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Bleeding Volume in Experimental Burns.

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Roome, Keith, and Phemister[1] showed that in experimental shock due to hyperventilation, anaphylaxis, histamine administration, spinal cord section, and spinal anesthesia the bleeding volume averaged 49.9% of the calculated blood volume (one-thirteenth of the body weight). This is only slightly less than the average of 58.6% obtained for control dogs. On the other hand, in shock due to trauma to an extremity, hemorrhage, plasmapheresis, and intestinal manipulation, the bleeding volume was greatly reduced, averaging 21.8%. Blalock[2] showed that the cardiac output in shock due to severe burns is markedly reduced. The work reported in the present paper was done to determine the bleeding volume in shock due to experimental burns.

Dogs under complete barbital anesthesia and suffering no pain were used throughout the work. They were burned and at intervals the carotid blood pressure, hematocrit reading, and hemoglobin percentage were determined. When the blood pressure had fallen to about 80 mm. of mercury the animal was bled to death through a large carotid cannula. The time interval between the burning and the bleeding varied from 16 to 24 hours in 7 dogs. The hematocrit reading and hemoglobin percentage rose steadily from the time of burning to the time of bleeding. On the other hand, the blood

TABLE I.
Bleeding Volumes of Dogs with Experimental Burns

No.	Wt., Kg.	Interval from burning to bleeding	Blood pressure mm. Hg.		Terminal bleeding vol. % cal. blood vol.
			Start	End	
		hr. min.			
1	10.4	17 40	100	52	11.9
2	9.2	16 15	148	44	14.6
3	11.3	17 50	154	108	29.3
4	7.8	23 10	116	48	16.1
5	10.5	21 40	162	66	16.7
6	12.1	23 45	148	86	28.4
7	6.8	18 20	118	66	24.9
Aver.					20.3

[1] Roome, N. W., Keith, W. S., and Phemister, D. B., *Surg. Gynec. and Obstet.*, 1933, **56**, 161.

[2] Blalock, A. PROC. SOC. EXP. BIOL. AND MED., 1933, **31**, 36.

pressure usually remained near the normal level until the end of the experiment and then fell more rapidly. The average bleeding volume in the 7 burned dogs was 20.3% of the calculated blood volume (one-thirteenth of the body weight) as shown in Table I. This figure agrees quite well with that of 21.8% which Roome, Keith, and Phemister found in similar types of shock. The extent of the burn in these dogs may be gauged as follows: After death the dogs were bisected according to the method of Blalock[3] and the weight of the normal and burned sides of the animal compared. This difference was 3.0, 2.5, 2.2, 0.3, 1.1, 3.0, and 2.4, averaging 2.1% of the total body weight in the 7 dogs and represents a fluid loss into the tissues on the burned side sufficient to account for the shock present in these animals.

In 4 control dogs that were similarly treated except that they were not burned, the average bleeding volume was 53.4% of the calculated blood volume as shown in Table II. This figure agrees

TABLE II.
Bleeding Volumes of Control Dogs.

No.	Wt. Kg.	Interval from start exper. to bleeding	Blood pressure mm. Hg. Start	Blood pressure mm. Hg. End	Terminal bleeding vol. % cal. blood vol.
		hr. min.			
1	24.0	24 0	154	128	49.8
2	13.0	17 20	134	136	52.0
3	12.1	15 40	136	102	47.2
4	19.5	18 20	118	116	64.7
Aver.					53.4

rather well with that of 58.6% which Roome, Keith, and Phemister found for control dogs. Any slight discrepancy may be explained by the fact that their dogs were bled one hour after beginning the experiment, whereas in the present paper the time interval in the control series was from 16 to 24 hours.

The blood pressure, hematocrit reading and hemoglobin percentage fell very slightly during this interval.

From a comparison of the results in the burned and control series it is concluded that the bleeding volume is markedly reduced in experimental burns.

[3] Blalock, A. *Arch. Surg.*, 1931, **22**, 610.