

## MAINTENANCE OF AN ASEPTIC TECHNIQUE IN GYNECOLOGICAL OPERATIONS OUTSIDE OF HOSPITALS.

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It is not necessary for me to-day to make any general remarks about, or put forward any arguments in favor of, the employment of a thorough aseptic technique in surgical operations. I feel sure that every member here present is anxious to discover himself, or to learn from others, and to carry out any measure which promises the speedy healing of the wounds which he makes, and obviates as far as possible the dangers of infection. I have more than once encountered an erroneous opinion which is not confined to members of hospital staffs, but is to a large extent shared by the public outside. I mean the idea that the great majority of serious operations cannot in these days be safely performed outside a hospital. When, however, we consider the class of private patients to whose homes we are called—homes supplied with every modern convenience—we must allow that, although we can only expect an ideal operating room in a hospital, we have some advantages which are not at our disposal in treating patients in the crowded wards of a general hospital. Again, we are dealing with a class of patients whose circumstances have been such that the system is much better prepared to afford a more stubborn resistance to pathogenic organisms, should they gain entrance, than we find among the members of the poorer classes, who have been suffering for years from the want of sufficient food and proper hygienic surroundings. Lastly, when we consider the successful operations which have been performed in private houses, we cannot but conclude that the statistics, if we exclude the better class of patients treated in the private wards, will compare very favorably with those which are furnished by the majority of our best hospitals.

I propose, therefore, to speak briefly of operations in private houses, in which the rigid technique observed in hospitals must necessarily be more or less modified, and to try to show that in scarcely any case will any essential principle of asepsis need to be sacrificed.

A surgeon who has mastered the principles underlying an aseptic technique will be called upon, while adapting himself to his surroundings, to utilize this knowledge to the full. Even if he is obliged to operate upon the shortest notice, he need never be taken by surprise; and even if the conditions are the most primitive, as long as he has fire, water, clean vessels, and common washing soda, he is in a position to carry out an aseptic technique.

We will suppose, however, a case in which the surgeon has had several days' notice, and thus has had ample time to prepare both himself and patient. Let us suppose the operation to be one of abdominal section. In ordinary cases the patient should be under observation for several days, and should be ordered to take a daily bath for one or two days prior to the operation. She should spend some part of each day in bed, in order to accustom herself to the recumbent posture which she will have to occupy later, and should also receive daily a vaginal

douche of a warm 1 to 3 per cent. aqueous solution of carbolic acid. The bowels should be opened daily by gentle laxatives. Twelve to twenty-four hours before the operation, a good purge is given, and before the patient comes upon the table the rectum should be thoroughly emptied by a large enema of soap and water. Light nourishing food should be taken, but unless the patient be very weak, nothing should be given by mouth for eight hours previous to the time of operation.

The preparation or sterilization of the field of operation is divided into two parts, the first consisting of measures employed some time before the operation, the second of those which are necessary after the patient comes upon the table.

The former may be summarized as follows:

1. Bath of soap and water and a vaginal douche of a 1 per cent. aqueous solution of carbolic acid given daily for three days before the operation.
2. Shaving the hair of the abdomen and pubes on the night preceding the day of the operation.
3. Thorough scrubbing of the parts with (a) soap and water, (b) alcohol and ether, (c) bichloride of mercury (1:500).
4. Poultice of green soap applied from 1 to 3 hours, according to the sensitiveness of the skin.
5. Removal of the soap by scrubbing with brush and hot water.
6. Application of a compress of bichloride (1:1000), to be kept on until the patient is brought to the operating table.

We must presuppose that the surgeon has provided himself with a stock of instruments and with a supply of dressings and suture materials which have been sterilized and can be used at the shortest notice. I do not mean by this that a large armamentarium is necessary, for the well-trained hand can effect great things with but few instruments.

If in order to economize room only one kind of suture material can be taken, it will be best to choose silk, not only because it can be made to serve almost every purpose, but also because if it becomes contaminated it can easily be resterilized by being boiled in the 1 per cent. soda solution.

The operating room should be chosen with especial regard to two requirements, viz: (1) that it is well lighted, and (2) that it can be easily cleansed. It can be chosen a day or two before the operation, and it should at once be cleared of all the ordinary furniture, carpet and rugs. The floor, and if possible the walls and ceiling, should be thoroughly scrubbed with soap and water. All hangings are to be removed from the windows and doors, and especial attention is to be given to the cleansing of the window-sills, of all corners and crevices, and of the wood-work generally.

For the operating table, an ordinary plain narrow kitchen table will answer every purpose. For the patient's feet to rest upon, a plain wooden chair can be placed at the end of



the table at such an angle that the back of the chair will be caught under the lower edge of the table.

It will be necessary to have two other tables about the same size as the first, on which the vessels which are to contain the instruments, ligatures, sponges and other necessities may be placed. When special tables for this latter purpose cannot be obtained, any two small, narrow tables may be used, provided that after they have been thoroughly scrubbed with soap and water and bichloride solution, they are covered with sterile gauze. Six plain wooden chairs should also be ready. The table and chairs should be thoroughly scrubbed with soap and water, and with a 1:500 aqueous solution of bichloride of mercury.

Arrangements should be made for an abundant supply of hot and cold water, some of which, after being boiled, should be kept ready for use in sterile vessels. Especial care must be taken about the cleansing of the large tin boilers in which the water is to be boiled, as well as the other vessels in which it is to be stored afterwards. They should be thoroughly scrubbed out with sand-soap and water and then well rinsed out with hot water. The vessels in the operating room should be provided with lids, which should be covered with sterilized towels, or some other clean material, in order to avoid the slightest risk of contamination from the dust of the room. These vessels are to be replenished from the boilers on the stove, and the duty of conveying the water from the boilers to the operating room should be delegated, if possible, to an assistant, or at least to a reliable person who is not likely through ignorance to be guilty of putting his hands into the pitcher, or of allowing the water to become contaminated in some other way.

Some hours previous to the operation, a good supply of water should be heated and transferred to the sterile vessels in the operating room, where it may have time to become cool.

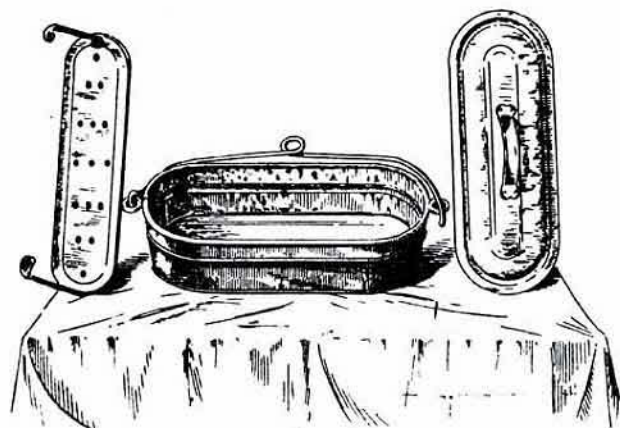


FIG. 1.

Before going to an operation, the surgeon should be careful to consult his instrument list and make sure that nothing which will be required is left out, since, when away from home, it will not be possible to make a requisition upon the stock instrument case for any article which has been forgotten.

For many reasons it is better to make the final sterilization of the instruments and dressings at the place where the operation is to be performed. It will therefore be advisable to take along the small soda solution apparatus, which is really nothing more than an ordinary fish-kettle (*vid.* Fig. 1) and the Arnold steam sterilizer.

The instruments can be conveniently carried arranged in compartments in a long sheet of canton flannel (*vid.* Fig. 2), which is then rolled up and tied around the middle with a broad tape. Several hard rubber trays for the instruments will be found very convenient, and if these are made so that they fit into one another they will not occupy too much room.

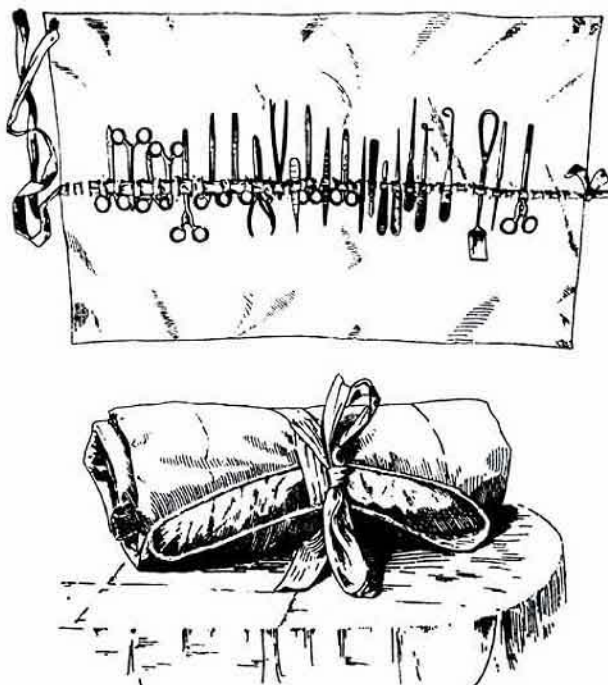


FIG. 2.

Good soap in tin cases, and air-tight screw-cap bottles containing potassium permanganate and oxalic acid, and a supply of green and oleine soap must not be forgotten.

Sterilized gauze, cotton, sponges and bandages are rolled up in sterilized towels, and the ligatures are carried in the large ignition tubes, which are plugged with cotton stoppers and which have been sterilized in the usual manner. A bottle of bichloride or iodoformized celloidin and any antiseptic powders which will be required, as well as some sterile physiological salt solution,\* and operating suits, a liberal supply of towels, rubber gloves and mackintoshes should be included in the outfit.

It is well to collect everything before commencing to pack

\* Perhaps I ought to say that physiological salt solution, before being used in hospitals, is generally subjected to fractional sterilization. But though this is to be preferred, a safe substitute may be provided by dissolving tablets of chemically pure chloride of sodium in water and afterwards boiling for some time.



the valise, so that each item on the list may be checked off as the article is packed.

The "telescope" valise will be found most serviceable and convenient. It is also inexpensive, and admits of being easily cleansed, and things packed in it can be transported safely.

It will be necessary for the surgeon to have with him at least one assistant who is thoroughly conversant with the technique which he wishes to carry out.

The strictest orders must be given to any volunteers that they refrain from touching any objects or rendering any assistance without being especially requested to do so.

The assistant should be sent forward some hours previously to see that everything is in order. On arriving, he will see that an abundance of water is put on the stove to boil in clean vessels, and that the dressings and a supply of towels are being sterilized in the Arnold steam sterilizer, and also that the furniture in the operating room has received the proper cleaning.

Before touching anything which has once been rendered surgically clean, the assistant must put on his operating suit and thoroughly scrub his own hands; but if he make use of a sterilized pair of rubber gloves, he can put off the final cleansing of his hands till just before the operation.

The operating table, after being sterilized, is to be prepared in the following way: A folded blanket, or better still, a felt pad large enough to cover it, is placed upon the table. Over this is spread a rubber sheet, which in turn is covered with a fresh, white sheet. A small pillow for the head of the patient to rest upon and the rubber ovariotomy pad are placed in position.

After this has been done, the various basins which will be required are conveniently arranged on the side tables, filled with water or sterilized salt solution, or with the various other solutions which may be preferred. The sutures are shaken out of the ignition tube into the vessel prepared for them.

The instruments, after being boiled for five minutes in a 1 per cent. solution of carbonate of soda (common washing soda), are turned out into the sterilized trays, which contain sufficient warm sterilized water to cover them. Instead of the simple water, cold, previously boiled, 1 per cent. soda solution, or a solution which contains 1 per cent. of soda and 1 per cent. of carbolic acid, may be employed. The trays should have been previously scrubbed thoroughly with soap and water and afterwards rinsed off with boiling water.

When everything is prepared, the final disinfection of the hands and forearms of the operator and his assistants begins. They are scrubbed vigorously for ten minutes by the watch, with a stiff, sterilized brush and with green soap, the water being used as hot as it can be borne, and changed several times. The excess of soap is washed off in hot water, and the hands and forearms are then immersed for two minutes in a warm saturated solution of permanganate of potassium, which should be well rubbed into the skin with the aid of a sterilized swab. They are next immersed in a warm saturated solution of oxalic acid, until the stain of the permanganate has completely disappeared, being afterwards rinsed off in sterilized water or sterilized salt solution, and finally immersed for two minutes in a 1:500 bichloride solution. Just before begin-

ning the operation the hands and forearms should be again well rinsed in sterilized salt solution, to remove the excess of bichloride.

The use of sterilized rubber gloves to protect the hands will often prove of the greatest convenience, for with their aid we can, without much fear of contamination, often perform the needful manipulations about the patient before the operation begins.

After the patient has been anesthetized and placed upon the table, the compress is removed and the following steps are carried out:

1. The field of operation is scrubbed with soap and warm sterile water.
2. Sponged with alcohol and ether.
3. In some cases with a solution of permanganate of potassium and oxalic acid, as in the disinfection of the hands, with subsequent irrigation with warm sterile water or salt solution.
4. Irrigated with 1 liter of a solution of bichloride of mercury (1:500).
5. Irrigated with sterilized salt solution to remove any excess of sublimate.

The abdominal wall having thus been rendered as nearly sterile as possible, is protected with sterilized gauze and towels, and the field of operation itself is covered with a piece of sterilized gauze which has had an opening made in it down the middle, so that when the edges are pulled apart the line of the abdominal incision will be exposed.

Of the operation itself, and the method of dressing the wound, we need not speak. In this connection, however, we would say, that wherever numerous stitches are required, the use of "carriers" (*vide* Fig. 3), with which you are all probably familiar, will bring about a great saving of time and trouble.

If irrigation of the abdominal cavity is required, a pitcher which has been rendered surgically clean should be ready (*vide* Fig. 4).

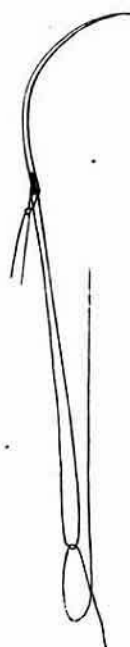


FIG. 3.

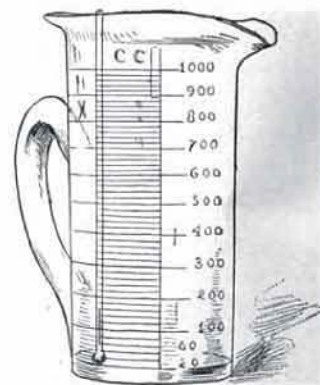


FIG. 4.

If an ordinary pitcher is used, a sterilized thermometer is necessary in order to test the temperature of the water, as it will not be safe to trust to the impression given to the hand from the outside, and it will of course not be allowable to place the fingers into the water.

Immediately after the operation has been finished and the dressings have been applied, the patient, not yet recovered from the anæsthetic, is removed to the bed where she is to remain during convalescence. The physician should not leave the house until all immediate danger from the operation is past.

The after-care of cases should be very much the same as of those in hospitals.

If the operator lives too far away to make it possible for him to see the patient every day, he must of necessity entrust her to the care of a brother physician, but before going away, he must not omit to leave full instructions regarding diet, catheterization, the administration of enemata, and the indications for changing the dressing, and in fact providing as far as possible against any emergency which may arise.

It will be well for the operator to do the first dressing himself, and we would insist that in this case the same rigid precautions with respect to the sterilization of the hands and forearms, which were employed at the time of the operation, should be observed.

It requires a considerable length of time to arrange all

those details which have been described, and I have purposely omitted to mention all the possible refinements in technique which may ultimately be introduced. If, however, we hope to do an aseptic operation, even what we might be tempted to call the most trivial detail must not be neglected, for in a surgeon's technique the adage is especially true, that "a chain is no stronger than its weakest link."

Where, from the grave condition of the patient, it is necessary to operate immediately, of course it will be impossible to carry out all these details, but at any rate we should, starting with strict principles, swerve from them no more than we are obliged to. Above all, we must not allow ourselves to form careless habits, which cannot fail in the end to lead to bad results.

A detailed description of all the possible chances of error, and of the many precautions which must be taken to meet them, would require the writing of a whole volume. In this short address I have attempted merely to give an outline of the general course to be pursued, leaving it to the good sense of the surgeon himself to decide upon the precise steps to be taken when other emergencies arise.