determine if hexyl resorcinol and other drugs of this series are as effective as gentian violet or crystal violet in eradicating *Strongyloides* from normally or experimentally infected hosts.

5485

Changes in the Liver Following Cholecystgastrostomy and Cholecystduodenostomy.*

I. M. GAGE. (Introduced by Alton Ochsner.)

From the Department of Surgery, Tulane University School of Medicine.

The presence of severe liver damage following cholecystgastrostomy and cholecystduodenostomy in the dog has been demonstrated by Lehman,¹ Horsley,² Beaver,³ and Gatewood and Stanley.⁴ The changes noted have been of varying degrees, from simple lymphangitis to extensive necrosis and abscess formation. All agree that in their experiments a hepatitis of varying degrees developed following anastomosis of the gallbladder to the gastro-intestinal tract. However, these authors failed to obtain specimens of the liver for histological study with concomitant bacteriological studies of the normal liver, stomach, or duodenum in order that a comparison could be made with sections of liver removed at varying intervals after the anastomosis of the gallbladder to the stomach and duodenum.

In 1909 Walbach and Saiki⁵ demonstrated that areas of necrosis occurred in the liver of normal dogs.

* Aided by a grant from the David Trautman Schwartz Research Fund.

¹ Lehman, E. P., *Arch. Surg.*, 1924, **9**, 16.

² Horsley, J. S., *South. Med. J.*, 1927, **20**, 669.

³ Beaver, M. G., *Arch. Surg.*, 1929, **18**, 899.

⁴ Gatewood and Stanley, *S. G. and O.*, 1930, **50**, 40.

⁵ Wolbach, S. B., and Saiki, T., *J. Med. Research*, 1909, **21**, 279.

Previously I reported on the bacteriology of the liver before cholecystgastrostomy and cholecystduodenostomy followed by a second bacteriological check-up 15 days after the first operation. I found practically no changes in the bacterial flora of the liver after cholecystgastrostomy and cholecystduodenostomy.

This paper deals with the changes found in the liver of normal dogs before and after anastomosis of the gallbladder to the gastrointestinal tract. A series of 40 dogs were used, divided into 2 groups. In the first series of 20 dogs cholecystgastrostomy was performed in 10 and cholecystduodenostomy in the remaining 10. In the second group a plastic operation on the gallbladder was done, producing a tube leading from the fundus of the gallbladder. The tube was inserted into the stomach and duodenum by a method similar to Coffey's method of ureteral transplantation. A series of 20 dogs were also used in this series, in 10 of which the gallbladder was anastomosed to the stomach and in the remaining 10 an anastomosis of the gallbladder to the duodenum was performed. This procedure was performed for the purpose of preventing reflux from the stomach and duodenum into the biliary apparatus.

There was an immediate operative mortality of 62.5% (peritonitis) and a total mortality of 90.7%; one animal still survives. Fifteen dogs (37.5%) were subjected to a second operation in order that a specimen of liver could be obtained for histological and bacteriological studies, and comparison made with the normal liver. The livers of 4 normal puppies, 8 days old, were also studied histologically in order to determine whether or not early pathological changes occurred and whether they corresponded to the changes in normal adult dogs.

The histological study of sections removed from the livers of the 40 normal animals revealed histopathological changes in 100%. The changes noted were small areas of necrosis of liver cells with round cell infiltration. The above areas at times were rather extensive and in some instances simulated abscess formation. The round cells consisted mainly of lymphocytes; however, polymorphonuclears and eosinophiles were also present. Perivascular infiltration with round cells was of common occurrence, appearing in Glisson's capsule and also noted around the central vein. There were no changes noted in the wall or epithelial lining of the biliary ducts. In one dog, bacteria (spore-bearing gram-positive bacillus) were found in the sinusoids with associated necrosis of the surrounding liver cells. A most interesting observation was noted which may have a bearing on the focal areas of necrosis. This was the finding of filaria in

the lumen of the blood vessels and sinusoids of the liver. This interesting condition was noted in 16 sections of normal livers, an incidence of 40%.

A study of liver sections removed 15 days postoperatively from the animals (15 in number) that survived the operation and appeared normal, revealed the following histopathological changes: In 8 (53.3%) there was no increase in the inflammatory process when compared with the corresponding sections of normal liver. The remaining 7 (46.6%) revealed a slight to moderate increase in the pathological findings when compared to the corresponding normal livers. The changes noted in this group (46.6% of the total) were: increase in size of the areas of necrosis, slight dilatation of the bile ducts, increase in congestion of blood vessels, packing of red cells in the sinusoids near the central vein, and the presence of bacilli in 3 sections.

Study of sections removed from the livers of the 8-day-old puppies showed changes in 2 puppies similar to those noted in the adult dog, in the remaining 2 there were no changes that could be interpreted as pathologic. It is of interest that the 2 livers showing pathologic changes showed infection when cultured, whereas culture of the 2 normal livers was sterile.

Conclusions. 1. The livers of 40 normal dogs showed pathological changes in 100%. 2. The pathological changes noted in the normal livers were: lymphocytes, perivascular round cell infiltration, areas of necrosis of the liver cells with infiltration of round cells, the presence of filaria in the lumen of the hepatic blood vessels and sinusoids, and spore-bearing gram-positive bacilli among the liver cells. 3. The microscopic changes found in the liver following cholecystgastrostomy and cholecystduodenostomy showed only a moderate increase over the normal findings in only 46.6%. 4. In all experimental research regarding changes in the dog's liver following certain types of operations, it is imperative that sections of normal liver be obtained in order that a comparison can be made with the changes found postoperatively.