junction of temporal and occipital bones; temperature moderately high. Death.

Autopsy.—Caries of tympanum. Pus in middle ear. Seventh nerve exposed and imbedded in pus. No mastoid disease. Meningitis.

Case 81.—*British Medical Journal*, April 14, 1888. Treated by Arthur E. Braker. Male, age thirty. Right ear. Chronic otorrhœa; lateral sclerosis of spinal cord; acute exacerbation; pain in right half of head; vomiting; epilepsy; contraction of right pupil; mastoid opened; no pus; rapid emaciation; incontinence of urine; stupor; somnolence.

Diagnosis.—Abscess in temporo-sphenoidal lobe.

Operation.—Parietal bone trephined; dura-mater incised; no pus; trephined again one and one-half inches above and one and one-quarter inches behind the external meatus; a needle was passed one and one-half inches deep, forward and inward; pus found; rubber drainage tube; iodoform dressing. Recovery.

Case 82.—*New York Medical Journal*, February 25, 1887. Treated by Abbe. Acute otitis media; acute meningitis; choked disc on same side. Death.

Autopsy.—Purulent meningitis at base of cerebrum and lower surface of cerebellum. No evidence that pus had extended from the ear. The internal auditory canal showed streaks of pus, following the course of the nerve.

Case 83.—*Archives für Ohrenheil*, vol. 26, page 84. Treated by Schmiegelow, of Copenhagen. Male. Right ear. Chronic non-suppurative inflammation of the middle ear; suddenly seized with neuralgia of all three branches of right trigeminus, followed by right facial paralysis; right choked disc; later, purulent otitis; pain; mastoid inflammation; mastoid opened; pus and granulations found; œdema of right side of face; skull trephined at posterior cranial fossa; no pus; mastoid opening enlarged backward; improvement; later, nausea; fever; headache; vomiting; unconsciousness. Death.

Autopsy.—Diffuse purulent lepto-meningitis. Abscess in temporal lobe of cerebrum.

(To be continued.)

CASES ILLUSTRATING THE MODERN TREATMENT OF WOUNDS, AND THE PRINCIPLES OF ANTISEPTIC SURGERY.

Clinical Lecture delivered Oct. 1, 1892, before the Clinical Class at the Pennsylvania Hospital.

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Gentlemen:—This morning I begin my twentieth annual course of clinical lectures in this hospital. I cannot do better than to devote the first part of my hour to day to the consideration of the method which I will follow in the treatment of wounds. Before showing you any cases, therefore, I propose making a few remarks upon the principles of antiseptic surgery, which we endeavor to carry out in all our operations. To some of you who have been in attendance upon these lectures in previous years, our practice here is well known; but others are here for the first time and are just commencing their studies; to these I may explain briefly the theory and practice of aseptic surgery, which will

avoid the necessity of repetition and of going over the same explanation time after time after every operation during the winter. Moreover, even those to whom the antiseptic dressings are no novelty may not thoroughly appreciate the principles involved, and when they attempt to practice this system for themselves they may overlook the essential part and meet with disappointment. This is very frequently the case with physicians who think that they understand how to practice antiseptic surgery, and get unsatisfactory results, which tend to bring modern wound treatment into discredit while the fault lies entirely with themselves.

For many years, I have been using antiseptic methods in the treatment of injuries and wounds after operations, and since it was first introduced into this hospital a number of years ago, I cannot say that there has been any decided change in our methods; the results have always been so satisfactory that there has been no need of change. During this period, it is true, many minor modifications and supposed improvements in detail have been brought out by surgeons; but I cannot say that I consider them as possessing real advantage. For instance, one surgeon will bake his knives for two hours before operation; another will use only dry dressings upon wounds; still another will have some special antiseptic like biniodide of mercury or lysol; but I have not found it necessary to depart from the original methods whose value has been established by many years' experience. The antiseptic method has for its object the preservation of an aseptic condition of wounds. You may ask "Why is this necessary?" Let me state at once that suppuration is a fermentation or putrefaction which goes on in wounds and which the antiseptic system is designed to prevent and protect from. Three elements are essential in order to produce this species of infection: 1. Warmth. 2. Moisture. 3. Germs.

Now, if we can exclude the germs, putrefaction will not occur, even though warmth and moisture are present; and in the same way if either of these are missing, there will be no putrefaction, even in the presence of the germs or bacteria, which, by the way, are generally present in the air, which carries them to the surface of the wounds or other places where they meet warmth and moisture, and the combination being complete, they rapidly increase. Precautions may be taken to prevent this combination so that putrefaction cannot occur, for without bacterial growth there can be no putrefaction or supuration. Let me give you a homely illustration of this fact. Here is a case of condensed milk, which is hermetically sealed. Here is warmth and moisture; but the bacilli of the air are excluded and it is impossible to ferment as long as it is sealed up; if it were to be opened, however, and the air allowed to enter, its contents would soon be attacked by putrefactive germs, which now are excluded. Here, I give you another illustration in a piece of jerked or dried beef. The bacteria can get at it and warmth is here, but no moisture, consequently it remains sweet; if it were placed in a bucket of water, it would be attacked by bacteria in a few hours. On the other hand, when we wish to preserve food in summer time we place it on ice, or in a cold place, and the germs and moisture cannot affect it in the absence of the necessary degree of temperature. The art of preserving food by excluding germs, as in canned meats,

is not altogether new since jars of preserves have been found in Pompeii, which, being hermetically sealed, had kept their contents sweet for centuries. It is evident that the ancient inhabitants of Pompeii appreciated the fact that heat and moisture would not produce fermentation, and that if the germs were excluded the preserves would keep. Then if we exclude the germs there will be no putrefaction; if we exclude moisture, there will be no putrefaction; and if we exclude warmth, there will be no putrefaction. Now, we have the germs in the air, everywhere around us. If we expose an unprotected raw surface for a very short time, germs will be deposited and in the presence of warmth and moisture, they rapidly multiply, and we will have set up the condition of suppuration, which is a form of septic infection of a wound. To prevent this infection is the problem of antiseptic surgery. In the living body, we must have warmth and moisture, we are obliged therefore to direct our efforts towards the exclusion of the germs and to the prevention of their growth by means of antiseptics.

You may ask, "What are antiseptics?" In brief, they are agents which destroy the vitality of germs. We have many remedies of this kind at our command, and new ones are constantly being introduced, but we have held fast to the one we first used, the bichloride of mercury, in solution in distilled, or recently boiled and filtered water. It is true that objections have been raised to its use because it occasionally causes irritation in a delicate skin and when freely used upon a large wound it may be absorbed and produce symptoms of mercurial poisoning; occasionally a nurse who has her hands frequently in it may be affected by it and have to lay off for a couple of weeks or so, but with ordinary care such accidents rarely happen. Of course, in abdominal operations, we do not use bichloride solutions; if we should sew up the abdomen and leave a couple of ounces of this solution within the peritoneal cavity, we would surely have mercurial bichloride poisoning; but for general use on the surface of the body and for small wounds, no such accident need be thought of. For the preliminary washing off of the skin a solution of $\frac{1}{1000}$ is used; for wounds a solution of $\frac{1}{2000}$ or $\frac{1}{4000}$; except in poisoned wounds, where we may apply a solution of $\frac{1}{500}$.

Here is an illustration of the application of this system, in the patient now before you:

"Frank B., 14 years of age, a well developed boy, who was injured by machinery on Sept. 23, and was at once brought into this hospital. His left arm was crushed and the tissues lacerated nearly up to the shoulder. On the day of admission, amputation was performed in the upper third of the arm. Previous to the operation the surface of the skin of the injured arm was scrubbed clean with soap and water, and afterwards washed with ether and finally with bichloride solution." The stump is a little ragged because I had to make the most of what tissue was left. The dressings applied a week ago, I will now remove. You notice there is a little moisture due to oozing from the wound, but not a drop of pus. The wound is perfectly sweet. My only object in exposing the wound now is to remove the drainage tube which was put in at the time of operation in order to prevent retention of the secretions in the deeper parts of the wound, and which being no longer needed can be removed and the wound allowed to

heal up. Except along this track, the wound has united by first intention and the gut sutures have been absorbed. There are no ligatures to come away, because the gut ligatures which were used have also been absorbed. I find here a small spot of dead cellular tissue at the upper part of the wound, which was probably devitalized by the injury. The dressings will be applied as at first, and I have brought him before you in order that you may see the details of the method. The great object in view is to secure cleanliness, and all the dressings must be scrupulously clean; the antiseptic agent is only a help in this direction, the real essential condition being cleanliness. This is proved by abdominal operations where we are obliged to do without the bichloride and rely upon recently boiled, sterilized water and accomplish the object in this way. The bichloride, however, is a very efficient antiseptic; should any germs happen to get into the dressings they could not live in such an atmosphere.

Before touching the dressings or the patient I carefully scrub my hands with soap and hot water and follow this by ether and the bichloride solution ($\frac{1}{500}$). All instruments and utensils have been sterilized by boiling water. The stump is also rendered aseptic by douching and scrubbing with bichloride solution and washing with ether. Over the line of the incision is placed some varnished silk protective in order to facilitate escape of the discharge if there should be any. This is placed directly along the wound, and then the surface is well dusted with iodoform. I do not think that iodoform is an antiseptic, but it favors healing and keeps the wound clean. Except for the expense, I would prefer aristol for this purpose, on account of its freedom from the peculiar odor which is the great objection to iodoform. Upon the well dusted surface, we place a compress of ordinary gauze wet with a solution of bichloride ($\frac{1}{2000}$), several thicknesses being used. The dressings are then confined by a roller bandage, also of gauze wet with the same solution. A layer of cotton batting, or dry absorbent cotton, is now used to envelope the stump, and a roller bandage applied to keep everything in place. These dressings need not be disturbed for a fortnight. This is precisely the same mode of dressing wounds which I used years ago, and which, I find, fully accomplishes the purpose of keeping germs out of the wound and preventing infection and suppuration. I have used it in all amputations, even of the thigh, resections, and other operations, and even these large wounds heal by first intention. It is wonderful that such serious injuries should be followed by so little disturbance of the system and so few symptoms. In this lad, for instance, the brachial plexus was exposed in the wound and the median nerve lacerated and pulled out. I can only attribute the favorable course of the case, to the prompt performance of amputation and the prevention of fermentation in the wound by the use of antiseptic dressings.

I will now show you a different kind of a case in which an operation will be done for removal of a tumor of the breast. While the patient is being etherized, I will read you her history:

"Jane T., a widow, 68 years of age, a seamstress by occupation, was admitted yesterday, Sept. 30. She states that four years ago having previously enjoyed good health, she fell and struck her right arm, causing dislocation of the shoulder. Shortly afterwards she noticed the presence of some lumps in her right

breast. In June, 1889, she was admitted into the hospital and the breast was found to be cancerous and was removed by my colleague, Dr. Hunt. She made a good recovery; but about a year ago she observed a growth in the cicatrix, which slowly increased until it attained its present size, which is that of a good sized orange. It is purple in color, hard, has many vessels visible upon the surface, and has begun to ulcerate. It causes constant pain which at times is sharp and lancinating. Her general health has declined, she is quite thin and her appetite is poor. Her urine has been examined and found free from sugar or albumen." Here is a fungoid growth following an amputation of the breast and is undoubtedly malignant. When we take into consideration the age, sex, and history of the patient, and the locality of the growth, there can be no doubt as to the diagnosis being correct. The mammary gland in the female is a favorite site for carcinoma, and this is especially likely to occur where the breast has been previously affected by inflammation, or "gathered breast," during lactation, in earlier life.

In operating, the field is cleaned as in the preceding case, with soap and water, ether, and bichloride solution, the axilla having been shaved just before beginning operations. The growth is then removed by being included between two curving incisions. It is better in these cases to tear out the growth, cutting as little as possible, so as to thoroughly remove it. All hard spots in the adjacent muscles or cellular tissue are also removed, and all suspiciously hard lymphatic glands found in the neighborhood. Bleeding vessels are at once seized with the hæmostatic forceps and subsequently secured by applying catgut ligatures. I have the surface frequently irrigated by the weak bichloride solution ($\frac{1}{1000}$) during the operation. Having found that the old cicatrix is hard, I will also remove that. We have now a large gaping wound over which the skin can be brought as in a plastic operation. As the wound is superficial, a drainage tube will not be required. Catgut, interrupted, double-knotted sutures are employed, the protective is placed over the incision, iodoform dusted on freely, including the arm pit, and the gauze compress bandage, cotton and retaining roller used as on the previous case. The arm was directed to be kept to the side, to prevent traction upon the sutures, and an anodyne directed to be administered.

The modern treatment of tumors of this kind is repeated operation. There are cases, in which there has been a recurrence after extirpation twelve or thirteen times, and life has been prolonged many years. Such growths should be excised as early as possible, and the operation repeated as often as it returns. I would operate in this case, even if I knew that her liver had been invaded by secondary growths, for the reason that this tumor is beginning to ulcerate, and in the course of a few weeks, the entire surface would be converted into a foul ulcer, having such a decided odor as to make her associates very uncomfortable, so that her existence would be almost unbearable; while her strength would be undermined by the discharges, and possibly by hæmorrhages from this foul, fungous growth. This operation will cover the surface with skin and get rid of this mass of malignant growth.

While the rule is to operate, I must acknowledge that it is also the rule that the growth will sooner or later return. In my own experience of nearly thirty

years in this hospital, the longest period of exemption after operation which I have seen was eleven years. In a letter which I received from Professor Agnew a short time before his death, he informed me that seven years was the longest period any of his patients had survived amputation of the breast for mammary carcinoma.

HOW TO STERILIZE MILK.—We have recently been conducting experiments upon this subject, with results so satisfactory that we are glad to be able to communicate them to our readers. The first experiments were made with a tin receptacle capable of resisting a pressure of 25 lbs. This was partly filled with water and placed in boiling water, to the action of which it was exposed for half an hour. The pressure indicator showed no very considerable increase in pressure within the closed receptacle. We then tried boiling the tin vessel in a saturated solution of salt in water, when the pressure, as indicated by the pressure gauge, rose to 4 lbs. This was the result which we expected. We accordingly proceeded to a further experiment, which consisted in boiling milk tightly sealed in strong bottles in a saturated solution of salt. Milk sterilized in this way, by boiling in the salt solution for half an hour, will keep perfectly for an indefinite length of time. We opened, a few days ago, a bottle of milk which had been thus sterilized last June (1891), and found it to be as fresh as when placed in the bottle. It is only necessary to take the precaution to allow the solution of salt in which the bottles are boiled to cool before removing the bottles. If the bottles are removed from the solution while hot, they will almost instantly burst. The vessel containing the bottles of boiling milk should be set aside and allowed to cool gradually, when the bottles should be removed and placed in an ice chest or an ordinary refrigerator. Ordinary soda-water bottles are excellent for the purpose; or beer bottles may be used. Ordinary corks may be used for the purpose, but they should be previously boiled for half an hour. They should be pressed in tightly, and fastened with wire or with a patent fastener. After the bottles have been cooled and removed from the boiling kettle, the tops should be carefully dried and, if corks are used, covered with sealing wax, such as is ordinarily used for canning purposes.

The efficiency of the salt solution is due to the fact that its boiling point is 227° F., while that of boiling milk is less than 200° F. By using different salts, a still higher temperature may be attained. For example, a saturated solution of carbonate of potash, or saleratus, boils at a temperature of 275 F., while a saturated solution of chloride of calcium boils at 355° F. These high temperatures are, however, unnecessary.—*Bacteriological World*.

ON PERIPHERAL NEPHRITIS IN TYPHOID FEVER.—Dr. Judson S. Bury arrives at the following conclusions from a consideration of such facts as have been recorded, and from a study of two cases which have come under his own observation: "In one set of cases we may suppose that the action on the nerves is too slight to give rise to outward manifestations, or that these are masked by the general symptoms of the fever. In another set of cases the toxic influence on the nerves appears to be revealed by a series of irritative phenomena, such as neuralgic pains, cutaneous and muscular hyperæsthesias, exaggerated reflexes, and cramps and contractures of various muscles; while, in a third group of cases, the presence of an atrophic paralysis, its distribution, progress, and associations, leave little doubt on the mind of an observer that he has to deal with a genuine parenchymatous neuritis, and frequently with one of wide distribution throughout the body."—*The Medical Chronicle*.

GLYCERINE IN HEPATIC COLIC.—Dr. Ferrard concludes a communication to the French Academy as follows: 1. Glycerine administered by the stomach is absorbed in its natural state by the lymphatics, especially by the vessels which lead from the stomach to the hilum of the liver, and to the gall-bladder; it is even found in the suprahepatic veins. 2. It is a powerful cholagogue, and an excellent remedy for hepatic colic. 3. In relatively large dose (20 to 30 grammes), glycerine brings an end to the attack. 4. In small doses (5 to 15 grammes), taken each day in a little alkaline water, it prevents new attacks. 5. Glycerine, without being a lithotriptic, is nevertheless a valuable agent in biliary lithiasis.—*Journal de Médecine de Paris*.