

by the force of the blood current behind them, which no longer can find a free exit. As the vessels dilate, the current itself becomes slower through them. As the current slackens, the watery portion of the blood, mixed with the white corpuscles, begins to escape through the dilated walls into the tissues around.

As these two escape they react upon one another, the watery serum becoming more gummy, almost glutinous, and fibrin is formed.

Second stage.—But before this change has gone far, the excess of fluid begins to filter through upon the surface of the wound and to stand there in drops. Increasing in quantity, the drops run together and fill the gap made by the operation. If no provision is made for the escape of surplus fluid, it may accumulate in such quantity as to force apart the wound surfaces and become itself a barrier to their union. To prevent this, drains of various kinds are placed along the lower levels of the wound, so as to carry off what is actually in excess into the dressings around. Now, when so much of this glutinous material has oozed out of every crevice in the wound and united with that supplied from the opposite side, you have a condition such as represented by the diagram (Fig. 1), a firm adhesive layer of coagulated fibrin filling the gap left by the operation, and spreading in all directions into the interstices of the wounded surfaces surrounding, holding all parts firmly together, and, as it contracts, drawing them still closer. What a magnificent scaffolding upon which to build up a new tissue, and this is, in fact, the end it serves.

Third stage.—Each blocked capillary sends out a little shoot, which, gradually enlarging, becomes hollow, and unites with one from another point, being supported in its growth by the fibrin scaffold (Fig. 2), until new blood and consequently new material for building is carried from every side and at every level to the gap which has to be filled. Should nothing interfere to prevent or to spoil the materials used, either of the scaffold or of the new tissue, the building-up goes rapidly on, and as the permanent tissue is laid down, the temporary fibrin scaffold is bit by bit absorbed until no trace is left. Then some of the vessels, of which a large supply was wanted for the special work, are no longer required, and become shrunken and obliterated. The tissue, as it receives less blood, becomes drier, firmer, and harder, and from being pink and soft, becomes whiter and more shrunken. Over all, at the proper level, the skin sends out shoots of its own particular kind of cell, covering in and rendering complete the scar.

The dead bits of silk, catgut, &c., left on the wound surfaces are gradually softened, liquefied

and absorbed by the fluids of the part; they appear to undergo no putrefactive change of any kind.

But note that to obtain such a result there must have been perfect freedom from bacteria from first to last; the skin divided, and for some distance round has been thoroughly cleaned and disinfected; the instruments used have been perfectly clean and exposed to the action of antiseptics for some time; the catgut, silk, horsehair, &c., used have been protected most carefully from contact with anything but the preservative fluids in which they are kept, and the wound itself, the hands of the Surgeon and of the Nurses have been *surgically* clean. The dressings contain so much antiseptic that bacteria cannot live in them, and they have been so thick and so *absorptive* that no fluid from the wound has been able to percolate through them, and so open up a way by which germs might enter. All these precautions have been rigidly adhered to, and the result is as I have described.

But the second case, in what does it differ from this? The first stage is precisely the same, except that possibly on the surface of the wound, possibly in the catgut used, on or in the drain tube, or scattered over the surface of the dressings, are bacteria, probably in an inactive condition, but capable of being excited to life and action by warmth and moisture, both of which are now present.

As the second stage goes on, these bacteria develop and multiply, and the immediate result of their life is that the dead materials first, then the semi-fluid scaffolding already described, is eaten away by these organisms, which abstract the nitrogen and carbon entering into their composition. Such abstraction of their components results in chemical change, and the formation of various matters, which are not only useless for the purpose their originals fulfilled, but distinctly harmful, some to the tissues around by their acrid and caustic properties, some to the general system by their poisonous effects. As they multiply, which they do with wonderful rapidity, they begin to attack the walls of the wound itself, and produce disintegration, ulceration of its surface. The irritation thus produced has, for effect, the exudation of still larger quantities of white corpuscles—suppuration. The bacteria find an entrance into the small vessels on each side of the wound; small veins, small lymphatics become choked with them, and the small microscopic layer of inflammation which we had in our first case becomes wide, very appreciably and very frequently steadily increasing, so that not only is the scaffolding broken down that served so important a function, but the very walls of the wound are more or less attacked, and the general vitality and resistance

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