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*Later Antiseptics in Private
Surgical Practice.*

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Later Antiseptics in Private Surgical Practice.

IN discussing the treatment of wounds, a subject confessedly the most important in the whole domain of surgery, we have no longer to ask, "Shall antiseptics be used?" That question has been answered, and in its place have arisen the queries "What antiseptics shall we use?" and "How shall we use them so as to obtain for our patients the greatest safety and benefit, and for ourselves the least trouble and expense?" The principles which underlie their scientific use, and with which for all future time the honored name of Sir Joseph Lister will be associated, briefly stated, are:—1st. That in the air, in fluids, and in the dust around us there exist particulate living bodies which may gain access to any wounds not subcutaneous. 2nd. That entering a wound they are the active agents in setting up putrefactive fermentation in its discharges. 3rd. That if they are absolutely excluded or are rendered innocuous, fermentative changes, with their frequently disastrous consequences, will not ensue. These

principles the surgical world has, either in words, or in actions that speak louder than words, accepted as proven. Founded upon them we had till recently only that system worked out by the father of all antiseptic surgery, and known by the name of Listerism. It aims to prevent the entrance of germs into wounds, and to keep these wounds strictly aseptic. Volkman modified this by washing the germs from the wound while it was exposed, and then protecting it from them by a dressing similar to Lister's. Billroth disregards the entrance of germs into wounds, or their presence in discharges, but depends on destroying their power for evil by the presence of an antiseptic powder. While carbolic acid remained the only or the chief antiseptic, no modification of Listerism was advanced suited to the requirements of private practice. The original method of Lister, befogged with spray and enshrouded in the folds of a mysterious gauze, the proportion of antiseptic, in which might be anywhere from 5% to $\frac{1}{2}$ of 1%, poisoning the patient or keeping his wound sodden and in an unfavorable state for rapid healing, irritating the wound till its discharges soaked through the thickest dressings, intricate, troublesome and expensive, had but one thing to commend it to the general practitioner. That one thing was the success attending its full and careful use. My practical experience with it began in 1873, in the treat-

ment of a compound fracture. Ever since then I have followed, sometimes perhaps afar off, the practice of the Lister school. By doing so I have reached some results that by ordinary methods, I could not have hoped for. Of these I shall mention here only one series: Five penetrating wounds of the knee-joint, chiefly axe-cuts, recovering perfectly and promptly. It is but just to say that ice supplemented the action of the antiseptics in each of these cases. In the treatment of less grave wounds, I have like others been seeking constantly for simpler, safer and less costly methods. The spray I long since abandoned for the douche, and the unstable carbolized gauze for that prepared at the time of use with Von Brun's solution. But it is only since the later antiseptics appeared and their value was demonstrated that I have felt the slightest danger of becoming a contented routinist.

Named in the order of their importance these are: The bichloride of mercury, iodoform, boracic and salicylic acids. Within the last four years they have been employed by numberless careful observers, and conclusions as to their safety and relative value have been reached. The most exact and extensive of these observations have been made in Germany. Based upon the methods of their use in that country, as described in recent literature, or as followed or modified in the New York, Roosevelt, Mount

Sinai, and German hospitals of New York city, where I have lately had opportunity of studying them, I wish to describe a method of wound treatment particularly adapted to the needs of private surgical practice. At the same time I do not wish to go on record as advising that any one method of treatment be used for all classes of wounds. The shoemaker who works on a single last is not the one who fits his customers most exactly.

The aseptic condition, close approximation, drainage, the elastic pressure of dry and absorbent dressings, rest and protection, *these* are what we should aim to secure, and through them by the method now to be described, we may expect most wounds to heal without suppuration and under a *single* dressing. Under an essentially similar method, Esmarch and Neuber of Kiel, found it necessary to change the dressings more than once in but 11 out of 212 cases of extensive wounds. Made, closed and protected in this way, one may leave, as I frequently have left, wounds to await a convenient hour for further attention at any time within ten days. Pain, fever, or the appearance of discharges are to be reported by the friends of the patient at once, and are the indications for the renewal of the dressings.

It will be convenient to suppose that a tumour of moderate size, situated on the fore-arm, is to be removed at a country farm-house. The arm

of the etherized patient is brought through an opening in a rubber sheet, and the upper part of this opening is drawn closely and secured by a safety-pin, or is laced or contracted by a purse-string of elastic tubing. The folds of the sheet are then so disposed as to convey fluids into anything convenient, placed on the floor to receive them. Next comes the thorough cleansing and disinfecting of the part to be operated on, and of the hands of the operator and his assistant. Soap, hot water, and a nail brush first, and then a solution of the bichloride of mercury, 1 : 1000 should be freely used.

At the New York hospital, in the service of Dr. Weir (to whom personally and to whose writings I am much indebted), the field of operation is also bathed with turpentine and alcohol, 1 to 7. The standard antiseptic solution may be prepared easily and with sufficient exactness when and where wanted by dissolving an 8 grain sublimate powder in each pint of water. I am in the habit of carrying these powders in a hard rubber pocket match safe. The recent discovery by Sir Joseph Lister that sublimate is soluble in $1\frac{1}{2}$ times its weight of glycerine, may furnish a still more convenient mode of preparing our solutions. Such a glyceole would doubtless diffuse in water more rapidly and uniformly than a powder could dissolve. The 1 : 1000 solution is to be mixed with an equal measure of hot water, for use in

cleansing sponges and douching the wound. A tank, a fountain-syringe, or Esmarch's inverted and bottomless bottle, arranged as I show you, may be used, but most convenient and portable of all is the syphon douche now presented. This consists of a sinker weighing 3 oz., attached to one end of a tube of thick rubber 4 or 5 feet long, on which has been slipped a clip to close the tube when desired. These replace the short afferent tube and light sinker of any good syringe made after the Davidson pattern. Any pitcher will do for a reservoir, and the thick tube coming over its edge will form a curve instead of an angle, which would occlude it partly or completely. A fine nose tip of hard rubber is convenient during operation, but a tapered tube must replace it to inject the drainage tube and the deeper parts of the wound. Constant irrigation, though not required, is harmless. Since the mercuric salt acts injuriously on instruments, rusting and dulling them, and loosing its strength in doing so, we have yet to use for their disinfecting a saturated 1 : 20 aqueous solution of carbolic acid. In this strength carbolic acid benumbs the fingers dipped frequently into it; hence it is well, when one is his own assistant, to place a towel wet with bichloride solution, when the instruments in use can be for the moment laid down, instead of being returned to and fished out from the carbolic lotion as wanted. The cutting instruments can be conveniently at

hand on a plate or platter, while a bowl makes a bath for the forceps. Of these last, since the securing of every bleeding point is so important when the effort is to gain entire primary union, I make mention of the exceptional value of Sir Spencer Wells and Pean's pressure forceps, and of the torsion forceps of Fricke. Good models of these are shown, since bad ones are common. The plan of going down for a bleeding vessel, and lifting into view successively deeper and deeper portions of tissue with a pair of dissecting forceps held in each hand, is worth referring to in this connection. Sponges should be kept and carried in a sublimate solution. Dr. Weir showed me a rubber ice-cap, with large hard-rubber screw top, which made a very convenient receptacle for them. Not less than three basins of warm 1:2000 solution should be provided for the cleansing of the sponges. Passing through these in rotation, they reach the operator clean and dry. This point I should hardly have mentioned if I had not seen sponges so often thrown into and taken from the same basin during an entire operation. Many surgeons, who would not think of using dirty water for their own faces, apply it without stint to their patient's wounds. The tumour removed, every bleeding point is to be secured by torsion or the catgut ligature so as to leave a dry wound. At present, in New York, catgut which after preparation, has been kept in oil of juniper or in absolute

alcohol, is used almost entirely. It ties and keeps its knot better than that preserved in carbolized oil. In ligating arteries, I use now only the two larger sizes, as the smaller ones are not strong enough to stand being tied, as Robert Liston said ligatures always should be, "devilish tight." For sutures, however, and in particular for the "sunken sutures" of the Germans—those by which we close together muscle to muscle in the deeper parts, tying the knot far below the skin and obliterating the wound, they are excellent.

The lines of drainage should be next arranged, and in them placed one or more absorbable tubes. I show you those of Neuber, imported from Germany, and those of MacEwan, made by my assistant, from the femora and tibiæ of chickens. Since the one form has with me succeeded as well as the other, and since the natural tubes can be bought in the flesh for about the same price as the drilled and turned ox-bone in oil, my decalcified tubes in future will, I think, be after-dinner considerations. If the wound is to be dressed again within a week, either rubber tubes, horse-hair, or Chiene's chromic-acid catgut may be used. The two last I have not found to drain pus well, though they are excellent for the early serous discharges. For closing the wound, catgut should be preferred. Horse-hair answers for adjusting the edges of the skin, and silver wire secured by lead buttons may be needed to sustain tension. If silk be used at all, it should

have been prepared by boiling for an hour in a 5% carbolic lotion, and should have been kept in one of the same strength. The line of union is to be dusted with iodoform, and then covered with several handkerchiefs of 10% iodoform gauze, or $\frac{1}{4}$ of 1% sublimate gauze, over which a roller of the latter material is to be applied. The dressing is completed by the adjustment of bags or pads filled with some one of the absorbents presently to be spoken of, by a second roller, and a splint to secure perfect rest to the part. Cheese cloth, boiled in a soda solution to remove fatty matters, and then washed in water to get rid of the alkali, answers for the preparation of the handkerchiefs, the bandages, and the pad covers. Iodoform gauze is made with this very simply, by Billroth's plan of rubbing the crystals into the meshes of the cloth. From 10 to 20% will be retained. Another method is to saturate the cheese cloth in iodoform 50 parts, ether 250 parts, alcohol 750 parts, and allow the fluids to evaporate. This gives a 10% gauze. Iodoform is always a desiccating dressing, hence it is important to bring the ends of the drainage tubes through the layers in contact with the wound. Neglect of this in one case where I had drained a compound fracture extending into the elbow joint, caused the end of the drain to be sealed in the antiseptic scab, the serous discharge to be retained, and the temperature to rise to 103° F. All went well again when the mistake

was corrected. The great value of iodoform lies in its permanence. It constantly evolves an antiseptic influence, as penetrating and as persistent as its own odor. Being non-irritant, a moderate quantity between the lips of a cut will not prevent union by the first intention. Neuber warns us that not more than 45 grains should be applied at any one time to a raw surface. When first introduced, large wounds, as after hip excisions, were filled with it, and deaths followed. Now we have the authority of Lister, Macormac, Longman, Billroth, Sands, and many others, for considering it to be the best-known antiseptic for direct application to wounded surfaces.

The bichloride gauze is made by simply saturating the cheese cloth with bichloride of mercury, 20 parts, water 4,480 parts, glycerine 500 parts, and allowing it to dry as far as the glycerine will admit. Its active agent, besides being the most powerful antiseptic of which we have any knowledge, is always at hand, is safe, permanent, pleasant to handle, and is only irritating to the extent of producing an occasional slight dermatitis.

We come now, and finally, to the absorbents which may be used to soak up and keep harmless all fluids which our internal drainage has brought to the surface. Of these I show you hygroscopic cotton and the same containing 15% of boracic acid. They will each take up, as I

have found by experiment, 16 times their own weight of water; wood-wool, 14 times; german peat, 12 times; and jute, 8 times. Dr. Weir is now testing the ordinary moss of our woods as an absorbent. After drying it in an oven to kill the insects it may contain, he finds it soft, elastic, and able to soak up about four times its weight of water. The *New York Medical Record* of last week contains a letter from Dr. Lydstone, of Chicago, advocating the use of punk or spunk, a substance used by dentists to dry out cavities in teeth. I show you a piece, part of which, when tested, was found to absorb 11 times its weight of water. I have not been able to obtain wood-wool from the paper makers here. That shown and also the peat came from Germany. Both are exceedingly cheap, costing only six or eight cents per pound in original packages. Specimens of each are shown as they come to us, others impregnated with equal parts of corrosive sublimate and glycerine in 200 parts of water, and still others, sewed in bags of sublimate gauze ready for use. The wood-wool is made from pine of non-resinous character, is soft, cottony in texture, elastic, and clean to work with. I prefer it to any thing excepting the cottons, which cost many times as much, or peat which costs about the same. Wood-wool collapses when thrown into or saturated with water. On this account the roller first applied should not cover any dressings containing it, or

the pressure may not be maintained and the result may be compromised. It has, as was recently pointed out by Lister, in the discussion at Woolwich on antiseptic field surgery, the same composition as cotton rags, which may replace it if used in sufficient mass. Dr. F. Lange, who is perhaps the best exponent of German antiseptic surgery in this country, is partial to borated cotton arranged in thick sheets and covered with sublimate gauze. I show you a "compound borated dressing" prepared as he directs.

The story of the introduction of turf, mould or peat, may be new to some here present. About four years ago a man applied to Dr. Neuber, assistant to Esmarch, in Kiel, relating that ten days before he had, while working on the moor, sustained a severe injury to the forearm. To this had been at once applied a thick coating of mould and a rude splint. On examination the wound was found free from suppuration and either united or granulating well, though there had been compound fracture of both radius and ulna, rupture of the wrist joint and extensive laceration of the soft parts. Neuber followed up this broad hint as to the value of peat, and its use has been attended by rapid and satisfactory healing of the parts it protected. A special advantage of peat is its power to absorb the gaseous products of decomposition, such as ammonia. Used as a litter for horses the same beds have, according to Dr.

Ernest Hart, been in use for two or three months. It absorbs best when slightly dampened, is soft, as you see, and very elastic.

In conclusion, I do not propose to enter into any recital of cases or statement of results. The method advised is one of the antiseptic methods, and results obtained by it belong to that system, the beneficent influence of which can be as little questioned as can be the good to mankind that followed the discovery of the hæmostatic use of the ligature, or the anæsthetic use of sulphuric ether. The materials required can all be carried in a small satchel, and all be purchased with what would be only a fair fee for their first use.

