EFFECT OF HEAT AND COLD ON HAEMORRHAGE

BY

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At the present time, when ambulance classes are being held all over the country, one feels that some notice ought to be taken of the effect of heat and cold on the control of haemorrhage. Although a surgeon or an obstetrician will try to control bleeding into a cavity by washing it out with a hot solution, it does not appear to be generally understood why this is done, and it is set out in the St. John Ambulance handbook that bleeding ought to be controlled by the application of cold.

By a series of experiments, performed as a preliminary to other work on blood-coagulation time, it was shown that heat shortened bleeding time but cold greatly prolonged it. It is known that the coagulation time of blood is affected by changes of temperature, but the duration of bleeding time appears to be altered more by the effect of temperature on the tissues than on the blood itself. In the two experiments illustrated below the first specimens of blood coagulated in approximately the same time whether the tissues were hot or cold. It is on the subsequent specimens, flowing through the same punctures, that the effect of temperature is seen.

In these experiments the blood was obtained through a small stab puncture above the terminal joint of a finger, a slight congestion being first produced. The rate at which the blood flowed could be controlled by altering this congestion. A bowl of water was used to warm or cool the hands, but the temperature of this was never excessive. The principle of the coagulometer used was that of Cannon and Mendenhall. Into a standard glass tube containing the blood a wire dips every half-minute until a clot forms. This limits the excursion of the wire. The instrument works automatically once the specimen is in position, and it allows the clotting time of ten specimens to be measured at the same period. When blood flows through a wound the subsequent specimens obtained have a gradually shortening clotting time. This shortening is considerable when the tissues are warm, but much less so when they are cold. It seems that a blood-coagulating substance is formed in increasing quantity by the tissues after a wound is made and that heat accelerates its production. If the rate of flow of a single blood specimen is increased less of the coagulant will be mixed with it, and we see that it has a longer clotting time than the specimens taken before and after it. A decrease in the rate of flow shortens the clotting time. It is to be noted that the rate of flow of first specimens taken from wounds does not affect the clotting time. Similarly, when tissues are cold and less of the coagulant is being formed, specimens are little affected by the rate of flow. The effect of heat and cold on bleeding time corresponds to that on clotting time. In the subjects used for these experiments the bleeding time was always greatly prolonged by the application of cold.

As bleeding is controlled by plugging the damaged vessels with blood clot, the aim of treatment ought to be directed to this end. Heat is obviously the means to attain this rather than cold, which merely narrows the vessels without accelerating the plugging process. It is noticed by many men, when it is pointed out to them, that they bleed from a shaving cut much longer on a cold winter day than on a warm summer day.

Experiment 52

HAND COLD			HAND WARM		
No. of Blood Specimen (a)		Clotting Time in Minutes	No. of Blood Specimen (a)		Clotting Time in Minutes
1	..	9½	1	..	8½
2	..	7½	2	..	5
3	..	5	3	..	5
4	..	4	4	..	1
5	..	3½	No further flow.		
6	..	4			
7	..	4½			
8	..	—			
9	..	4½			
10	..	4			
11	..	3½			
Blood continued flowing.					

Experiment 69

HAND COLD			HAND WARM		
No. of Blood Specimen (a)		Clotting Time in Minutes	No. of Blood Specimen (a)		Clotting Time in Minutes
1	..	7½	1	..	7½
2	..	6½	2	..	6½
3	..	8½	3	..	4½
4	..	7	4	..	2½ slow (b)
5	..	6½	5	..	4 quick (b)
6	..	7	6	..	3½ quick (b)
7	..	5½ quick (b)	No further flow.		
8	..	4½ quick (b)			
9	..	4½ slow (b)			
10	..	5½ quick (b)			
Blood continued to flow.					

Notes.—(a) Specimens were taken at 1-minute intervals and through the same puncture. (b) Denotes that the rate of flow was made quick or slow by altering the capillary congestion.

Summary

It is shown that heat accelerates the production of a blood-coagulating substance in damaged tissues and cold retards it.

It is suggested that heat and not cold ought to be used to control haemorrhage.

Clinical Memoranda

An Unusual Case of Facial Paralysis and a New Operation

Cases of facial paralysis due to various causes are fairly common, but such as I am about to describe I have never experienced before in civil or war practice. Before perusing the following description I would ask the reader to look into the nearest looking-glass, draw the right lower eyelid well down, push the tip of the nose over to the left, then screw up the facial muscles of the left side, and a very good idea of the case can be conceived. In May, 1939, the patient came into my hands, and the results obtained by my operation being considered satisfactory by all parties concerned I submit these brief notes.

Case.—A man aged 45 with right-sided facial paralysis; and the history was that forceps had been used at birth and in later life he had a motor accident. The lower right eyelid was everted, with epiphora and some discharge. The nose pointed to the left side, the right ala being collapsed. The mouth was drawn to the left side. When his face was not passive the patient grimaced hideously.

The Problem.—Obviously none of the classic operations such as nerve grafting or Gillies's temporal muscle transfer would be of any use even if the patient would have agreed to the time necessary for it. The everted lid and epiphora alone necessitated operative procedure. The nasal stenosis also caused distress; for the rest a cheery personality and congenial outdoor occupation led him to make light of his condition. After much thought I conceived the idea that if the facial tissues could be drawn across and firmly anchored the result should be satisfactory.