THE TREATMENT OF INFECTED WOUNDS BY PHYSIOLOGICAL METHODS.

Colonel Sir Almroth E. Wright, C.B., M.D. Dublin, F.R.S., contributes a most interesting paper to the *Lancet* on the treatment of infected wounds by physiological methods (drainage of infected tissues by hypertonic salt solution, and utilization of the anti-bacterial powers of the blood fluids and white corpuscles). He says in part :—

The treatment of septic war wounds divides itself naturally into three therapeutic procedures :—

(1) In the *first* we have a number of different aims to pursue concurrently : we have to promote the destruction of the microbes which have been carried into the deeper tissues; we have to re-establish normal conditions in those tissues, resolving the infiltration in the walls of the wound, and getting rid of the infected sloughs; and we have to prevent "the corruption of the discharges," and inhibit microbic growth in the cavity of the wound.

Further, during the whole period occupied by these operations we have to be constantly on our guard to prevent active and passive movements which would propel bacteria along the lymphatics and carry poisonous bacterial products into the blood.

(2) When the microbes in the deeper tissues have been exterminated and physiological conditions have been restored, and the wound has been rendered to naked-eye inspection perfectly clean, the difficult portion of our task has been accomplished, and the time has come for dealing with the surface infection.

(3) As soon as this has been suppressed, or all but suppressed, all our thought ought to be given to promoting the processes of repair, bringing together the tissues, and covering over the denuded surfaces.

The Ideal of Physiological Treatment is to give Intelligent Aid to the Organism in Combating the Bacterial Infection.

Saline dressings supply a means for evoking, in the infected wound, certain requisite physiological reactions. By their aid we can, while at the same time inhibiting bacterial growth, drain the tissues, resolve infiltration, and promote the separation of the sloughs—besides giving other assistance.

Physical and Physiological Action of Concentrated Salt Solutions.

(1) A concentrated salt solution will attract water; and, except in the case where a membrane which is impermeable to albumen is interposed, the outflowing current of water will carry out with it the whole of the protein substances which it holds in solution. This means that hypertonic salt solution applied to tissues lying bare in the wound (or to granulating surfaces) will operate as a *lymphagogue,* drawing out from the infected tissues lymph which has spent all its anti-bacterial energy, and drawing into the tissues from the blood stream lymph inimical to microbic growth.

(2) Brought into direct application upon leucocytes a hypertonic solution (what is in view here is a solution containing 5 per cent. salt) will disintegrate leucocytes, setting free the tryptic ferment they contain. Such a hypertonic salt solution will also exert a number of inhibitory actions.

(3) It will inhibit the action of the tryptic ferment set free in the wounds.

(4) It will inhibit coagulation and so prevent the sealing up of the orifices through which lymph pours into the wound.

(5) It will inhibit leucocytic emigration into, and prevent phagocytosis in the cavity of the wound.

(6) It will inhibit microbic growth.

General Instructions for the Carrying Out of the Lines of Treatment Indicated Above.

Concentration in which the hypertonic salt solution ought to be brought into application.—For all ordinary purposes the best hypertonic solution to employ is a 5 per cent. solution of common salt. Where we require more vigorous lymphagogic effect we may resort to a 10 per cent. solution, or even to a stronger solution. But these are very painful when applied to skin edges and sensitive granulations; and salt applied in saturated or nearly saturated solutions will often cause sloughing of the superficial tissues.

Most convenient form of stock solution to keep on hand.—The most convenient stock solution to keep on hand is a saturated saline solution, made by shaking up water with an excess of salt and then allowing this to settle. Such a solution contains at ordinary temperatures 35 per cent. of salt.

Diluted 1 part saturated solution with 6 parts water it gives a 5% solution.
Diluted 2 parts saturated solution with 5 parts water it gives a 10% solution
Diluted 1 part saturated solution with 39 parts water it gives a 0·85% (physiological solution).

N.B.—Hot water should be employed for making the dilutions required for all saline dressings and irrigations. For the physiological reactions which are to be evoked, whether these be active hyperæmia and tran-

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