

SURFACE TENSION OF THE BLOOD SERUM OF THE DOG AFTER UPPER GASTROINTESTINAL TRACT OBSTRUCTION.

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While studying the physicochemical changes in the blood of the dog after obstruction of the upper intestinal tract we have determined the surface tension of the serum. Du Noüy has shown (1) that the surface tension of serum decreases as soon as it is exposed to the air. This phenomenon, designated "the time-drop," he considers an excellent index of the changes upon which surface tension depends.

Method.

Dogs were used for all the experiments. All operations were done under ether anesthesia with aseptic technique. The obstruction of the cardiac end of the stomach and of the pylorus was made with a tape ligation. The jejunum was obstructed by severing the gut and inverting the cut ends.

The du Noüy tensiometer (2) was used for all surface tension determinations. The non-protein nitrogen was determined by the Folin and Wu method (3), and the chloride on the tungstic acid filtrate in the manner suggested by Gettler (4). Blood for the surface tension and chemical determinations was withdrawn from the jugular vein before operation and at 24 hour intervals thereafter until the end of the experiment.

EXPERIMENTAL OBSERVATIONS.

In Table I are summarized the surface tension determinations on the blood serum of twenty normal dogs. The average initial reading was 64.0 dynes with a 2 hour time-drop of 3.5 dynes. The surface tension was found to vary little in normal dogs.

The surface tension readings on four dogs with obstruction of the cardiac end of the stomach are shown in Table II. The readings remain quite constant. The time-drop tends to increase 24 hours

after obstruction. There is no constant change, however, even with the marked change in the non-protein nitrogen. With obstruction of the pylorus (Table III) there is also no characteristic change except

TABLE I.
Surface Tension of the Blood Serum of the Normal Dog.

	Initial.	After 2 hrs.	Time-drop.
	<i>dynes</i>	<i>dynes</i>	<i>dynes</i>
Average (20 dogs).....	64.0	61.5	3.5
Highest.....	67.5	66.2	4.7
Lowest.....	60.7	58.0	0.7

TABLE II.
Obstruction of the Cardiac End of the Stomach.

Dog No.	Day after operation.	Surface tension.			Blood.	
		Initial.	After 2 hrs.	Time-drop.	Non-protein nitrogen.	Chlorides (as NaCl).
		<i>dynes</i>	<i>dynes</i>	<i>dynes</i>	<i>mg.</i>	<i>mg.</i>
16	0	64.1	59.4	4.7	33	470
	1	62.7	56.7	6.0	40	480
	2	61.4	58.7	2.7	42	450
	3	63.5	59.4	4.1	150	420
17	0	62.7	61.4	1.3	30	510
	1	58.0	57.4	0.6	74	410
	2	60.0	57.4	2.6	185	490
18	0	64.8	61.4	3.4	37	480
	1	65.5	60.0	5.5	31	460
	2	62.7	59.4	3.3	74	430
4	0	64.8	61.4	3.4	31	480
	1	62.1	57.4	4.7	44	460
	2	65.5	59.4	6.1	121	450

an increase in the time-drop after the obstruction is made. Likewise with obstruction of the jejunum there is no typical change even with hypochloremia and a rise in the non-protein nitrogen.

TABLE III.
Obstruction of the Pylorus.

Dog No.	Day after operation.	Surface tension.			Blood.	
		Initial.	After 2 hrs.	Time-drop.	Non-protein nitrogen.	Chlorides (as NaCl).
19	0	<i>dynes</i> 60.7	<i>dynes</i> 58.0	<i>dynes</i> 2.7	<i>mg.</i> 34	<i>mg.</i> 460
	1	65.5	59.0	6.5	46	320
	2	64.5	59.7	4.8	111	230
20	0	63.4	60.1	3.3	24	520
	1	66.8	58.2	8.6	28	480
	2	62.4	57.3	7.1	38	390
	3	62.4	57.4	5.0	126	320
7	0	64.2	61.4	3.7	29	460
	1	65.5	58.0	7.5	59	360
	2	61.7	58.3	3.4	141	360
21	0	64.1	60.7	3.4	31	500
	1	66.8	60.0	6.8	35	450

TABLE IV.
Obstruction of the Jejunum.

Dog No.	Day after operation.	Surface tension.			Blood.	
		Initial.	After 2 hrs.	Time-drop.	Non-protein nitrogen.	Chlorides (as NaCl).
22	0	<i>dynes</i> 63.5	<i>dynes</i> 60.0	<i>dynes</i> 3.5	<i>mg.</i> 24	<i>mg.</i> 470
	1	64.8	60.0	4.8	25	440
	2	63.5	60.0	3.5	88	420
23	0	63.5	59.4	4.1	54	470
	1	61.4	57.4	4.0	33	440
	2	61.4	56.7	4.7	34	430
24	0	61.4	62.1	0.7	26	460
	1	61.4	58.0	3.4	41	410
	2	63.5	61.4	2.1	35	330
	3	60.7	59.0	1.7	50	360
	4	65.5	60.7	4.8	34	400
	5	66.2	64.4	1.8	35	330
25	0	64.8	65.5	0.7	38	460
	1	65.5	59.4	6.1	39	400
	2	64.1	62.4	1.7	44	370
	3	66.8	64.8	2.0	60	330
	4	63.5	60.0	3.5	33	320

SUMMARY AND CONCLUSIONS.

After obstruction of the upper gastrointestinal tract the surface tension of the blood serum of the dog shows no marked change. There is a tendency of the time-drop to increase 24 hours after operation. There is no characteristic course of the time-drop.

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