found to be highly sensitive to toxic manifestations of a cardiac glycoside on cardiac rhythm, in comparison with normal females in anestrus, or castrate females treated with estrogenic substance. A high degree of resistance to toxicity of digoxin was exhibited by the 3 normal females in natural estrus which were available.

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A Hook-like Instrument for Atraumatic Ligation of Minute Vessels.* (23000)

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The complete interruption of arterial blood flow to liver in rat presents a technical problem because of the wide anatomical variations and the very small size of vessels to be ligated. At least 3 arteries have to be tied. Chase Greene(1) describes the common hepatic artery, the gastroduodenal artery and the hepatic artery proper. Moreover, De Long(2) found a small collateral artery in rats, arising from the esophageal artery and joining the intrahepatic branches of the hepatic artery proper. This artery always increased in size and became readily visible when he ligated the other three.

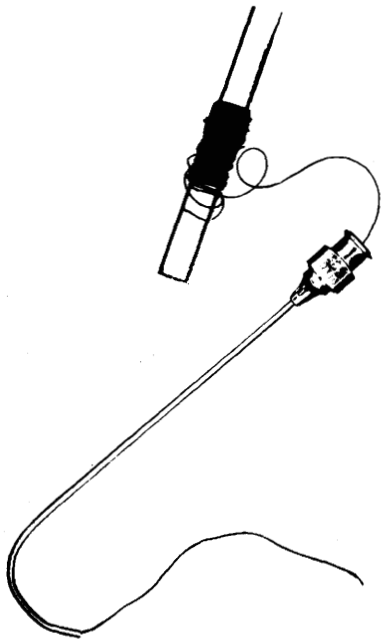

FIG. 1. Crochet hook-like instrument. Description in text.

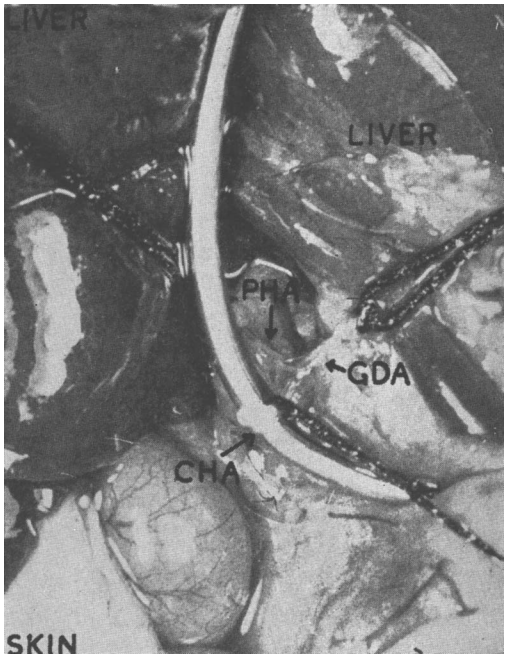

FIG. 2. First step of operation: Liver turned cranially. Gastroduodenal artery (GDA) and hepatic propria artery (PHA) are ligated. Hook passes thread around common hepatic artery (CHA). Note how large the #000 silk seems in comparison to minute size of vessels.

Having these anatomical details in mind, we were faced with the technical problem of ligating all 4 vessels with a minimum of

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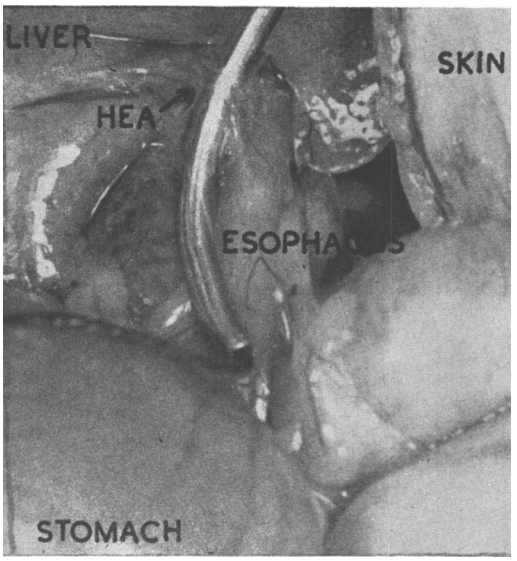

FIG. 3. Second step of operation: Liver turned to right side. Hook passes thread around hepato-esophageal artery (HEA).

trauma and in the shortest possible time.

Methods. An 18 gauge-4 inch lumbar-puncture needle bent into a hook proved to be of great help (Fig. 1). The free end of the needle was bent into an arc about 2 cm in diameter and its tip was blunted. The needle was threaded with #000 surgical silk with the free end protruding from the tip and the spool at the other end of the needle. This hook is used in the same way as an aneurysm-hook, but does not need to be rethreaded each time. The needle is passed around the blood vessel, the end of thread is caught and the hook is then removed.

There is no need for any extensive dissection as the hook is simply passed blindly around the vessel and emerges from the surrounding tissues. The entire procedure of ligation takes only a fraction of the time which would be required if a complete dissection had to be carried out and the thread passed around the vessel by a curved haemostat.

Fig. 2 shows the first step of the operation. The liver has been turned cranially. The gastroduodenal artery and the hepatic artery proper have been ligated. Fig. 3 shows the second step of the operation. The liver has been turned to the right. The hook passes the thread around the hepato-esophageal artery.

Summary. A hook shaped needle facilitating the ligation of minute vessels in the rat is described. It has been adapted from an 18 gauge needle used originally for lumbar puncture. The instrument has been used with success for complete interruption of the arterial blood supply to the liver of the rat.

The assistance of Mr. C. R. Cowan in making the instrument is gratefully acknowledged.

1. Chase Greene, E., Anatomy of the rat. Trans. Am. Philosophical Soc., New Series XXVII, Hafner Publ. Co., New York, 1955.

2. De Long, R. P., *Surg. Forum,* 1954, v4, 388.

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