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SURGICAL STERILIZATION AND STERILIZERS IN PRIVATE PRACTICE.

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SURGICAL STERILIZATION AND STERILIZERS IN PRIVATE PRACTICE.

BY EDUARD BOECKMANN, M.D.

Last May I delivered an address in Buffalo, N. Y., before the "Association of Military Surgeons" of the United States, on "Asepsis in Military Service." This address printed in the transactions of that society and also in our own JOURNAL, Nos. 4 and 5, Vol. 26 (January 25 and February 1, 1896), considers at length the principles of sterilization, and gives at the same time a number of practical points just as applicable in operations in private practice as in operations in military service, for which reason I take the liberty to refer you to that for details.

With regard to the mechanical and chemic phases of surgical sterilization I have not much to add to or take from what I said last year. Supported by further experience I can this year more strongly than last recommend the 1 to 2 per cent. solutions of lysol at 120 degrees F. for combined mechanical and chemic disinfection of the operator's hands and the patient's skin.

Lysol possesses the undeniable advantage of being at the same time antiseptic and aseptic; it is a happy combination of a powerful disinfectant and soap (saponified cresol). It has the dissolving and penetrating properties of an alkalin substance. I know of no agent which at the present time is better adapted and more reliable in the disinfection of the skin than lysol, with the possible exception of alcohol, which certainly, with good reason, receives the support of the world. Heretofore we have viewed alcohol in the light of a purely mechanical agent in the disinfection

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of the skin; this can no longer be successfully maintained. Alcohol is certainly a potent solvent of a great number of substances, sparingly however of fats. Alcohol must be viewed as a strong antiseptic, possessing the same significance for the skin as for anatomic preparations, taking up its moisture, penetrating and hardening them; a decided advantage over ether and turpentine, which certainly dissolve fat much more readily but which are much less hydrophile. In order to obtain the greatest possible antiseptic effects of alcohol it is obvious that the skin must be dried, and strong, preferably absolute alcohol used, and the skin energetically rubbed for some little time. Since experience has taught me that the germicidal principle in lysol acts as a powerful antiseptic in the above mentioned strength, and as a prolonged friction with absolute alcohol makes my skin uncomfortably hard and brittle, I reserve the alcohol for the field of operation only.

The last act in my sterilization of the skin consists in impregnating it with sterilized lanolin. By this procedure it is my intention to restore to the integument its fatty protective, which has been removed to the greatest possible extent by the preceding chemico-mechanical disinfection; at the same time I aim to cover up the remaining, inaccessible bacteria. Lanolin, which is rich in bacteria, is sterilized simply by heating the anhydrous article over the fire in an enameled vessel to about 350 degrees F., whereupon it is either run into collapsible tubes (sterilized in boiling water) or mixed with four to five parts of anhydrous ether, as soon as it has cooled below the boiling point of the latter, and then put into patent stoppered, sterilized glass bottles. Lanolin contains a great many impurities not soluble in ether, and which sink to the bottom as a voluminous, white sediment; only the clear, yellow solution is used.

Provided with lysol, absolute alcohol and ethereal solution of sterilized lanolin, we are enabled to disinfect the skin, the most dreaded bearer of infection, as

safely, I imagine, as is possible at this time; and with as few and simple agents as can be demanded in operations in private practice.

While I practically occupy the same standpoint with regard to chemico-mechanical disinfection, I must take up the thread where I dropped it last year, as far as thermic disinfection is concerned. It is quite natural that surgeons who occupy themselves with operations in private practice, not only are interested in portable sterilizers, but also prefer such as are constructed for combined boiling in water and its steam. Inventive geniuses have also from time to time, at short intervals, endeavored to satisfy this popular demand, but they have all, as far as I know, up to the present committed the error of constructing their apparatus for under-steam, which streams through the sterilizing chamber from below upward; that is, a stream, which neither expels the air, nor penetrates the articles to perfection, and which consequently results in deficient condensation, besides leaving the articles moist. All sterilizers for streaming steam must necessarily be constructed for over-steam; the reasons being fully given in my article previously referred to. Personally I am not particularly in favor of combination sterilizers even when scientifically constructed, chiefly because boiling and steaming are different processes requiring an unequal time, steaming at least three times as long as boiling, not to speak of the time required to dry the dressings after sterilization. This entails the practical disadvantage, that instruments, for which boiling is our method of choice, suffer unnecessarily in the prolonged boiling but, as this can be avoided as I will explain shortly, I have in deference to the apparent popular demand revived the idea of a combination apparatus, which I described in the *Medical Record* a couple of years ago, and it is my improvement upon that apparatus which I take the liberty to demonstrate upon this occasion.

My combination portable sterilizer consists, as you

see, of four parts: 1, the boiling pan; 2, the hood; 3, the instrument tray, and 4, the steam chamber.

The boiling pan is made oval for the sake of the instruments; convenient dimensions being four to five inches high, eight inches wide and sixteen inches long. Around the upper border on its outside is constructed a groove half an inch deep. The center of the bottom

FIGURE 1.

is perforated by a small opening, into which is fastened a tube, which extends to the level of the upper border of the pan; under the opening at the bottom is placed the iron plate, familiar from my other sterilizers.

The hood, which fits closely within the outer lip of the groove of the boiling pan described above, and

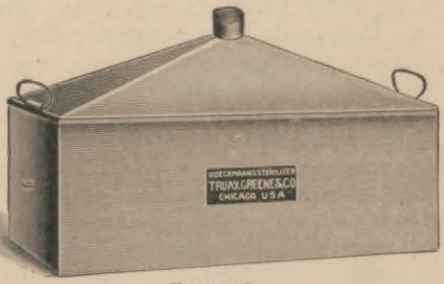

FIGURE 2.

whose height is adjusted to that of the steam chamber, above which it extends half an inch, has a sloping roof, whose extreme top is perforated and fitted with a short tube or chimney. The hood is supplied with handles and can be fastened to the boiling pan by means of two hooks.

The instrument tray is made to fit accurately within the boiling pan, the corners are cut off to allow for the legs of the steam chamber, the bottom is of galvanized wire and the frame is provided with two handles.

The steam chamber is of the same form and dimensions as the boiling pan; the chamber extends downward in a sloping bottom, whose lowest, perforated

FIGURE 3.

point is on a level with the upper border of the pan; into this opening is fastened a tube, which fits accurately outside that described in the boiling pan and which is of the same length; at the juncture of the steam chamber and its sloping bottom is placed a diaphragm of galvanized iron; between this and the opening beneath is a small square tin plate; the

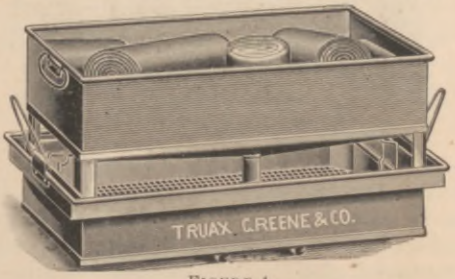

FIGURE 4.

chamber rests upon four legs, is provided with handles and a sloping cover, perforated at the top underneath a handle.

Directions for use.—The boiling pan is filled with a sufficient quantity of water, care being taken to fill the groove at the same time; the hood is adjusted, and the whole placed over any good fire. While the

water is heating, the instruments are arranged on the tray, and the dressings, etc. (previously washed) in the steam chamber; needles, drainage tubes, ligating and suturing materials are put separately in a small metal box (sterile catgut is brought along in hermetically sealed envelopes). When the water boils, the hood is removed, the steam chamber put in, whereupon the hood is replaced with a cork in the upper tube. The steam will now ascend between the hood and the steam chamber to the top; the cork at the top and the water in the groove and in the pan acting as locks, the steam is forced to work its way through the opening in the cover of the steam chamber into

FIGURE 5.

this, through the articles contained, and out through the tube in the boiling pan. In the course of a quarter of an hour the sterilization is completed; the hood is removed, also the steam chamber; the instrument tray is now put in, the steam chamber is replaced, the hood likewise, *but without its cork.* For the preservation of the instruments a little soda or soap has been added (lysol serves the same purpose). In the course of five minutes the instruments are surgically sterile; during this time the steam will escape continuously through the open tube of the hood, both that delivered by the water and that contained in the

steam chamber: simultaneously a draught of hot air will enter the chamber from below and when this is removed, its contents are not only sterilized but also dry. A combined sterilizer of the dimensions above mentioned can without difficulty be transported in a suitable wooden case and as the preparation and sterilization of the necessaries is an easy matter, there is no possible excuse for resorting to mercantile antiseptic goods in operations in private practice. The surgeon who relies indiscriminately upon antiseptic wares, which he buys, is a dangerous man!

Articles adapted to sterilization by steam can safely be transported to the place of operation in various ways, Bloch's method in double filtering paper being preferable; it is, however, always safer to sterilize on the spot, and, as only half an hour is required for the whole procedure, it is also practicable. In urgent emergency cases a surgeon ought never to be taken by surprise and as time is valuable in such cases he should always have on hand a supply of sterilized articles.

One more remark with regard to operations in private practice; I will most emphatically impress upon all surgeons, with the possible exception of those few, who are masters both in surgical technique and in asepsis, to consider every wound at the end of an operation of some duration as slightly infected, and therefore to combine their asepsis with a judicial antisepsis. Thus I am in the habit of repeatedly dipping my hands during the operation in a weak, sterile solution of lysol (½ per cent. or even less). The small amount of antiseptic which in this way is carried into the wound, I have yet failed to find objectionable, and I use lysol, because it is at hand, and because it is alkaline like the fluids of the tissues. And when the operation is completed, I apply next to the wound an antiseptic dressing not exactly the customary iodoform gauze, because its preparation requires extraordinary facilities, but antiseptic and at the same time aseptic, hydrophile ointments. Anhydrous lanolin ab-

sorbs moisture greedily; it is first sterilized, mixed while cooling with 2 per cent. lysol and run into tubes. A generous quantity is expressed over the wound, and over this the ordinary dressing is applied. Changing this dressing is unattended by the disturbance of the wound or the patient's comfort, as it does not stick like a dry dressing.

In the foregoing it has been my aim to dwell upon the most essential points in surgical sterilization and sterilizers in private practice, points, which I could stamp with some degree of originality.