

TABLE I.  
Normal dog No. 5, wt. 19 kg., fasted over night.

Time	Coagulation Time		Blood Sugar	Serum Calcium
	Lee and White	Wright		
Normal	11 min.	11 min.	76 mgm. %	10.0 mgm. %
	Injection of 75 cc. of 50% glucose intravenously in 15 Min.			
5 min.	8 min.	8 min.	230 mgm. %	10.2 mgm. %
15 "	4 "	4 "	168 " "	13.6 " "
30 "	5½ "	5 "	102 " "	14.2 " "
1 hr.	4 "	4 "	72 " "	13.4 " "
1½ "	4 "	4 "	74 " "	12.6 " "
2½ "	3 "	3 "	68 " "	12.4 " "
3½ "	4 "	4 "	68 " "	11.7 " "

The injection of hypertonic sodium chloride (isotonic with 50% glucose) produced a moderate rise in blood sugar, a rise in blood calcium over a period of several hours and a corresponding decrease in the coagulation time of the blood.

We are led to conclude, therefore, that the reduction in the coagulation time of the blood following the intravenous injection of glucose or of substances which produce a hyperglycemia, is accompanied by an increase in the blood calcium which persists after the blood sugar has returned to normal and closely parallels the coagulability of the blood.

## 5056

### Evaluation of X-Ray Evidence as a Criterion of Strangulation Obstruction.

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Recently Wangenstein and Lynch<sup>1</sup> indicated that the accumulation of gas in the small intestine as visualized by X-ray examination was an early and reliable criterion of obstruction to the continuity of the bowel. In this study an attempt has been made to evaluate the significance of X-ray evidence in the early recognition of strangulation obstruction.

Strangulation obstruction in dogs was established under aseptic conditions employing local anesthesia (procaine) of the abdominal wall fortified by the preliminary injection of morphine sulphate.

<sup>1</sup> Wangenstein, O. H., and Lynch, F. W., *PROC. SOC. EXP. BIOL. AND MED.*, 1930, xxvii, 674.

In each instance about 24 inches of small intestine together with its mesentery was tied off about 18 inches above the ileocaecal valve. Umbilical cord tape was used for the tie and an attempt was made to establish varying grades of strangulation which might be designated on the basis of I-IV, IV being the maximal grade of strangulation obtained. In the grade IV strangulations, the blood supply to the loop was arrested; in grade III there was immediate congestion and discoloration of the bowel but slight pulsation could still be felt in the mesenteric loop beyond the ligature after placement of the tie. It was found to be extremely difficult to establish strangulation obstructions of grades I and II, and these experiments concern strangulation obstructions of grades III and IV. In 2 dogs mild (Grade I and II) strangulation obstructions were established; these survived the procedure and subsequent laparotomy showed the continuity of the bowel uninterrupted despite the angulation of the loop. Twelve animals in which grade III and IV strangulations were established serve as the basis for this report. Perforated lead shot were sewed to the mesenteric border of the strangulated loop in an effort to determine whether the bowel proximal to the obstruction or the strangulated loop distended most readily.

In summarizing briefly the results of this study it was found that gaseous shadows were observed in the small intestine fairly early during the course of the obstruction. Employing the same criteria in a previous study of simple obstruction it was found that gaseous shadows were observed proximal to the obstruction in 4 to 5 hours after the establishment of the obstruction. In this series, gas was first observed in the small intestine 3 hours after the establishment of strangulation obstruction and the longest interval was 8 hours, the average interval being 6 hours.

It is an interesting fact that the strangulated loop frequently did not exhibit gaseous distension in excess of that exhibited by the bowel proximal to the obstruction. During the latter course of the obstruction, the distension of the strangulated segment could usually be traced out with ease on the X-ray film. In several of the animals, gaseous distension of the intestine distal to the obstructed loop was also observed, an occurrence not noted in the study of simple obstruction. This finding is probably significant of the concomitant occurrence of inhibition ileus as seen in the paralytic ileus of peritonitis in which the entire intestinal canal participates in the distension.

A number of years ago Wahl<sup>2</sup> described "Darmsteifung" of the

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<sup>2</sup> Wahl, E., *C. f. Chir.*, 1889, xvi, 153.

strangulated loop and it has generally been accepted that early distension and stiffening of this coil was the usual occurrence. Rabwin<sup>3</sup> has recently referred to 2 patients with strangulation obstruction in which gaseous shadows failed of demonstration on the X-ray film.

The results of this study indicate that the X-ray is not of the same value in detecting the presence of strangulation as it is in the early recognition of simple obstruction of the intestine.

## 5057

Observations on the Transfusion of Portal Blood From Dogs With  
Intestinal Obstruction to Normal Recipients.

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In recent years evidence has accumulated that seriously questions the almost universally accepted belief that the absorption of a toxin from the intestinal canal is responsible for the death of the animal with simple obstruction of the bowel. There exist, however, a few bits of evidence which would substantiate such a belief. Sugito<sup>1</sup> found that blood serum obtained from obstructed dogs when injected into the peritoneal cavity of rats provoked toxic symptoms. Scholefield<sup>2</sup> has obtained results of a similar nature, but it is a noteworthy fact that he found no evidence of a toxic substance in the portal blood until the dogs were in a moribund condition.

In this study, 6 dogs were obstructed by severing and inverting the ends of the bowel in the lower ileum under aseptic conditions. When it was apparent that the obstructed animal was rapidly failing, the abdomen was opened under ether anesthesia and a large mesenteric vein was divided and the portal blood collected into a 3% solution of sodium citrate, (10 cc. per 100 cc. of blood). The blood thus obtained was injected into the external jugular vein of a normal anesthetized dog under aseptic conditions and the blood pressure of the recipient was registered by means of a cannula introduced into the carotid artery. Two other experiments were employed as controls. In one of these, 220 cc. of blood was obtained from the

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<sup>3</sup> Rabwin, M. H., *Am. J. Surg.*, 1929, vii, 656.

<sup>1</sup> Sugito, S., *Mitt. a. d. Med. Fak. d. k. Univ. Kyushu. u. Fukuoka.*, 1924, ix, 229.

<sup>2</sup> Scholefield, B. G., *Guy's Hospital Reports*, 1927, lxxvii, 160.