

## CHAPTER VI.

## ASEPTIC SURGERY—MODIFICATIONS.

Country practice: *How to dispense with the spray during the operation—and during the after-treatment: How to render the dressings less frequent.* Is the aseptic method applicable in war? *Mr. Lister's suggestions: Esmarch's plan: Reyher's method.* Development of Aseptic Surgery in Mr. Lister's hands: *Compound fractures—Pure carbolic acid—Formation of crust—Carbolic putty—Lead plaster—Lac plaster, syringing wounds with carbolic lotion, protective, catgut ligatures, method in 1870—Present method in the main introduced in 1871—Further introduction of wet gauze, steam spray, elastic bandages: abscesses—Method of opening them under carbolic oil: wounds.*

SUCH are the methods usually employed in carrying out the Listerian principle in hospital or in private practice. It is, however, said to be difficult of application to country practice, and we must therefore enquire in what way it can be made easier. The difficulties urged are that the spray is too heavy to carry: that it is not always easy to return a long distance to see a patient on the day after the operation, and that the dressings are too expensive for the lower classes. We must therefore, in some way or other, render the dressings very infrequent, so as to avoid expense and unnecessary visits, and we must try to dispense with the spray.

In the first instance in going to perform an operation or to treat a wound, the surgeon takes instruments with him, and he may, without any additional trouble, easily add a spray to the contents of his bag, and this spray may be left at the patient's house, and brought home again after the first dressing. But, suppose the surgeon has not a spray at hand. What is to be done? Well, he must use all the other precautions before described, and wash out the wound frequently with 1-40 carbolic acid lotion during the operation, and while the stitches

are being inserted; and then, before the piece of wet gauze is applied, he may distend the wound with the same lotion, the wet gauze being applied while this is still flowing out. At the same time I cannot see that, in the great majority of cases, it can be any great hardship to carry a spray to an operation.

During the after-treatment a spray is not necessary. The spray may be rendered unnecessary during the after-treatment in two ways. In the case where catgut stitches and catgut drains are used a deep dressing may be applied at the time of the operation, and may never require to be changed. This deep dressing is fixed down in some way or other, and is treated as a wound, the gauze being soaked with carbolic lotion every time the superficial dressing is removed, and then a piece of wet gauze larger than the deep dressing, and the general dressing are applied. Should it be necessary to remove the deep dressing, there is no necessity for the spray, if catgut drains be used, because there is no cavity into which air may pass. The deep dressing having been removed, carbolic lotion is allowed to flow over the wound till a guard is applied. Where a tube is used it is more difficult to do without the spray, for in that case there is an open orifice into which dust may fall, and be sucked into the interior of the wound, and further, when the tube is removed, air must enter to take its place. This may be avoided by the use of a syringe which constantly keeps a stream of carbolic acid lotion passing over the wound and over the drainage tube, till a fresh dressing is applied. Should it be necessary to remove the tube it is well, in addition to this constant flow of lotion, to cover the orifice of the tube with a rag dipped in the antiseptic lotion. The best way is to take a guard soaked in carbolic lotion and folded in several layers, and place this over the orifice of the drainage tube, extending on each side of it for a considerable distance. The tube is now seized with a pair of forceps through this rag, and as it is pulled out the rag is carefully tucked in around it, so as to compel the air, as it passes in to take the place of the drainage tube, to traverse the moist guard. This seems to me better than the method of slipping in forceps under the guard and pulling out the tube, the guard being well pressed down on it. In taking out wire or silk stitches, the



guard is pulled aside so as to expose the stitch, a little carbolic lotion is then dropped over the suture, and as the latter is withdrawn, a few drops of the lotion are applied to the orifice of the puncture.

These methods—the use of catgut stitches and catgut drain, and the employment of a permanent deep dressing, together with the hints in cases where a drainage tube or non-absorbable stitches are employed, suffice to render the operator independent of a spray.

Can we now render the dressings less frequent? This may of course be done to a certain extent by applying a larger amount of gauze, but the best way is to use sponges in the interior of the dressing for the purpose of absorbing and retaining the fluid. The deep dressing having been applied and fixed, a large sponge or several small ones are placed outside it, these sponges having just been wrung out of carbolic lotion; outside the sponges and extending well beyond them is a piece of wet gauze, and then the masses of loose gauze and general gauze dressing. In this way the discharge is retained in the interior of the dressing, and of course so long as it is there, and so long as the discharge has not reached the edge of the dressing, it is as safe from putrefaction as if it were in a pure flask. By the use of these sponges several days may be allowed to elapse, in many cases, before the first dressing is changed, though it is well in every case to change the first dressing on the day after the operation. When the dressing is changed these sponges are squeezed thoroughly, washed in carbolic lotion 1-40, and reapplied. By the use of sponges two or three dressings suffice for the treatment of most operation wounds.

By the use of salicylic jute in large masses, the same avoidance of frequent dressings may be obtained, but this material is not very trustworthy as an antiseptic.

Thoroughly purified cotton wool, which may be obtained cheaply by impregnating it with sulphurous acid fumes, applied in large mass may prevent the necessity of frequent dressing.

By the means described, the difficulties in the way of the adoption of this system in country practice may be overcome,

and instead of causing additional expense to a poor patient, it saves expense in many ways. The dressings required are so few that the price of the materials employed is not greater than that which would be necessary even if water dressing were used; and expense is saved in many other ways, as I shall mention in the latter part of this work, notably in the rapid healing, which is of course of the greatest consequence to the bread winner.

*Is the Aseptic method applicable in War?*

In the 'British Medical Journal' for September 3, 1870, Mr. Lister describes a method for the use of army surgeons. He suggests that the wound should, as soon as possible after the injury, be thoroughly washed out with 1-20 carbolic lotion, the surrounding skin being at the same time purified. Bleeding vessels are secured by catgut, by torsion, or by carbolic silk. While the wound is full of lotion, extract the bullet, clothes, &c. Then cover the wound with two or three layers of oiled silk, smeared on both sides with carbolic oil 1-5. Over this apply layers of lint soaked in the 1-5 oil, overlapping the oiled silk for about three inches in every direction, and about a quarter of an inch in thickness. This is covered with gutta-percha tissue, and the whole is fastened on with a bandage soaked in carbolic oil. This is the permanent dressing. Outside this, another and larger dressing of oiled lint covered by gutta-percha tissue is applied daily. During the first day apply fresh oil to the outer cloth once in six or twelve hours. On the following day the outer dressing is changed, carbolic lotion being introduced under the edge, as it is lifted, by means of a syringe; or carbolic oil may be poured in. After the first dressing use the 1-10 oily solution, and later the 1-20. On the second day oil is only applied once in twelve hours, after that it is applied daily for five or six days, and then once in two days.

In compound fractures use a wire splint next the deep dressing, and apply the fresh superficial dressings outside the wire. This splint need not be removed till union is complete, the oil being merely poured between the meshes when the dressing is changed.



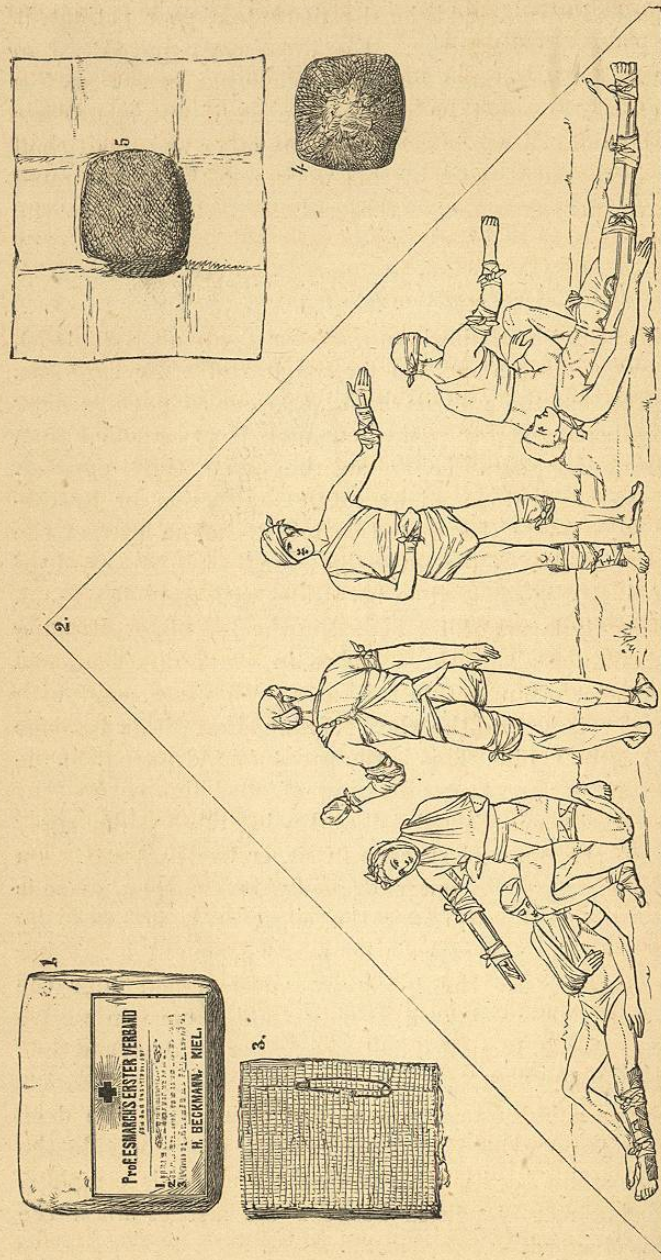


FIG. 57 (FROM MACCORMAC).  
Esmarch's first dressing for the wounded in battle. 1. Packet folded up. 2. Triangular bandage and square of oiled paper. 3. Gauze bandage. 4. Antiseptic tampon. 5. Tampon

Esmarch, in Langenbeck's 'Archiv,' vol. xx. p. 171, proposes another plan of treatment.

He points out that the new form of bullets passing quickly through the clothes may not carry into the wound any causes of putrefaction. Therefore, if the wound is not examined by dirty fingers or instruments, and if it be seen at once, it may in most cases be regarded as aseptic. Starting on this principle, he suggests that each soldier should be provided with tampons of salicylic cotton, wrapped in salicylic gauze. Fig. 57 represents the contents of the packet of dressings which Esmarch proposes to supply to each soldier. At the front, when there seems any possibility of saving the limb, these tampons are introduced into the openings, and bandaged on without any preliminary probing or examination of the wound. Any other necessary apparatus is applied, and the patient sent to the rear. At the rear the skin around the orifice is purified with some antiseptic lotion, and if there is any necessity to explore the wound, as for removing bullets, splinters, &c., the tampon is removed under the spray, the wound washed out, and an antiseptic dressing applied. If there is no necessity for exploring the wound, the skin is merely purified, and then a mass of salicylic jute or other antiseptic material is applied without disturbing the tampon. If putrefaction occurs later the wound must be enlarged, and an attempt made to purify it.

Conservative surgery being more applicable with the aseptic method, the necessity for primary amputation at the front is less frequent, and as a rule exists only in the case of smashes from large balls. Esmarch considers that for such cases a sufficient supply of antiseptic materials should be present in the ambulance. Referring to those cases not treated aseptically which do well, and to the evils of investigating the wound at the first, Esmarch says: 'So weit ich habe in Erfahrung bringen können sind diejenigen Fälle, welche aseptisch verliefen, auf dem Schlachtfelde nicht mit dem Finger gründlich untersucht, sondern gleich verbunden worden, während solche Fälle bei denen wiederholte Untersuchungen vorgenommen waren, mir oft einen besonders schlimmen Verlauf zu nehmen schienen.'

Esmarch's method has been put to the test by Dr. Reyher



during the late Russo-Turkish campaign. His results were excellent, and will be referred to later on. He carried out the aseptic method in two ways, according to the nature of the injury and the treatment before the case came into the surgeon's hands. These are, either that the surgeon closes the wound without further treatment, merely disinfecting the surrounding parts, or else that he cleans out and purifies the track of the bullet, and afterwards makes provision for free aseptic drainage. In the first instance healing occurs under a crust; in the second, under a moist and antiseptic dressing.

The cases which are suitable for the first method of treatment—treatment by a crust—are those in which the wound is small, where no clothing has been carried in with the bullet, where the edges of the wound fall together as where the wound is more or less valvular, and where no examination of the wound by finger, probe, &c., has been made. In such a case the surrounding skin is carefully purified, and an attempt is made to obtain a dry crust either by allowing the blood to dry, or by aiding the drying by applying charpie, gauze, &c.; or the wound may be covered by a mass of salicylic wool or carbolic gauze. Reyher lays particular stress on the avoidance of probing or draining such wounds. On the contrary, any communication with the outer world should be shut off as soon as possible.

In many cases this 'occlusion' of the wound cannot be depended on, and the bullet track must be washed out, and treated in the way described under compound fracture, free drainage being carefully provided. This is chiefly the case where the missile has been travelling slowly, and where, consequently, the wound in the skin is not so small nor valvular, and where there is more likelihood of articles of dress being carried in with it; where, also, as Reyher puts it, the wound is open and 'the air has not only entered but must enter again.' This treatment is also necessary in cases where wounds have been examined with unclean fingers or instruments before reaching the ambulance.

It is thus evident that the spray is not required for the majority of cases, and indeed by following the lines previously indicated it may be entirely dispensed with. The gauze re-

quired for the dressings can be made in the vicinity, and for this purpose Reyher carried with him the machine for making gauze described in Chapter III., and had thus a constant supply of the freshly-prepared material. There is not much difficulty, therefore, with regard to the materials; the real question is how to have the cases treated aseptically from the very first. Reyher was able to overcome these difficulties by proceeding in the following manner. In the first place, instructions were given that wounds were never to be examined at the front, either with fingers or instruments, nor was any attempt to be made to extract a bullet. The only exceptions to these rules were cases where blood-vessels were injured, though even in these it was generally possible to apply an Esmarch's elastic band to control the hæmorrhage temporarily; and cases where the projectile had passed into the large cavities of the body, and, without wounding the contents, had remained in the wall of the cavity. In such a case the bullet ought to be extracted at once, lest it should fall into the cavity during the transit of the patient. 'For surgeons at the front there is only one line of treatment—to occlude the wound provisionally—to lay the wounded part in a suitable position on the litter, and to render it provisionally immovable. As provisional dressing the salicylic balls recommended by Esmarch are the best.' This method is chiefly suitable for cases where the soft parts alone are injured. Most of the serious cases can be attended to as a rule at the foremost ambulance.

The more surgeons become imbued with the true principles of aseptic surgery, and the more thoroughly they grasp antiseptic surgery in all its developments, so much the greater is the likelihood of obtaining aseptic results. Reyher's results show strikingly what can be done with the methods at present at our disposal. There can be no doubt that with improved methods and increased knowledge and experience, aseptic surgery will soon be universally carried out in war.<sup>1</sup>

It will be interesting now to trace the gradual development

<sup>1</sup> For a *résumé* of the opinions of army surgeons on the best methods of carrying out aseptic surgery in war, see a little pamphlet by Surgeon-Major H. Melladew, *Notes on Antiseptic Surgery in War*. London: Ranken & Co. 1881.

BIBLIOTHECA  
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