Correspondence and notes re wound shock

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INSTITUTE OF PHYSIOLOGY,
UNIVERSITY COLLEGE,
GOWER STREET,
LONDON, W.C. 1

May 8th 1917

Dear Capt. Cowell

I am much obliged for the notes of your cases. They are very interesting.

It occurs to me that it might be worth while trying the effect of dextrin in your hypertonic solution No. 8. I should expect the result to be more lasting. The dextrin should be that sold as "precipitated by alcohol."

I am somewhat surprised that the addition of calcium is an improvement. I should have thought that there was enough in the gum itself, but evidently not in 2 No. Probably, the calcium may act in constricting the vessels.

It appears that I did not make it quite clear in my original paper that not less than 0.9 % NaCl is needed even in 7 % gum. The gum alone has not a sufficient osmotic pressure to prevent haemolysis.

One would expect that the addition of gum

would be more beneficial in cases in which there has been haemorrhage, as in most of yours. I notice that you find 2% sufficient, but the only cases where you used a stronger solution seem to have been hopeless from the first.

I am pleased to notice your reminder that you were R.M.O. at the Hospital here. You mention Elliott; if you come across him again, please remember me to him.

You must find it rather hard to keep much in the way of records after operating for so long at a time.

Yours sincerely

W. M. Bayliss

ST. CUTHBERT'S,
WEST HEATH ROAD,
HAMPSTEAD, N.W. 3.

London.
Feb. 17th 1918

Dear Cowell

It has occurred to me that perhaps you might care to know that we have done ourselves the honour, at Univ. Coll., of electing you to a Fellowship. Unfortunately it is merely honorary. You will not receive official notice, I believe, until the Senate approves.

I have just been reading with great interest the series of papers in the recent Memorandum of the Medical Research Committee. Near the top of p. 65 of your paper, you speak of an intravenous infusion being given. I wonder if you remember what it was. I have, in a moment of weakness, promised to give the Oliver-Sharpey lectures at R. Coll. of Physicians at the end of April & feel that the best I do would be to discuss the value of intravenous infusions. It seems necessary, however, to test whether the bicarbonate without gum might not serve as well, as it is easier to prepare. I have done one expt. in which the muscles were injured more extensively than in the

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exps. what I did with Cannon & always got shock.
In this experiment, I gave 20 c.c. of 6% gum,
without bicarbonate, about 6 minutes after the injury &
another 15 c.c. an hour afterwards to keep up the
blood pressure. A further 15 c.c. was given 2 hours
later. No signs of shock developed up to
4½ hours, when the animal was killed with b.p. &
respiration normal. So far as this goes, it looks as if
the main point is to prevent fall of blood pressure
but I would not lay stress on a single exp.
I should value your opinion & criticism on the
question, when you find time to give it without
inconvenience.

Cannon went to Paris last Wednesday
& I miss his cheery presence very much.

Kindest regards

Yours

W. M. Bayliss

RAMC 466
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Received + Reply
29.10.17
Ghd

INSTITUTE OF PHYSIOLOGY,
UNIVERSITY COLLEGE,
GOWER STREET,
LONDON, W.C. /

October 25th 1917

Dear Cowell

I hear from Fraser that you have found 2% gum better than stronger solutions. This is rather surprising to me in view of the expts. that I have been doing lately. In order to simplify the problem to start with, I have so far studied uncomplicated ~~haemorrhage~~ haemorrhage in cats; taking away a known vol. of blood & replacing it by an equal volume of the solution to be tested. There is no doubt that the addition of gum even in small amount is a great improvement. Mere saline solutions are very nearly useless. But the superiority of 5 or 6% gum is so remarkable that, if the reason of its failure in man can be discovered, it seems a pity to forego the advantage. It can always be depended upon, in the conditions of my expts., and I have never seen any indication of unpleasant symptoms, even with 7%.

Naturally, if too much blood is removed, more than 60 to 70%, nothing but blood itself can make up the oxygen carrying capacity.

The matter seems to me to be of some importance + I am trying to discover whether any condition, "acidosis" or prolonged want of oxygen + so on, can be induced in cats of such a kind as to make the stronger gum dangerous.

It seems possible that we may see Fraser next week & I will try to get more details from him and when you have time perhaps you can give me some hints.

It is to be remembered that the object is to raise the blood pressure. With a given height of B.P. the work of the heart is no greater if the pressure is raised by a small volume of a more viscous fluid or a larger one of a less viscous fluid. In the latter case, owing to the deflection osmotic pressure, the pressure of the blood soon begins to fall, as liquid goes out into the tissues. A mixture of blood with 7% gum has the same viscosity as the blood itself; with less gum, the viscosity is less than that of blood.

In those cases where you found the stronger gum injurious do you feel convinced that 2% gum would have done better?

In my cases, 5% gum, although the height to which it brought back the blood pressure was somewhat less than that done by stronger solutions, was equally effective in maintaining it at the level to which it had risen. Weaker solutions were effective in about ½ the cases tested. Hypertonic saline was only effective in 1 case in 5, at the most.

With kindest regards

Yours sincerely

W. M. Bayliss.

D.G./T/111/37. D.M.S., Third Army 2489.
D.D.M.S., XVII Corps No.9/46.

RAMC 466
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D.M.S.
Third Army.

The attached copies of Report on Research Work conducted in the First Army Area are forwarded for your information.

G.H.Q. (Signed) J.F.Martin, Major,
2nd Echelon. for D.G.M.S.,
30.10.17. British Armies in France.

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D.D.M.S.,
XVII Corps.

For information.

Headquarters, (Signed) W.Tyndale, Lt.Col.,
Third Army. for Surgeon General,
6.11.17. D.M.S.

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O.C., 18 F.A.

Forwarded for information.

H.Q., XVII Corps. (Signed) R.Kirkpatrick.
7th November 1917. Colonel, D.D.M.S.
To:- A.DsM.S. with copies for Field Ambulances.
O.C., XVII Corps Rest Station.

The Initiation of Wound Shock, with suggestions for its Early Treatment.

1. Primary Wound Shock

It would appear that the incidence of shock is unpreventable in the most severe wounds, i.e. a condition of Primary Wound Shock is inevitable. By careful treatment however suitable cases may be successfully evacuated to the Casualty Clearing Station still in an operable condition.

11. Secondary Wound Shock.

In the case of moderately severe wounds, where the anatomical disturbance is such that life is not immediately endangered early shock is absent. Later, as the result of cold and pain superimposed on pre-wound factors of exposure, fatigue and thirst, together with continual slight loss of blood and onset of toxaemia, the blood pressure gradually falls and Secondary Wound Shock develops so that in the presence of the above factors severe Secondary Wound Shock may arise even in apparently simple flesh wounds of the thigh or buttock.

111. Treatment.

A. A man hit in the line, may be one or two hours carry from the nearest Aid Post or Advanced Dressing Station. Recent experience has shewn that it is in this part of the journey that Secondary Wound Shock develops. All Regimental Stretchers at isolated or advanced Bearer Posts or carried out with working parties, should be furnished with the Waterproof-sheet blanket Packet described in D.M.S. circular dated Oct. 1917.

Regimental Stretcher Bearers should be instructed by their Medical Officer to keep the patient as warm as possible to give a hot drink if at all feasible and possibly in cases such as compound fracture of the femur to give a tablet of Morphia gr. ¼ by mouth, making a note in the usual way.

B. On arrival at the Aid Post, it is wise to consider the general condition of the patient first and his wound second. A dry stretcher with three blankets should be prepared so as to give a final cover of four folds of blankets all round the patient. (1 Corps D.D.M.S. Circular ? date 1917). The patient is then lifted on to this prepared stretcher which is placed on trestles over a "primus" or"beatrice" stove with the two folds of the under blankets hanging over the sides of the stretcher an excellent hot air chamber is provided, which rapidly warms the patient while his wounds are being carefully cleaned up and dressed, splint applied or wet clothing removed. At the discretion of the Medical Officer how water bottles may be placed in each axilla and a third across the groins. Finally a cup of hot sweet tea, with one drachm of Sodium Bicarbonate is given before the patient is sent on.

C. At the Advanced or Main Dressing Station the warming process may be repeated, while the A.T.S. is being given etc. a sweetened alkaline drink should be administered as described above before the patient is sent down in the Motor Ambulance to the C.C.S.

IV <u>Battle Conditions</u>.

The treatment outlined in para III will be possible in trench warfare, as it exists on this Front for the greater part of the year. In time of Battle, the administration of hot or cold sweetened alkaline drinks should present no difficulties. In these conditions as a rule the cold factor is not so important.

V. <u>At the Casualty Clearing Stations</u>.

The primus hot air chamber should be applied to cases of severely wounded men, while they are being undressed and made ready for operation.

(signed) E.M.Cowell, Capt.
17th October, 1917. R.A.M.C. S.R.

D.G./T/111/37. D.M.S., Third Army 2489.
D.D.M.S., XVII Corps No.9/46.

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British Armies in France.

-2-

D.D.M.S.,
XVII Corps.

For information.

Headquarters,
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6.11.17.

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for Surgeon General,
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-3-

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(signed) E.M.Cowell, Capt.
17th October, 1917. R.A.M.C. S.R.

RAMC 466

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Suggestions for prevention and early treatment of
WOUND SHOCK.

-:-:-:-:-:-:-:-:-:-:-

A. Examination of a large number of men directly after wounding and in process of evacuation to Casualty Clearing Stations has shown :-

(1) That two varieties of wound shock may be recognised

(a) Primary - the direct result of the wound.

(b) Secondary - induced by cold and the inevitable disturbance of transport. Very often this comes on with comparatively slight wound if the body heat is allowed to fall.

By appropriate means (a) can be reduced, and (b) either prevented or minimised.

(2) That the shocked man suffers from Acidosis and requires to have his alkaline reserve strengthened.

B. Treatment. All wounded should be treated as urgent cases and carefully kept warm, whether shock is present or no.

(1) In front of the Regimental Aid Post. The bearers should be instructed in the dangers of wound shock and taught to keep the patients from losing body heat as far as possible. No patient should be carried without at least one blanket and water-proof sheet. These are conveniently carried in a closed stretcher (see D.M.S. letter No. 710/57 dated 7-10-17).

(2) At the Aid Post. The patient should be stripped of wet outer garments and placed on a dry stretcher on trestles with a primus stove beneath. This stretcher is prepared with two blankets folded three times lengthwise, so that there are four folds beneath the patient and one hanging down on either side to complete the hot air chamber (Fig. 1 & 2). Thus while dressings and splints are applied the patient is being warmed. The third blanket now covers the patient (Fig.3), hot water bottles are applied.

A hot sweetened drink of tea, coffee or cocoa with a drachm of Soda Bicarbonate is given by mouth and the patient is sent on.

(3) At the Advanced Dressing Station. The warming process is repeated while A.T.S. is given, together with hot alkaline sweet drink.

¼gr. Morphia given subcutaneously is usually sufficient to relieve pain and anxiety. Although more may be required to produce ease, its use is probably detrimental to the patient as tending to increase Acidosis.

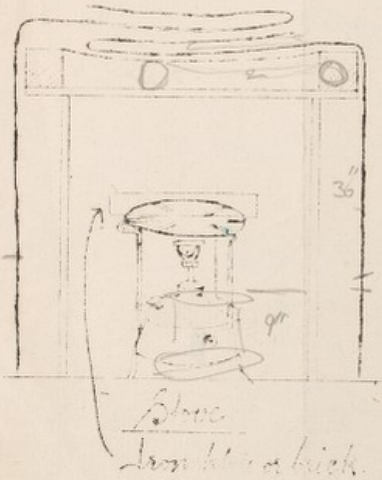
Figures 1, 2 & 3 attached.

H.Q., First Army.
2-11-17.
S

R. Davidson Lt-Col.
for Surgeon-General,
D. M. S.

Fig. I

Blankets or stretcher heated ready for patient.

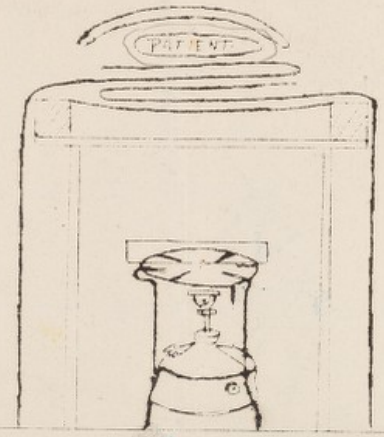


Stove

Iron blocks or brick.

Fig. II

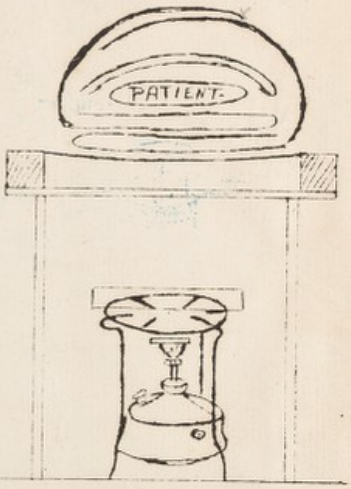
Patient heating up.



Stove.

Fig III

Patient ready for transport.



Stove.

Réchauffement