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Effect of Complete Biliary Fistula on Blood Cholesterol.

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The rôle of the biliary system in the metabolism of cholesterol is not well understood. Cholesterol taken in the food is largely absorbed into the blood. Some is excreted into the bile, but is to a large extent reabsorbed. The cholesterol in the faeces should theoretically be derived partly from the food, partly from the bile. Dorée and his associates concluded that the cholesterol in the faeces could be accounted for entirely by the cholesterol of the food. That cholesterol can be and is absorbed in the intestinal tract has been repeatedly demonstrated. That cholesterol can be absorbed by the gallbladder is believed by many, but has not been conclusively demonstrated.

Many experimenters[1, 2, 3, 4] have injected cholesterol and other lipoids into the gallbladder and after ligating the cystic duct have noted a degree of absorption. Boyd[5] was able to demonstrate a lowering of the blood cholesterol 9 days after cholecystectomy. Sweet,[6] however, found a rise in blood cholesterol of almost double normal after cholecystectomy, which continued to be present for about 40 days and became lower than normal only after 72 days.

It would appear logical that if bile were lost by the presence of a biliary fistula there should be a definite reduction in blood cholesterol. If cholesterol is absorbed in the gallbladder this reduction should be even more marked if a complete biliary fistula were made and the gallbladder removed also.

Attempt was made to demonstrate the changes in the blood cholesterol in dogs with a complete biliary fistula, both with and without the presence of the gallbladder. All the animals were fed a special kennel food in amounts calculated according to their body weights. Repeated daily readings of the blood cholesterol were made. The cholesterol was estimated on the whole blood by Sackett's modification of Bloor's method. The blood was withdrawn from the jugu-

[1] Illingworth, C. F. W., *Brit. J. Surg.*, 1929, **18**, 203.

[2] Aschoff, L., *Münch. med. Woch.*, 1906, **38**, 1847.

[3] Mentzer, S. H., *Am. J. Path.*, 1925, **1**, 38.

[4] Torinoumi, K., *Ziegler's Beiträge*, 1924, **72**, 456.

[5] Body, W., *Brit. J. Surg.*, 1923, **10**, 337.

[6] Sweet, J. E., *Internat. Clinics*, 1924, **1**, 187.

lar vein at the same time daily. Feedings were also at a regular hour. The food was given by gavage when not voluntarily eaten. After several normal readings were obtained, operation was done. In 4 dogs a complete biliary fistula was

TABLE I.

Dogs with Complete Biliary Fistula. Daily Determination.

Mgm. Chol. per 100 cc. blood	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Dog C 700				214.2	230	230	214	222	181	240	200	260	245	
" C 703	230	206	214.2	193.5	214	230	222	214	217	211	227	230		
" C 704	171	176	189	187	222	230	200							
" C 707	217	227	240	157	157	230								

Dogs with Complete Biliary Fistula and Cholecystectomy.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
" C 702	250	214	206.9	200	206	210	187	214	234	240	237	272	260	176
" C 705	166	166	176	174	206	214	222	214	214	211	227	214	182	
" C 706	193	116	169	166	176	160	187	166	240	238	260	285	260	
" C 708		156	163	157	250	165	176	181	176	224	208	230	224	

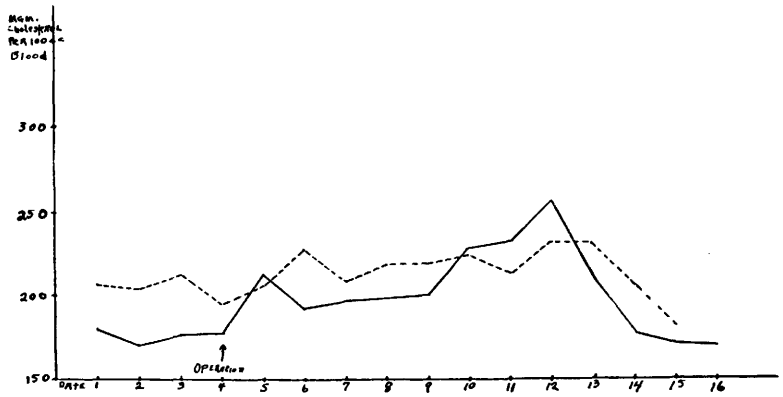

FIG. 1.
Composite curve of daily cholesterol determinations on 8 dogs.
—— complete biliary fistula and cholecystectomy.
- - - - complete biliary fistula only.

made by severing the common duct near its entrance into the duodenum, ligating the distal end, and cannulizing the proximal end with a small soft rubber catheter, the size depending on the caliber of the duct. This catheter was brought out through the abdominal wall by allowing it to go through the peritoneum at the upper angle of the incision, course in the preperitoneal fat to the lower angle of the wound, then pass through the muscle and course in the subcutaneous tissue to the upper angle of the incision and then pass through the skin. To the end of the catheter was attached a sterile rubber balloon. By this method the possibility of ascending infection of the bile ducts was minimized. In 4 other dogs an identical procedure was done and in addition the gallbladder was removed. Ether was the anesthetic used. Daily cholesterol determinations were continued (see table). The dogs lost weight rapidly and many of them died within 10 days after operation.

The increase in blood cholesterol was not as marked as that observed by other experimenters after operation on the biliary tract. There was not an appreciable difference in the blood cholesterol in dogs with complete biliary fistula with cholecystectomy and those with complete biliary fistula only.