

left; reacted to light. There was rigidity of the neck; no paralysis; no Kernig sign. Pulse was 96; axillary temperature 99; respirations 28. Lumbar puncture showed diplococci answering the description of the pneumococcus; extracellular.

December 2, pulse was 120; axillary temperature 100.3; respirations 48. There was coma; slight icterus; no eruption; retraction of the head and rigidity of the neck; joints as before; no paralyses. Bilateral choked disc was more marked in the left.

December 3, pulse was 120; temperature 100.3 per rectum; respirations 60. Resonance over both lower lobes was impaired; more marked in left than right; breath-sounds loud and accompanied by a few crepitant râles. The heart was not enlarged; both basal tones were pure and accentuated; pericardial friction. There was slight external strabismus; right-sided ptosis; head turned to the right; beginning herpes labialis on the right side. Left wrist was punctured, yielding a few drops of thick whitish mucopus, showing pneumococci. Blood smears show the same organism. Lumbar puncture was repeated, but no fluid obtained.

Diagnosis: Diffuse infection by the pneumococci, causing meningitis, pericarditis, and multiple arthritis.

Autopsy, by Dr. Hektoen, showed a small amount of purulent fluid in the pericardium; lungs showed hypostasis below and an old healed tuberculosis in the right apex. The kidneys showed an acute degeneration; brain and cord, diffuse purulent meningitis, and multiple arthritis. Bacteriologic examination showed pneumococci in the blood, pericardium, meninges and joints.

CASE 6.—J. M., male, a patient of Dr. Billings, entered March 2, 1899. He was comatose and unable to give any account of himself.

Examination showed right eye closed; left held open; heart negative. Lungs showed dulness, with high-pitched breathing over the left lower lobe with friction. Abdomen: Liver was palpable; spleen, not. Pulse 80; temperature 102 in the axilla; respirations 32. All rose gradually till death on the sixth day.

Lumbar puncture yielded a diplococcus which by stain, culture and inoculation proved to be the diplococcus of pneumonia. Anatomical diagnosis at autopsy: Purulent cerebrospinal meningitis, acute endocarditis, pulmonary edema, cloudy swelling of the kidneys.

(To be continued.)

[This series of papers on Pneumonia will be completed next week when discussion will follow.]

## ASEPSIS OF HANDS OF THE SURGEON AND SKIN OF THE PATIENT.\*

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1. Ideal asepsis has become an established fact as far as all objects are concerned which stand boiling well.

2. The atmosphere has no pernicious effects on wounds, as pathogenic bacteria fortunately have a tendency to settle, so they can only come into contact with a wound when the dust in the room is immoderately stirred up. To avoid this possibility, the air in the operating-room is saturated with moisture, at least during two hours before the operation. This can be done simply by originating steam in a kettle.

3. Asepsis of the hands of the surgeon as well as of the skin of the patient is still imperfect, total destruction of the bacteria of the skin being practically impossible.

4. Asepsis must be attained principally by physical, especially mechanical, methods. Chemical processes should play but a very subordinate part.

5. The means with which asepsis should be attained must be aseptic. This refers particularly to the water used for washing, and the soap, which must have been prepared by the boiling process. If brushes are used special care has to be taken. They can only with

difficulty be rendered aseptic, thorough cleaning impairing their usefulness.

6. The surface of the human body is impregnated with many different bacterial species. Some of them adhere to the skin surface, others are imbedded in the dried cells of the epidermis. They do not need destruction, but removal. This can be done by simple mechanical means, viz., scrubbing with soap and hot water. Two kinds of soap are used for this purpose. First with linen compresses, dipped into fluid soap, which is mixed with soft sand (Stuttgart sand), the skin is energetically scrubbed for two minutes, a stream of very warm water always flowing over the surface. Then aseptized green soap is used in the same manner, for the same length of time. Particular attention is given to the folds and creases of the skin and to the subungual space. The latter requires the use of a nail-cleaner and energetic wiping with the sand-soap. Now the skin is dried with an aseptic towel and rubbed with a gauze compress, saturated with 50 per cent. alcohol for about one minute. The alcohol is used for the purpose of dissolving the fat of the skin, which shelters the bacteria; and by dissolving the shelter, the bacteria are removed at the same time. Whether washing with bichlorid of mercury is needed after these procedures is open to discussion; it will certainly not do any harm.

There is no doubt that the surface of the skin can thus be rendered absolutely aseptic by this method, as well as by a few other similar ones. But there remain still a number of bacteria imbedded in the glands of the skin—the secretions of which offer a favorable soil for their development—which cannot be removed. But they will do as little harm as the dust in the room, if cared for properly, viz.: In the incising of the skin a number of glands are naturally dissected, and the bacteria contained by them are freely exposed. The dissecting-knife also comes in intimate contact with them and must therefore be considered infected. This undeniable fact explains thoroughly the so-called supuration of the stitch-canal, as well as the bad reputation of the catgut, and many cases of infection under the supervision of the "extremely careful aseptic surgeon." It also explains supuration after most laboratory tests, carried out under "the most minute aseptic precautions."

How do we get around this salient point?

The knife used for the skin-incision must not be used for further incisions.

The wound-margins of the skin are covered with sterile napkins, which are fastened to the wound surface with small miniature forceps, so that the skin-wound is not touched at all during the subsequent manipulations.

Surgeon and assistants wear sterilized linen gloves. The surgeon changes gloves after the skin-incision is completed.

For uniting the wound-margins of the skin the subcutaneous method should be preferred. The superficial surface of the skin of the patient had been rendered aseptic beforehand by having been given a warm bath twenty-four hours before the operation, a rigid scrubbing with soap and shaving having taken place at the same time. A poultice of green soap had been applied to the skin-surface for twenty-four hours in order to secure thorough permeation of the epidermis, which is macerated to some extent by this procedure. The surface being aseptic, and the skin-glands, which contain bacteria, being *hors de combat*, it becomes evident that the only possible source of infection remaining then,

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would be the surgeon's hands. As explained before, the bacteria on the skin-surface can be removed, consequently also those of the surgeon's hands. But the bacteria in the skin-glands can not. But as the surgeon's skin is not incised, the bacteria sheltered by his glands are not exposed, provided there are no forcible efforts made to dislodge them. These facts teach us:

The advisability of wearing aseptic gloves.

In case gloves interfere with the technic of a delicate operation, the hands should come in contact with the wounded area as little as possible, most manipulations should be done by instruments, for instance a needle-holder should be used while sewing, instead of taking the needle into the hand—thumb forceps should be used for holding tissues instead of holding them with the fingers.

The advisability of operating as quickly as possible.

The necessity of avoiding forcible manipulations, especially blunt operating, which is so much favored by some surgeons under the pretense of blood saving.

7. The head should be covered with a cap, as, in bending over the field of operation, it often happens that the heads of the surgeon and his assistant come in contact.

8. Long beards are unsurgical.

9. The air expired by the healthy contains no bacteria deleterious to wounds. If the surgeon should suffer from rhinitis, tonsillitis, etc., he should best omit operating, or at least use proper local precautions.

11. Bacteriologic tests of aseptic methods, gained on artificial soil, cannot be transferred upon biologic processes, the living cell reacting against bacteria differently from gelatin, agar or serum.

## POSTPUERPERAL SEPSIS.

INDICATIONS FOR AND OPERATIVE TREATMENT THEREOF.\*  
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The comparative frequency with which postpuerperal sepsis occurs even at the present time, with our knowledge of asepsis in surgery and obstetrics, calls for some discussion as to the best method to combat this serious and dangerous affection. In order to arrive at the best means of disposing of the sepsis and the prevention of an extension of the infection, we must consider the source and cause of the infection. The report of the following case demonstrates how the destructive changes consequent on puerperal sepsis will at times become circumscribed, and give the surgeon the opportunity of both saving life and performing an ideal operation.

TUBO-OVARIAN ABSCESS (R) WITH INFECTION OF UTERUS FOLLOWING CHILDBIRTH; UTERUS, RIGHT TUBE, RIGHT OVARY AND LEFT TUBE REMOVED.

A. S., aged 28 years, married, was born in Germany. Her mother died of pneumonia at 70; father, two brothers, three sisters, and husband are living and well; has been married eight years; four children dead, two living and well. The first child was born at term, the second, third, fourth and fifth were miscarriages, all occurring between 6½ and 8½ months. The last child is living and healthy.

*Previous History:* She had a sprained ankle ten years ago; was never sick until two months after the first child was born—seven years ago—when she had pneumonia and was sick three weeks, and she has never felt well since; she has had more or less constant cutting

pain in the abdomen and backache ever since her first child was born.

During her last pregnancy she had an inflammation of the uterus for which she received local treatment, and she says that every time she douched herself large pieces of membrane were expelled. The childbirth was easy and she felt well for two days; then she complained of a dull pain on the right side of the uterus. The pain increased from day to day. This pain was much worse at night, preventing sleep. Appetite was very poor. She got out of bed ten days after the birth of the child, but could not walk straight because her hip pained her. She remained out of bed until two days before admission to the German Hospital, five weeks after confinement.

When admitted she had a fever and rapid pulse and was very weak. The abdomen was tender but especially marked on the left side. Vaginal examination revealed a very painful mass on the right side. The left side was not so tender and no prominent mass could be felt. The uterus was enlarged and boggy and a slight laceration of the cervix was also present. She had vesicle irritation one week before.

Under ether, an incision was made through the right rectus muscle, the peritoneum opened and the intestines packed back with gauze. The right tube and ovary were enlarged and the seat of a tubo-ovarian abscess as large as a lemon, which was ruptured in delivery. The tube and ovary had been destroyed by the inflammatory exudate and were therefore removed. The uterus was enlarged and the seat of multiple foci of suppuration and was also removed. The left tube being diseased was removed, leaving the ovary which was normal. The patient made a good recovery.

The question of puerperal sepsis is, we are forced to admit, a most important and too often a serious condition. The different ways in which the destructive consequences of this unfortunate condition demonstrate themselves are too well known to every active abdominal surgeon. There are three forms of puerperal sepsis from an anatomic standpoint, all of which are infectious and due to abrasion of the mucous membrane lining the cervical canal and uterus. They are endometritial, metritial and the parametritial. The most fatal form is the metritial. It is characterized by multiple foci of infection and abscesses. The endometritial is most amenable to treatment, viz., curettement of retained decidua and thorough disinfection of the uterine canal. The parametritial form is frequently mistaken for so-called pelvic cellulitis, a name which means nothing, for all the so-called cases of pelvic cellulitis are infective processes and lead to abscess formation.

It is a well-known fact that postpuerperal sepsis is of two varieties, that due to putrefactive changes in the retained portions of the decidua, afterbirth, or of blood clots, and that which is the result of the introduction of micro-organisms by means of the denuded endometrium, through the sinuses or as the result of injury to the external genitalia following the use of instruments during labor. The first cause, that produced by putrefaction, has a tendency to localize foci of infection in the immediate neighborhood of the putrefactive changes where nature has protected to a certain extent by a barrier formed by reactive inflammation. In the latter condition sepsis, the result of micro-organisms, a more general septic condition, is apt to be present and is usually produced by dirty instruments in attempted abortion or premature labor.

The attempt on the part of Nature does not always

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