A nurse's guide for the operating room / by Nicholas Senn. Pub. under the direction of the sisters of charity, St. Joseph's hospital...Chicago.

Contributors

Senn, Nicholas, 1844-1908.
Augustus Long Health Sciences Library

Publication/Creation

Chicago : W. T. Keener & co., 1905.

Persistent URL

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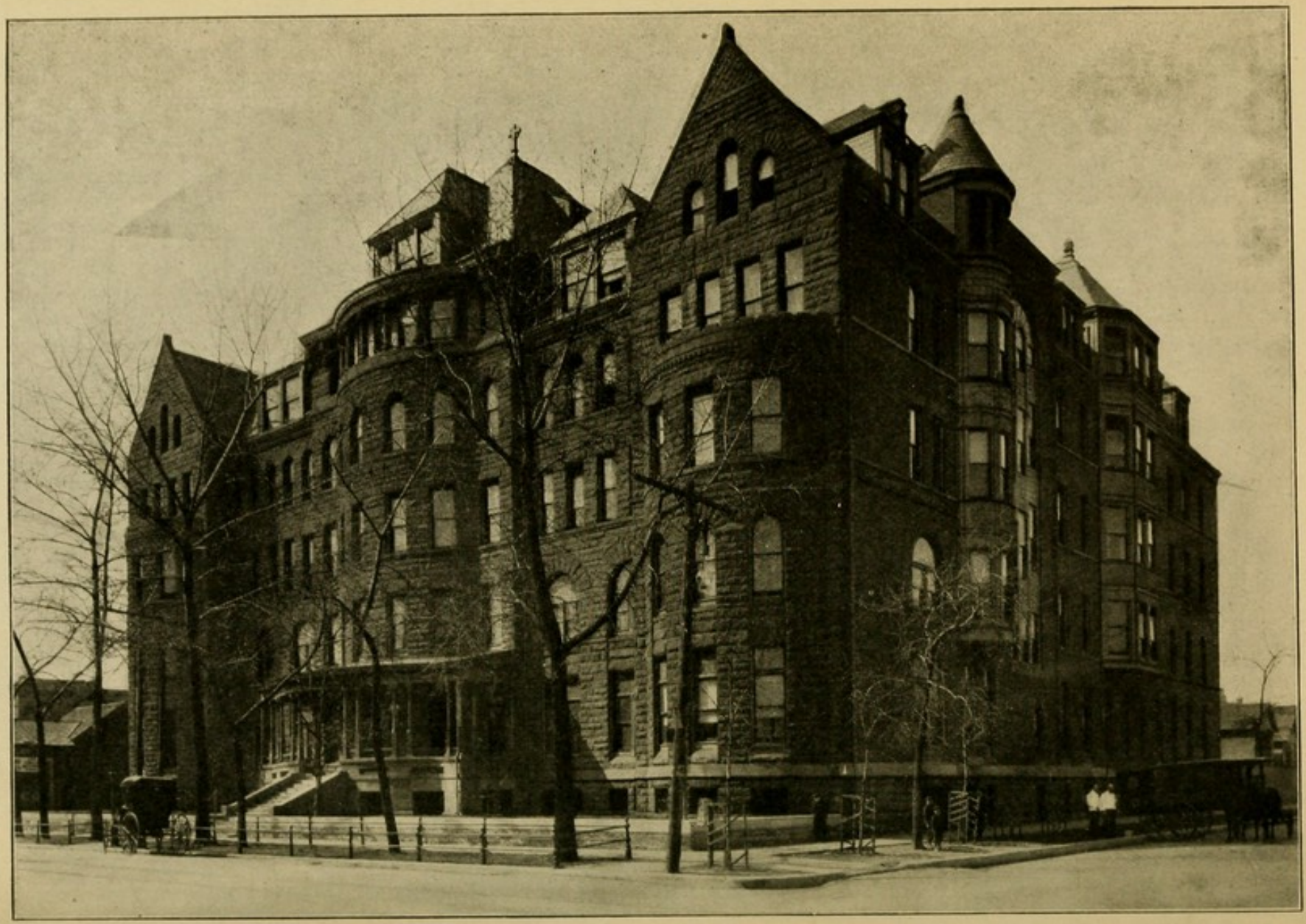

ST. JOSEPH'S HOSPITAL, GARFIELD AVENUE, CHICAGO

Conducted by the Sisters of Charity of St. Vincent de Paul

A Nurse's Guide

FOR THE

Operating Room

Second Edition, Enlarged and Revised.

BY

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Published under the direction of the Sisters of Charity, St. Joseph's Hospital, 360 Garfield Av., Chicago

W. T. Keener & Co. :: :: Chicago, Ill.
Number Ninety Wabash Avenue

M. L. A.

PREFACE TO SECOND EDITION.

The rapid sale of the first edition and the favorable comments of the medical press have shown that this little book has found a legitimate place in the literature on nursing.

The scope of the book has been enlarged, the text greatly increased, and many new illustrations have been added.

The author bespeaks for the second enlarged edition the same favorable reception as was accorded the first.

N. SENN.

CHICAGO, March, 1905.

PREFACE TO FIRST EDITION.

This little book is intended to serve as an aid to the trained nurse in her work in the operating room. The text is made up largely of abstracts of lectures delivered by the Author to the pupils of the Training School of St. Joseph's Hospital, Chicago.

The principal aim of this "Guide" is to instruct the nurse in as concise and thorough a manner as possible in the details of her responsible duties before, during, and after operations. The technique of asepsis is given a prominence commensurate with the importance of the subject. The most important wound complications are mentioned and briefly described, so that the nurse may recognize them and give timely warning to the attending surgeon. Formulæ for the most reliable antiseptic solutions in common use are given. In giving the directions for preparation for the most important major operations, a list of instruments is given and ligature, suture and dressing material are described.

It has been deemed advisable to append illustrations of instruments in general use, so as to familiarize the nurse with their names and use.

N. Senn.

Chicago, April, 1902.

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CHAPTER I.

THE SURGICAL NURSE.

In the exhumed part of Pompeii stand, as one of the most interesting landmarks of the former famous city, the remains of the venerable Temple of Æsculapius, the fabled god of the art of healing. With the ill-fated city, the temple was buried under the ashes and pumice stone which issued in hot streams from the angry crater of the enraged Vesuvius during that awful night, November third, in the year A. D. 79.

For nearly two thousand years this ancient temple has been shut out from the eyes of the world. Its altar has received no offerings; its magnificent halls had been silent and in utter darkness until they were recently opened to a new world, a new people, as sacred and interesting objects of antiquarian and historical study. The priests and worshipers have disappeared from the scene; their places have been taken by an idle, curious, gossiping crowd, with guide books in their hands.

Those who did duty in this sacred place, and those who were in search of health and relief from pain on that afternoon, when the infuriated volcano began his deadly work, shared the fate of the other inhabitants of the unfortunate city. They either fled in haste for a place of safety, or were entombed in the sepulchre of fire and smoke. Fortunately time and the destructive elements have dealt gently with this wonderful temple and its precious contents.

In the center of the capacious ante-room stands the sacred altar of pure white marble, beautifully and artistically carved, at which the disciples of Æsculapius served in the interests of suffering humanity. The ap-

pearance of this altar indicates that it was used for a long time before the worship in the temple was so suddenly interrupted by the murderous elements, which the volcano, in a sudden angry passion, directed towards the doomed city.

This temple is a type of the early, primitive hospital. Its altar, its halls, its roof, were devoted to works of mercy and charity. It is here that the sick, the maimed, the injured, and the mad, sought relief. As I stood behind the altar where so many devoted disciples of Æsculapius had ministered, it seemed to me that I could hear the pitiable appeals of the suffering Pompeians, and the sick, who had come here from afar, in a last effort to be healed; and the sweet words of consolation and encouragement of the officiating priests, engaged in earnest prayer for the bodily well-being of their supplicating clients.

The modern hospitals are the new temples of Æsculapius; the physicians are the priests, and the trained nurses the priestesses. The altars and the sacrifices have disappeared, but the same spirit of unselfishness, charity, humanity and devotion remains, which continues to inspire and actuate the hearts and dictate the deeds of those who are engaged in the noble work of bringing sunshine into the homes darkened by the shadows of disease and death.

There is no nobler calling than that which has for its objects the prevention of disease and the care of the sick and disabled. There is no better indication of the degree of civilization of any nation than the character of the institutions devoted to the care of the sick and the poor. There is no profession that dispenses charity more freely and willingly than the profession of medicine and the one so closely allied to it, the profession of nursing.

Of the three great virtues—faith, hope and charity—charity is the greatest, and charity in its highest, noblest

sense is what characterizes the daily work of the true physician and the faithful nurse.

The evolution of hospital construction has kept abreast with the revolutionary progress of the science and art of medicine during the last quarter of a century. Modern medicine and surgery have created a wide field for skillful, scientific nursing. The trained nurse has become a necessity to the physician and the right arm of the surgeon. It is the trained nurse who is in constant touch with the patient and observes and records the progress of the disease and carries out the orders of the attending physician. It is the trained records the progress of the disease and carries out the necessary preparations for an operation and in conducting the after-treatment.

The improved results in the treatment of disease and the low mortality in operative work at the present day are due to the progress which the art and science of medicine have undergone during the last twenty-five years, and the co-operation between the physician and surgeon and the growing army of trained nurses.

Nursing is woman's special sphere. It is her natural calling. She is born a nurse. She is endowed with all the qualifications, mental and physical, to take care of and comfort the sick. Her sweet smile and gentle touch are often of more benefit to the sufferer than the medicine she administers. The dainty dishes she knows how to prepare, as a rule, accomplish more in the successful treatment of disease than drugs. Her sense of duty and devotion to those placed under her charge are seldom equaled by men. This became more apparent to me during the late Spanish-American war than ever before. The same impressions were made upon me in comparing the work of the Sanitary Corps and the trained female nurses during the Graeco-Turkish war.

The sick or wounded soldier, far away from home, relatives and friends, realizes keenly the superiority of the female over the male nurse, and especially is this

the case if his illness be tinged with homesickness. It is under such circumstances that the professional female nurse is greeted in camp and field, on board ship and in the hospital as an angel of mercy, and every look and move she makes are of the keenest interest to the expectant sick. For the time being she takes at the bedside the place of the devoted wife, the loving mother or the dear sister. She watches the progress of the disease by day and throughout the long nights, and her heart rises and gladdens with the approach of symptoms which denote improvement, while deep sorrow and tender sympathy take possession of her soul when the shadows of death lengthen, despite her heroic efforts in battling with an unconquerable disease or a mortal wound.

Never does the trained female nurse appear grander and nobler than when ministering to the sick and dying of an army in active warfare.

The American woman, above any other, is peculiarly fitted for such a trying and onerous post of duty. She is enthusiastic, energetic, tireless, devoted and, more than all, intensely patriotic.

The profession of nursing is following very closely the footsteps of civilization to the remotest parts of the world. The presence of the educated female nurse in hospitals and communities is almost a sure indication that the patients she serves are under the care of progressive medical men.

In the operating room the surgical nurse has become a necessity. It is the surgical nurse and the appliances for asepsis that must be credited to a large extent with having minimized the complications of postoperative and accidental wounds. There are specialties in nursing as there are specialties in medicine and surgery. The successful specialist must begin his professional career as a competent general practitioner, from which position he elevates himself in the direction for which he has a special aptitude. So the surgical

nurse is recruited from the ranks of general nurses in virtue of a special aptitude for surgical work. Every woman is in possession of some of the qualities requisite for nursing, but the aptitude for such a calling varies greatly in degree. With some women nursing is a natural vocation. They are born nurses. They have inherited a natural aptitude for the care of the sick. Their inborn gentleness, good judgment, patience, perseverance and devotion to their work are such that, with very little training, they become reliable and competent nurses. From what I have seen of the profession of nursing in various parts of the world I have come to the conclusion that this class of nurses is rather the exception than the rule.

More frequently the desirable qualities of a nurse have to be improved by hard study and careful training before she has acquired the necessary qualifications for the sick room. I need not say that many of our graduate female nurses have made a serious mistake in the choice of their vocation in life, as no amount of study, training and experience can make up for the lack of those qualifications so desirable and essential in a good nurse. The surgical nurse is called upon to perform the most responsible and the most important functions pertaining to the profession of nursing, and for this reason alone, if for no other, she must be in possession of superior intelligence, tact and good judgment far above the average general nurse.

It will not be amiss to emphasize a few of the most important qualities which the surgical nurse should possess.

Physically she must have the strength and power of endurance which her exacting and often onerous duties demand. Her special senses should be intact, as all of them will often be severely taxed in the daily routine of her work. Her preliminary education must be above the general average to prepare her adequately for her professional studies and the minutiæ of surgical train-

ing. She must be endowed with no ordinary degree of common sense and good judgment, without which all her knowledge will often fail her, in cases where prompt action on her part may be the means of saving life, whereas hesitation and uncertainty may prove disastrous. Deep knowledge and a well-balanced mind beget moral courage and steady hands. Superficial knowledge and a high-strung nervous temperament are at the bottom of indecisive and uncertain action. A good memory is indispensable—forgetfulness, dangerous. A keen foresight prevents many bitter after-thoughts and agonizing regrets.

Punctuality is an essential quality of a reliable surgical nurse. The punctual nurse is present at the expected time, has the preparations for an operation completed at the hour fixed by the operator; is to be found at her post when the surgeon makes his visits, administers the medicines and nourishment, takes the temperature and records her observations with the regularity of a clock.

Reliability is another feature absolutely necessary in the make-up of the many good qualities which a trained surgical nurse should possess. Unless a nurse is reliable she can not be trusted. It is the reliable nurse in whom the surgeon has full confidence. Should she make a mistake, she has the moral courage to acknowledge it to the surgeon, who will respect her for her candid, honest conduct. Her bedside records must bear the same stamp of reliability.

The reliable surgical nurse is always in readiness and prepared when her services are needed. She performs her work with forethought, systematically. In making the antiseptic solutions and in administering powerful drugs she never omits to carefully inspect the labels so as not to commit serious, if not fatal, mistakes.

The experienced surgical nurse has become fully aware of the uncertainty of diagnosis in many surgical

cases, and, therefore, in making preparations for a certain operation uses her foresight and is prepared when, during the course of an operation, conditions are revealed for the removâl or correction of which, additional instruments might be required.

During an operation the surgical nurse not only takes her legitimate part in handling the instruments, ligature and suture material, but watches every move of the operator and assistants, and if anything occurs that might frustrate her aseptic precautions she removes the contaminated instrument, suture or ligature, or silently places a basin containing an antiseptic solution in a position where the guilty party can not escape it. Such prompt, silent action speaks stronger than words and is less objectionable to those who, during the strain of an operation, may have been unconscious of an act of omission or commission in the employment of aseptic precautions.

In critical operations the deliberate, cool-headed nurse is a source of indescribable comfort to the surgeon, and her prompt actions and silent suggestions are not infrequently the turning point from an apparent defeat to a crowning victory. The soldiers who have been in the heat of many battles and who have done most in thinning out the lines of the enemy never speak of their deeds of heroism; and so the nurse who has done such signal service never speaks of her work boastingly, but is content with the consciousness of having done her duty.

In private practice the surgical nurse must be resourceful. She must know how to convert a kitchen, dining or living room into an aseptic operating room in the shortest possible time and by the simplest and safest means.

In emergency cases, in the absence of aseptic dressing material, she must be conversant with procedures, the employment of which will, in a short time, furnish safe and efficient substitutes from materials which are to be

found in any household. She must know how to extemporize an operating table and to make kitchen and tableware answer the purpose of the elaborate outfit of a well-equipped operating theater, without increasing the risk of infection.

An ideal surgical nurse talks little, hears much, and makes no unnecessary noise. She is modest, diligent, courteous and pleasant, but can be firm and determined at the proper time. Hilarity, if she has any, she leaves at the threshold of the sick and operating room. She is dignified on all occasions and is never unmindful of her position in life, serving the sick and assisting in the noblest of all professions.

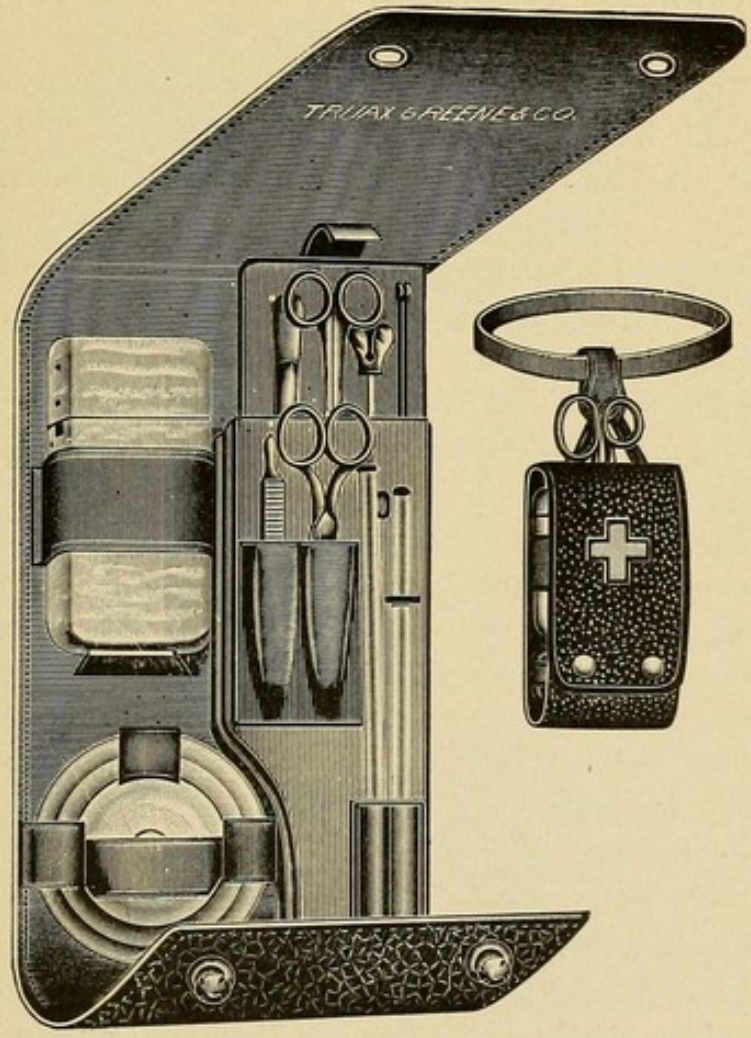
She realizes to the fullest extent the responsibility which rests on her when called upon to make preparations for an operation. She is fully aware of the fact that unwarranted haste or the slightest oversight or negligence might become the cause of grave complications, or even death, although the operation might be performed faultlessly and by the most expert surgeon.

The ideal surgical nurse must be progressive. She must keep pace with the improvements and advances which are constantly being made in her profession, which means that she must be studious, familiar with new text-books and the current literature on nursing. She should spend most of her leisure time in acquiring more knowledge, rather than in places of amusement.

Fully imbued with the importance and responsibility of her vocation in life, she will make strenuous efforts to increase her usefulness to the patients under her care and the surgeons she assists. In contact with her patients, she combines sympathy and gentleness, with firmness. Her well-poised temper brings cheer and hope into the sick room, and her dignified conduct commands respect and submission from all classes and sorts of people—rich and poor, educated and ignorant, young and old.

Finally, the ideal nurse is best known by her devotion to her duties. She finds her greatest pleasure in her work, and her highest ambition is success in her chosen profession.

Surgical Nurse.



Senn's Chatelain for Nurses.

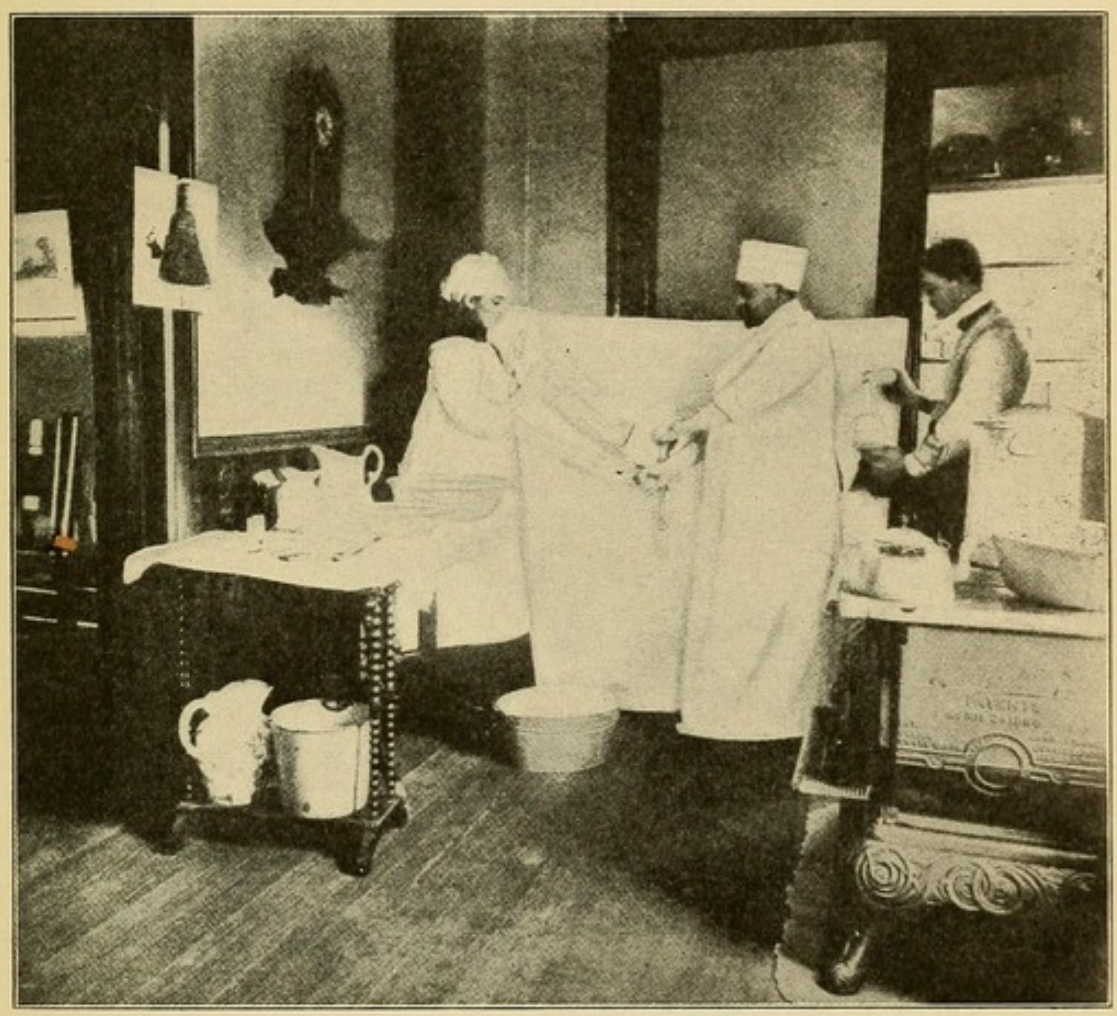
CHAPTER II.

PREPARATION OF OPERATING ROOM IN A PRIVATE HOUSE.

In private homes a room is to be selected that is least frequented, and very often the kitchen will recommend itself as the best for this purpose. Carpets, curtains, pictures and all unnecessary furniture must be removed. If time permits, the disinfection of the empty room should be commenced by fumigating with sulphur dioxid for 12 hours. Burn 3 pounds of sulphur for every 1,000 cubic feet of air space in the room. The sulphur must be burned in an iron kettle placed in a wash tub partly filled with water, and doors and windows should be tightly closed to prevent escape. After the expiration of the 12 hours, or if time does not admit of fumigation, ceiling, doors, floors, walls, windows or blinds and all objects in the room must be scrubbed thoroughly with hot soda solution, to be followed by scrubbing with a solution of corrosive sublimate 1:1,000 or carbolic acid, 5 per cent. The disinfecting solutions should invariably be colored to prevent accidents.

The microbes developed upon the surface of the earth find their way in limited number into the lower strata of the atmospheric air by currents of wind that carry with them visible dust. Naegeli showed, a quarter of a century ago, that microbes are transported through the air, through the medium of dry dust, never from fluid organic media in which they grow. Dry air contains more microbes than moist air, because more dust is suspended in it, which serves as a carrier for the microbes. Rain carries with it microbes from the air to the surface and purifies the atmosphere.

Nature's process should be imitated in the operating



Kitchen Converted Into an Operating Room.

room. The microbes floating in the air should be precipitated by moisture in the form of steam or spray; by doing so the air is purified and the microbes become attached to the moist floor, which should be kept moist until the operation is completed. For the cleansing of wall paper von Esmarch has recommended rubbing with soft bread, and his advice is based on the results of carefully made experiments.

Whenever possible the room should be prepared the day before the operation, after which the doors and windows are closed. In emergency cases this can not be done, but the atmosphere can be moistened with steam in a very short time during and after the mechanical and chemic cleansing of the room and its contents.

The kitchen table can be converted into an operating table that will answer every purpose by placing upon it a blanket properly folded and covering the same with a clean sheet.

The kitchen stove does excellent service in sterilizing everything that can be sterilized by heat—wash basins, pans, water, instruments, etc. Napkins and towels that are to be used during the operation and the sterility of which is doubtful, should be boiled for five minutes in soda solution. Sterile water, hot and cold, and saline solution in sufficient quantity must be kept in readiness, as well as sterile vessels for use during the operation.

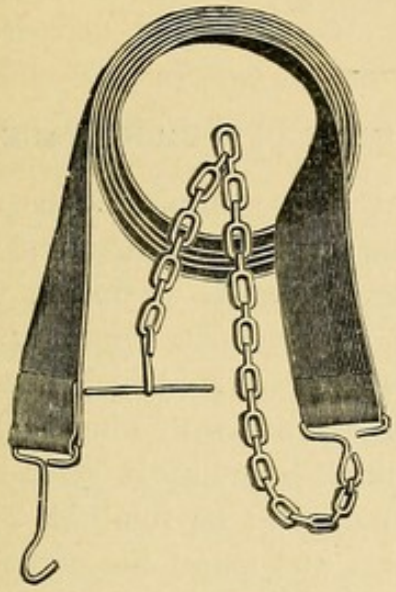
An active, efficient nurse can prepare any room in a few hours so that it will be safe to perform any operation by making liberal use of hot soda solution, hot water and potash soap, antiseptic solutions and steam.

For major, prolonged operations the temperature of the room should be kept at not less than 75 degrees F. Warm blankets, bottles filled with hot water, or warm bricks must be kept in readiness to supply the necessary heat in operations on feeble patients, or in cases in which shock is liable to set in as an immediate effect of the operation. A hypodermic syringe, strychnin tab-

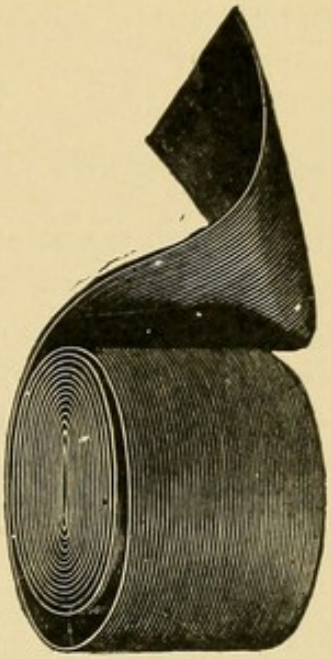
lets, capsules of nitrite of amyl, alcoholic stimulants, ether and chloroform must be kept within easy reach of the anesthetizer.

Brushes used for hand and surface disinfection are rendered sterile by exposing them to live steam for thirty minutes, or by boiling them in soda solution from five to ten minutes. Carbonate of soda dissolves fat and liberates the microbes for the more effective action of the antiseptic solution. Ether has the same effect and is used extensively for the same purpose. Before hand disinfection is commenced coats are laid aside and the sleeves are rolled up securely above the elbows when the operator and his assistants are ready for the operating room. Should gowns not be on hand, night shirts answer as excellent substitutes, and in the absence of such, a clean sheet may be wrapped around the chest and abdomen and fastened with safety pins. Towels can be used in the same manner for the arms.

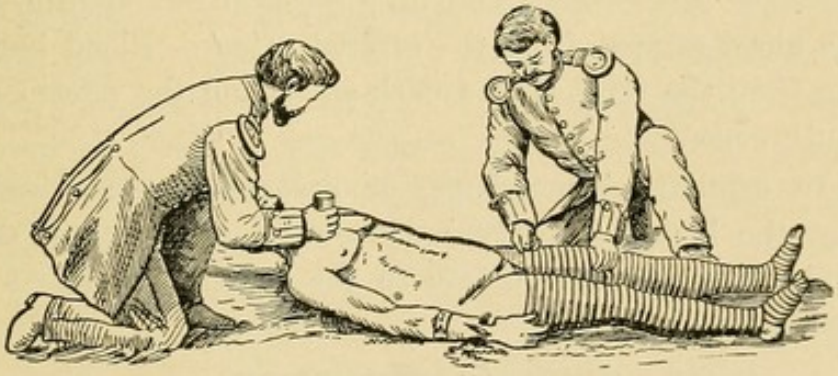
As microbes attach themselves much more readily to woolen fabric than linen or calico, the nurse should always wear a calico dress and over it an aseptic gown. Hair and beard of operator and assistants may be covered with aseptic gauze. The face mask of Mikulicz has found few imitators. If during the operation the hands of any one connected with the operation should become contaminated, they should again be thoroughly disinfected. The antiseptic solution which the operator may prefer and the saline solution should be placed within easy reach to be used when his hands become bloody or contaminated.



von Esmarch's Elastic Constrictor with Strap and Chain.



von Esmarch's Elastic Bandage.



Autotransfusion—von Esmarch's.

CHAPTER III.

PREVENTION AND TREATMENT OF HEMORRHAGE.

Hemorrhage is one of the trying emergencies in surgery. It is in cases where the surgeon is confronted by dangerous hemorrhage, either accidental or during the course of an operation, that he must act promptly in order to save the life of the patient. It is in such emergencies that the nurse must co-operate with him intelligently to enable him to accomplish promptly what has to be done. The trained nurse must be familiar with the means employed to prevent and arrest hemorrhage and in emergencies, in the absence of the surgeon, should be competent to act independently and resort to safe and effective means to staunch the bleeding until the surgeon arrives. Knowledge, good judgment and self-reliance are essential in such cases.

Arterial hemorrhage is distinguished by the bright red color of the blood and by the jets in the stream as the blood escapes from the severed artery. Blood issuing from the veins is of a dark color, and the stream is continuous.

In capillary hemorrhage, or parenchymatous bleeding, the blood, a mixture of arterial and venous, escapes from the cut surface in the form of continuous oozing.

ELASTIC CONSTRICTION.

The principal means of preventing hemorrhage from any of the large vessels of the extremities is by elastic constriction as first intelligently described and practiced by Professor von Esmarch, a distinguished military surgeon. The instrument employed is a strong

rubber band, to which is attached on one side a chain and on the other a hook.

In the absence of the constrictor, a piece of stout rubber tubing, an ordinary rubber bandage or an elastic suspender may be advantageously employed.

The limb should be held in a vertical position for a few minutes to render it practically bloodless, when the constriction is made at its base with sufficient firmness to arrest at once both the arterial and venous circulation. The successive turns should not override each other, but be placed side by side in order to guard against harmful pressure on the underlying large nerve trunks, which has occasionally been the direct cause of temporary and even permanent paralysis.

Elastic constriction is also employed in emergency cases and in autotransfusion.

It must be remembered that it is dangerous to prolong elastic constriction for more than two hours, as when it is continued beyond that time it might result in gangrene of the limb.

LIGATION OF BLOOD VESSELS.

The most direct and surest way to arrest hemorrhage is ligation of the severed vessel, artery or vein. This is now usually done by the use of the animal absorbable ligature—catgut or kangaroo tendon—although some surgeons give the fine aseptic silk ligature the preference. Sterilized catgut and kangaroo tendon ligatures, according to their thickness, remain in the tissues from 7 to 21 days, long enough to interrupt the circulation until the interior of the vessel at the point of ligation is obliterated, when they are removed by absorption by the new tissue cells formed around them.

Hemostatic forceps, artery needle, sharp tenaculum and a curved round needle threaded with catgut are the instruments to be kept in readiness for the ligation of blood vessels.

ASEPTIC TAMPON.

The aseptic tampon, of which the Mikulicz drain or tampon is an example, is frequently resorted to in arresting capillary hemorrhage and bleeding from vessels of small caliber.

HOT SALINE SOLUTION.

Water or, better, normal saline solution heated to a temperature of 120 degrees F., is an important and efficient agent in arresting troublesome capillary oozing. It is employed by pouring the hot fluid at some height over the bleeding surface, and its hemostatic action is increased by combining its use with compression. A compress of sterile gauze is wrung out lightly, after dipping it into the hot water or saline solution, when it is held against the bleeding surface firmly until the bleeding ceases.

INDIRECT LIGATURE.

In troublesome bleeding from vessels of considerable caliber not within reach of a direct ligature, a round, curved needle armed with catgut is used, and the ligature is made to include some of the surrounding tissue to prevent slipping; in other words, the indirect ligature is resorted to in cases in which, either on account of friability of the vessel or the nature of the surrounding, the direct ligature has proved inapplicable.

In suturing wounds of arteries or veins, the finest silk ligature and delicate, curved, round needles are invariably called for and must be kept in readiness.

CHAPTER XIV.

THE USES OF NORMAL SALT SOLUTION IN SURGERY.

Within a few years the normal salt solution, or, as it is often called, physiologic solution, has almost entirely taken the place of sterilized water in the operating room. In my own practice the latter has been entirely eliminated.

The effect of this solution on wounds is less harmful than that of water, as it represents, chemically, blood serum and the tissue fluids.

The solution is prepared by dissolving in sterilized water six-tenths of one per cent. of chemically pure salt. For the irrigation of recent wounds it is the very best that can be employed, and if it is used hot, is a valuable agent in arresting capillary oozing.

It is also in very general use in flushing the abdominal cavity for the removal of blood and pus. Its present most important use in surgery consists in meeting the urgent symptoms in the treatment of grave shock and serious hemorrhage.

Its therapeutic action is largely a mechanical one, by increasing the failing blood pressure. According to the urgency of the case, it is administered in three different ways: (1) intravenous infusion, (2) subcutaneous injection, (3) rectal enemata.

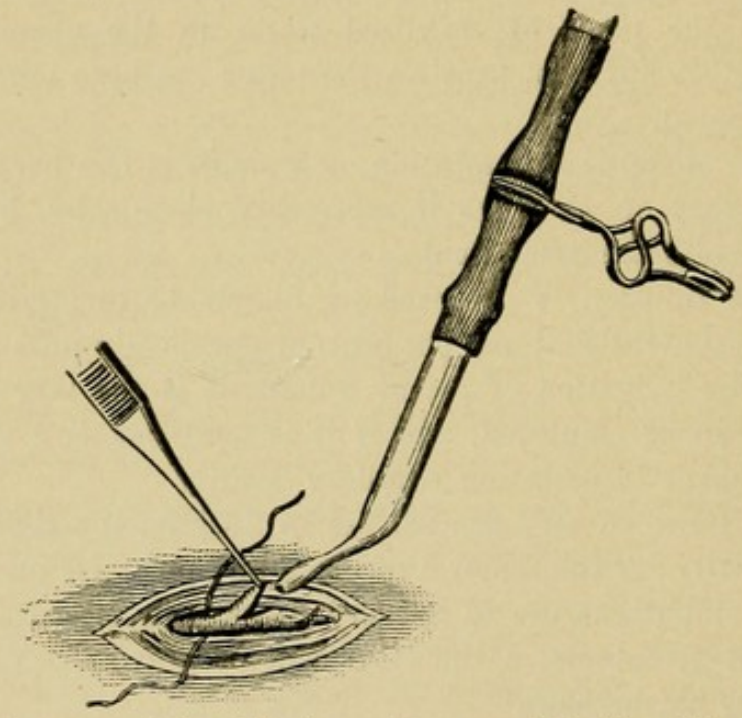
INTRAVENOUS INFUSION.

This procedure has almost entirely taken the place of transfusion of living blood from one person to another, or from an animal to a person.

This operation is resorted to in cases of grave shock or dangerous hemorrhage; cases in which it is necessary to gain its therapeutic action promptly.

Aseptic measures must be strictly observed in this as in all other operations; this is especially to be remembered, as this operation has usually to be performed in haste to meet alarming, dangerous symptoms. Articles needed:

One elastic constrictor.
One small scalpel.
One tenotome.
Two tissue forceps.



Intravenous Saline Infusion. Manner of Incising Vein and Inserting Glass Tube.

Two tenaculum hooks.
Two blunt hooks.
Two pairs scissors.
Three artery forceps.
One aneurysm needle.
One pair small retractors.

One small canula (a glass tube drawn out into a fine point), to which is attached a small rubber tube sixteen inches long. At the other end of the tubing attach a glass cylinder or funnel (a glass syringe without a piston will answer). Into the receptacle is poured the

physiologic solution at a temperature of 100 degrees F. Prepare one quart of this solution in distilled or sterilized water.

In emergency cases the ordinary fountain syringe is sometimes used.

LIGATURES:

Aneurysm needle armed with medium-sized catgut or fine silk ten inches long to ligate vein.

SUTURES:

Two glover's needles for silkworm gut or silk.
One glover's needle for horsehair.

DRESSING:

Boro-salicylic powder, 4:1.
Sterilized gauze and cotton.
Three sterilized towels.
Sterilized gauze sponges.
Roller bandage and safety pins.

There is one great danger attending this operation—the injection of air into the vein causing air-embolism. To avoid this, see that the solution is running freely before the surgeon inserts the canula.

SUBCUTANEOUS INJECTION.

In less urgent cases the same object is reached in a longer time by injecting the solution into the loose subcutaneous cellular tissue under the breast, below the axillary space, or in some other locality where the skin can be easily lifted away from the underlying muscles.

As much as a quart of the solution at blood temperature can be safely injected at one time.

A large exploring needle or a small trocar is used in making the puncture, to which is then attached the rubber tube at least six feet in length, which connects it with the vessel containing the solution (usually a large conical glass vessel with a contracted tip at the conical end, or an ordinary rubber irrigation bag).

The fluid is forced gently into the connective tissue

by elevating the vessel four to six feet above the level of the point of puncture.

Kneading the seat of injection aids in diffusing the fluid underneath the skin.

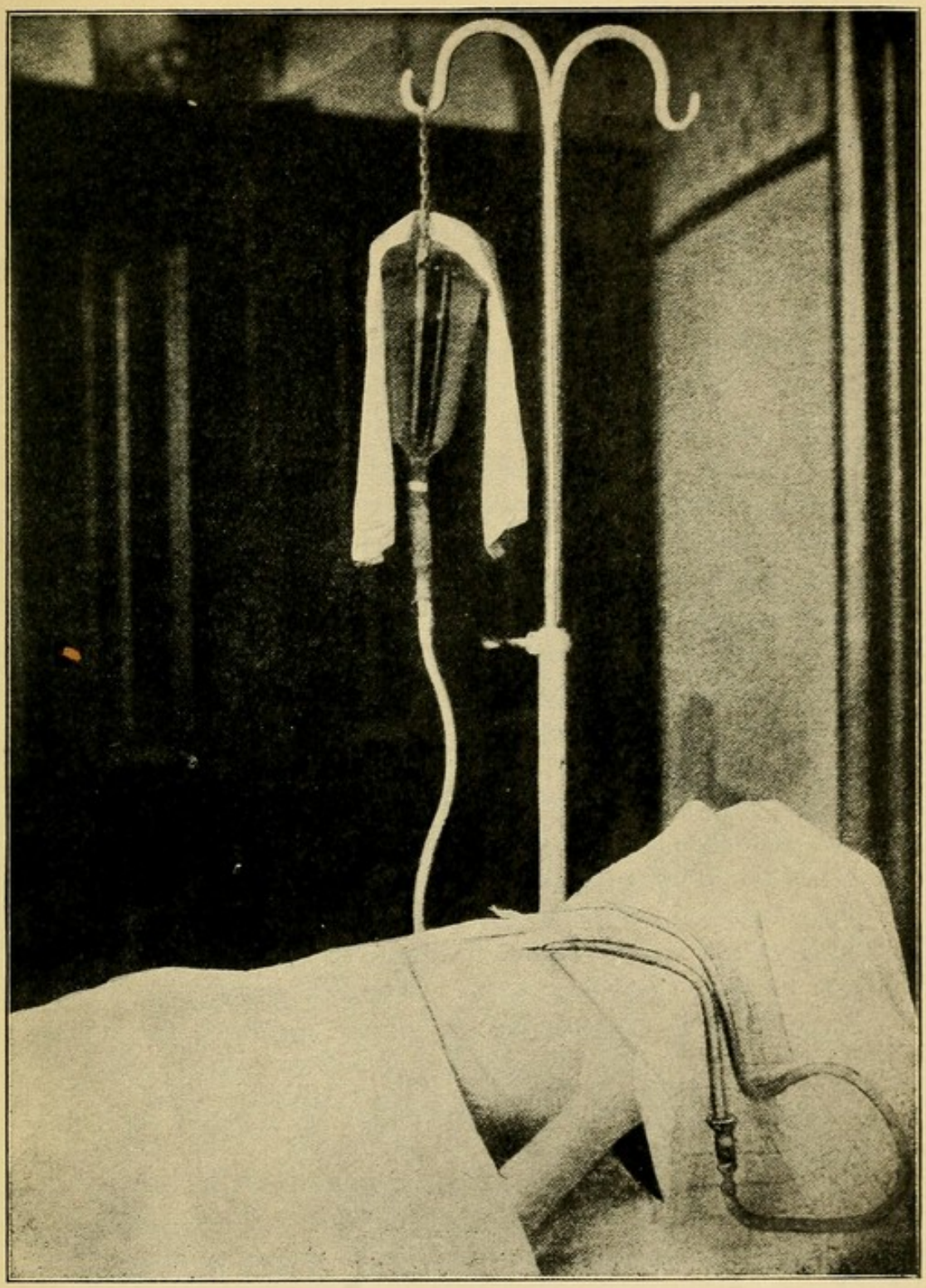
The point of puncture must be carefully disinfected, and needle or trocar, vessel and solution, sterilized by boiling.

RECTAL ENEMA.

The rectal mucous membrane absorbs the saline solution very rapidly; hence, if time does not have to be considered, this is the route usually selected to supply the blood with the necessary amount of fluid. A quart can be administered in this manner without inconveniencing the patient.

In giving the injection the patient should be placed on the right side with pelvis elevated, and the fluid should flow somewhat slowly from the fountain syringe.

Rectal enemata are frequently given the day before abdominal section to prevent distressing thirst following the operation.



Subcutaneous Saline Infusion.

CHAPTER V.

URINALYSIS.

The kidneys are excretory organs, which carry away much of the waste material of the body through the urine. Serious textural diseases of these organs are made manifest by alterations in the urine which on chemical or microscopic examination, shows the presence of abnormal pathogenic products, such as blood, pus, concretions, casts, epithelial cells and albumin.

For the purpose of ascertaining the existence of renal complications during the course of many acute and chronic diseases, the urine is frequently subjected to a careful examination. The urine is invariably examined before the administration of a general anesthetic, as the existence of renal disease indicated by such examination has much influence in the selection of the anesthetic. Many surgeons hesitate to make use of sulphuric ether as an anesthetic for patients affected with organic disease of the kidneys. Of all acute infectious diseases scarlatina is the one in which the kidneys become most frequently implicated. Hence in such cases the nurse is expected to pay special attention to the function of these organs, and make repeated examination of the urine, especially during the latter stages of the disease and the first week of convalescence.

Every trained nurse must be competent to make the ordinary urine tests to determine the presence or absence of the most common forms of renal disease, as this part of the examination is not infrequently assigned to her by the attending physician or surgeon. She is not expected, however, to be an expert in the use of the microscope, or familiar with the finer and more complicated chemical tests.

NORMAL URINE.

Normal urine is a straw colored fluid, almost colorless when abundant. In the adult the daily quantity varies from thirty-two to fifty ounces. It has a distinct acid reaction, turning blue litmus paper red, the intensity of the red coloration furnishing an approximate indication of the degree of acidity. On exposure to the atmospheric air it soon becomes neutral or alkaline by decomposition of urea and formation of ammonium carbonate.

Alkaline urine does not change the color of blue litmus paper, but turns the red litmus paper blue. It must be remembered that the color and reaction of urine are influenced by some drugs. Rhubarb and senna, favorite laxatives, cause a reddish yellow to deep red color, especially in alkaline urine. Santonin produces a bright yellow color, changing to red or crimson on the addition of an alkili. The internal use of carbolic acid or the absorption of this drug when externally applied causes a smoky, or even black, discoloration of urine, while large doses of salicylic acid color it green.

The admixture of bile in cases of jaundice gives to the urine the familiar light or dark beer color, according to the intensity of the jaundice. The odor of fresh urine is characteristic; of decomposed alkaline urine, ammoniacal.

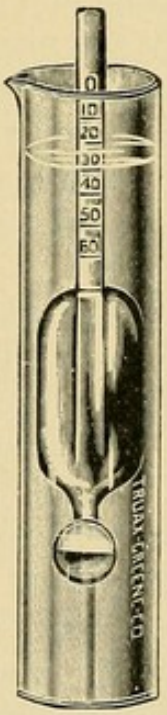
The specific gravity of normal urine varies considerably, according to its density. The average from 1.012 to 1.032. A specific gravity above 1.030 may give rise to the suspicion of the presence of sugar; larger quantities of which may cause this specific gravity to arise to 1.050, and even higher in established and far-advanced cases of diabetes.

It must not be forgotten that the specific gravity of urine considered separately from the quantity passed in twenty-four hours is of little diagnostic value, and that in some diseases (for instance, in acute nephritis with albuminuria) the specific gravity of albuminous urine

may be as high as 1.030, while a diabetic urine may have a specific gravity of 1.025 or less, in consequence of a large volume passed.

The specific gravity of urine is determined by the use of a urinometer, which is a small hydrometer graded from zero or 1000 to 60 or 1060.

As the temperature influences liquids as to their density, a urinometer can only give correct results at a certain temperature, which is generally marked upon the instrument, 60 degrees F.



Ordinary Urinometer.

In taking the specific gravity of urine, the quantity must be sufficient to float the instrument, and the vessel in which it is contained, wide enough so that it will not impinge upon its walls. After the instrument is in proper position and floating freely, stand with the back to the light, hold the vessel vertically at the height of the eye, and read off the number on the stem of the urinometer, in the plane at the lower sharply defined edge of the concave surface of the liquid.

BLOOD AND PUS.

Blood and pus are heavier than urine. Hence, if urine is left to stand for some time, they will settle to the bottom of the vessel. These abnormal substances in the urine, when present in considerable amount, can be detected and the quantity approximately estimated by pouring the urine into a conical glass and allowing it to stand for some time, when the color of the deposit will show its nature and quantity.

TEST FOR ALBUMIN.

The rough, and yet quite reliable tests to detect albumin in urine are heat and nitric acid. In a test tube about an ounce of urine is heated slowly to the boiling point, and if by so doing the urine is rendered turbid a drop or two of acetic or nitric acid are added. If the turbidity is caused by the presence of albumin it will remain; if it is the result of an abnormal presence of inorganic salts it will disappear. In using the nitric acid alone, proceed as follows: Take a clean test tube; pour into it pure, colorless nitric acid to the depth of about half an inch; hold it on an inclination of about 45 degrees; then, with a nipple pipette, add an equal amount of urine, allowing it to trickle slowly down the side of the test tube in such a manner that the urine forms a distinct and separate layer over the nitric acid. If albumin is present a white zone of varying thickness (according to the quantity of albumin present) appears at the point of contact of the fluids.

In country practice, if there are no conveniences at hand for testing the urine, the presence of albumin can be determined by bringing the urine to a boiling point in a tablespoon held over a coal or a wood fire and when a deposit forms, add a few drops of vinegar. If the deposit remains, the urine is albuminous.

TEST FOR SUGAR.

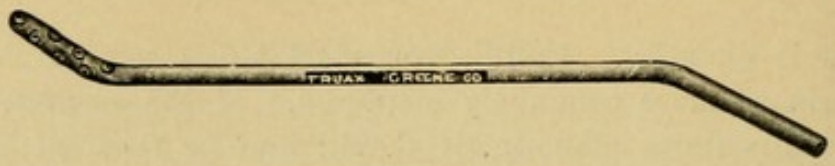
Fehling's or Haine's test may be employed, as both of them are reliable, if sugar is present in any consid-

erable quantity. In this country Haine's solution is, perhaps, more commonly employed. If the suspected urine contains albumin, it should first be removed by boiling and filtration, as its presence interferes with the reduction of copper. Pour into a clean test tube about one inch of the solution and heat slowly over the flame of a spirit lamp. Before boiling hold the tube in an inclined position at an angle of 45 degrees. Hold only the side of the tube to the flame and heat from above, downward, to prevent explosive boiling and loss of solution. If any precipitate is formed, the solution must be filtered and boiled again. If it remains clear add immediately 5 to 10 drops (not more), drop by drop, of the urine to be tested, and reboil. If sugar is present it is shown by the rapid production of a brick red or rich yellow precipitate of suboxid of copper, which will soon settle to the bottom.

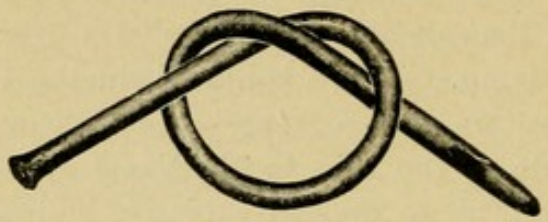
USE AND CARE OF CATHETERS.

The catheter is a tubular instrument made of silver, glass or flexible rubber, used for the purpose of emptying the bladder when, owing to abnormal conditions of the bladder or its outlet, normal micturition is impeded. The catheters for females are straight, with a short curved beak. Kelly's glass catheter is an excellent instrument, and should be used in preference.

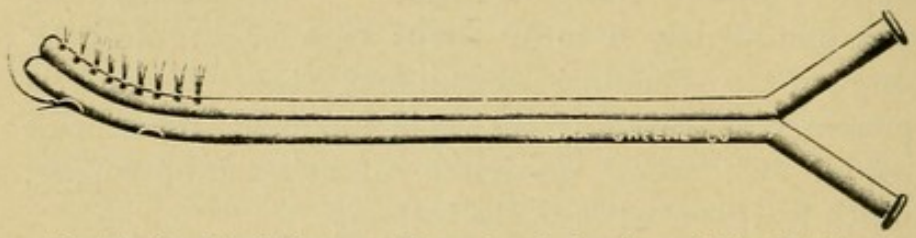
A catheter that is not surgically clean, that is aseptic, is always a dangerous instrument; hence the necessity of sterilizing it before using, and keeping it in an aseptic condition, when it has to be used repeatedly. Boiling in a 1 per cent. solution carbonate of soda for five minutes suffices to render it aseptic. The hands of the one who uses it, as well as the meatus or outlet of the urethra, must be disinfected before each insertion in order to prevent subsequent contamination of the instrument, and the transportation of pathogenic microbes from the infected orifice into the bladder. This



Female Catheter, Glass.



Flexible Rubber Catheter.



Kelly's Double Catheter, Glass, for Irrigation of the Bladder.

Glass Jar for Catheters.

can be done with one of the antiseptic solutions or diluted alcohol.

The instrument must be lubricated with some aseptic fatty material to facilitate its insertion. Fatty material as a coating for the instrument is of value not only in a mechanical way, but also in furnishing for the urethral microbes a mantel of an indifferent substance, and in so doing prevents their contact with the mucous membrane of the bladder. The best preparation to fulfill these indications for aseptic catheterization is sterilized white vaselin with the addition of 2½ per cent. carbolic acid, or one-tenth of 1 per cent. formic aldehyd. This ointment should be kept in collapsible tubes, and carried in every emergency bag.

After use, the catheters should be thoroughly cleansed, and suspended in a high glass jar with a wide mouth and closely fitting glass stopper.

It was formerly customary to keep the catheter in an antiseptic solution, but this caused the rubber soon to become rough and fragile. It may be kept aseptic by placing in the bottom of a glass jar a few tablets of formalin. The gaseous product from the tablets fills the jar and keeps the instrument in a sterile condition.

The nurse who has in charge a patient who has entered upon a catheter life, should supply herself with a number of catheters, and suspend them, after sterilization, in the formalin jar. Before using, the instrument should be thoroughly rinsed in warm, sterilized water.

CHAPTER VI.

CLINICAL THERMOMETRY.

The art of reading thermometers and taking temperature is among the first instructions which young nurses (beginners) receive, and they, as well as those experienced in the work of nursing, should give the taking of temperature their conscientious attention.

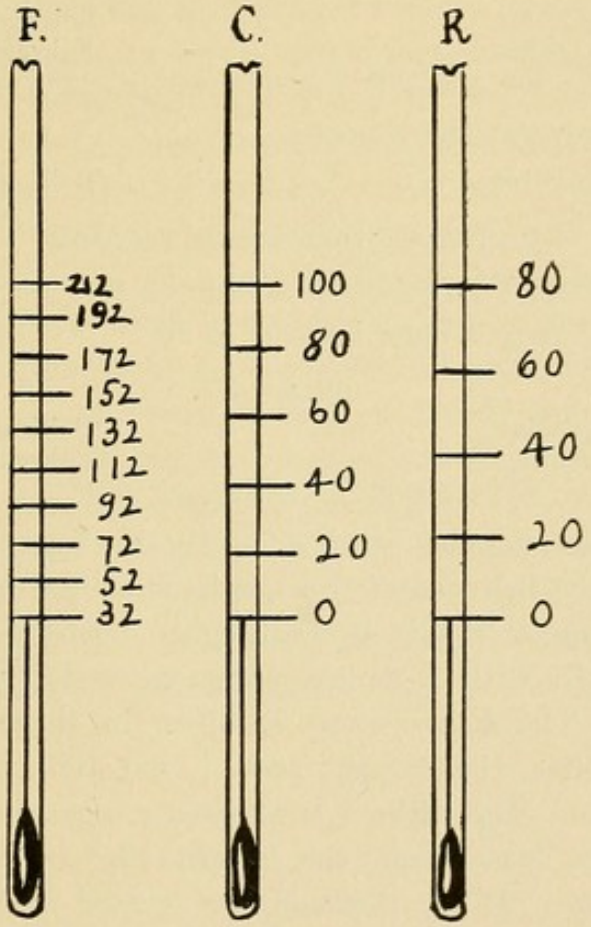
They should not leave the patient while taking the temperature, as he might remove the thermometer and thus cause the evidence to be incorrect. The treatment of the case may depend largely upon the record which the nurse makes of the temperature, and attention to detail in this characterizes the earnest nurse.

A thermometer is an instrument used to measure temperature. In the manufacture of clinical and scientific thermometers, mercury is invariably employed as the expanding agent.

In 1693 Fahrenheit first used mercury in this capacity in thermometers, making the freezing point 32 degrees and the boiling point 212 degrees above zero. Although this scale proved inconvenient for scientific purposes, it is at the present time more largely used in this country and Great Britain than any other.

Réanmur, about forty years later, presented the metric scale, marking zero as the freezing point and the boiling point 80 degrees above it. Some European countries still employ this system.

Celsius, in 1742, produced a better instrument by raising the boiling point 20 degrees in his scale and marking it as 100 degrees above the freezing point or zero. This latter is known as the centigrade or Celsius scale. In Germany the centigrade thermometer is used almost exclusively, and, as physicians educated in Germany are partial to this instrument, it is quite neces-



Clinical Thermometers.

sary that nurses should be able to convert one scale into another, and for the convenience of those who are not familiar with the process the following table is appended, also a cut of the thermometers described in the foregoing.

To convert centigrade into Fahrenheit multiply by 9, divide by 5, and add 32 to the result.

EXAMPLE.

Boiling Point. Centigrade. — Boiling Point. Fahrenheit.

$100° \times 9 = 900° \div 5 = 180° + 32° = 212°.$

Or to reverse the process:

Boiling Point. Fahrenheit. — Boiling Point. Centigrade.

$212° - 32° = 180° \times 5 = 900° \div 9 = 100°.$

To convert Fahrenheit to Réaumur proceed as before, but use 4 as a divisor instead of 5.

EXAMPLE.

Boiling point. Réaumur. — Boiling point. Fahrenheit.

$80° \times 9 = 720° \div 4 = 180° + 32° = 212°.$

The thermometer should always be kept surgically clean. The instrument can not be sterilized by boiling. After using, it should be thoroughly cleansed and carefully wiped with a gauze sponge saturated with pure alcohol. The temperature is taken in three different ways: First, the mouth; second, the axilla; third, in the rectum. The axillary temperature is generally about one degree lower than the temperature in the mouth and rectum. If the thermometer is used in the mouth it should be placed under the tongue and the patient requested to close the lips gently over the projecting part of the instrument and to keep them fixed in that position the necessary length of time, which is on an average of about five minutes.

In taking the axillary temperature the instrument is placed in the upper part of the axillary space and the arm placed closely against the chest wall. A longer time is required to take the temperature in the axilla

than in the mouth or rectum. In young children, unconscious, delirious or insane patients, the thermometer must never be placed in the mouth. The thermometer is always resorted to after operations, as its indications are of the greatest importance in determining the condition of the patient. A subnormal temperature arouses suspicion of shock or hemorrhage. A sudden rise of temperature within twelve hours suggests fermentation fever caused by the absorption of fibrin ferment formed by the blood which has accumulated in the wound. A normal temperature for a day or two, followed by a gradual rise in temperature, is only too often the forerunner of sepsis, the result of infection of the wound. In inflammatory surgical complications and the continued fevers the danger of life as indicated by the thermometer is much greater when the temperature remains continually 3 to 5 degrees F. above the normal than when the curves are sharp, although the maximum temperature may be much higher at certain times, usually in the evening or during the night. In acute inflammatory affections recovery is often announced by a sudden fall of the temperature. In other instances the decline is gradual. A temperature of 106 or 108 degrees F. is a signal of great danger.

CHAPTER VII.

METRIC DATA.

Nurses are not always familiar with quantities expressed in the metric system, hence are inserted simple data which may be of use.

The meter, a Greek word meaning measure, is the unit of length; it approaches very nearly to our common yard. This measure, or meter, is divided into fractional lengths of tenths, hundredths and thousandths.

The tenth of a meter is called the decimeter, the prefix deci meaning 1-10. The hundredth of a meter is called the centimeter, the prefix centi meaning 1-100. The thousandth of a meter is called the millimeter, the prefix milli meaning 1-1.000.

If one-tenth of a meter is one decimeter, then ten decimeters must make one meter.

One one-hundredth of a meter being one centimeter, then one-hundred centimeters must make one meter.

One one-thousandth of a meter being one millimeter, then one thousand millimeters must make one meter.

The terms of expressing the multiples of the meter are: Ten meters make one decameter, the prefix deca meaning tenfold.

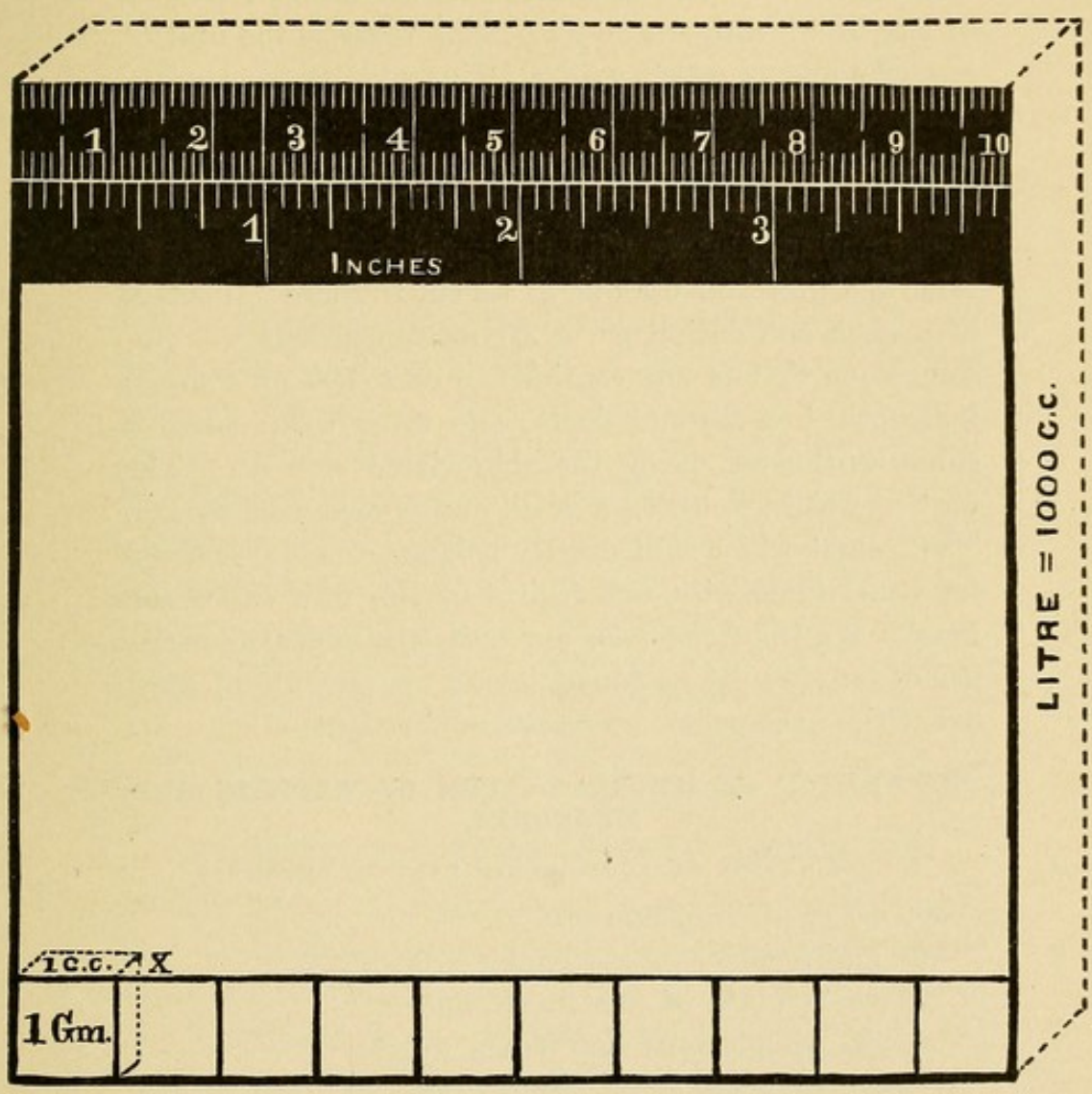
One hundred meters make one hectometer, the prefix hecto meaning 100-fold. One thousand meters make one kilometer, the prefix kilo meaning 1,000-fold.

Ten thousand meters make one myriameter, the prefix myria meaning 10.000-fold.

The following diagram shows the relation between the metric and the linear measure:

It is seen that the measurements both of the multiples and subdivisions increase and decrease by tens. From the measure of lengths all others are obtained, those of capacity, weight and area. The unit of a fluid

Fig. 1.



Metric Diagram. (Remington.)

Length.—Meter. One side of the above square measures 1 decimeter; it is graduated into tenths (centimeters), and these into tenths (millimeters): 10 decimeters equals 1 meter, equals 39.370432 inches.

Capacity.—Liter. A hollow cube having each side of the same size as the square would hold a liter equals 1000 c.c. equals 2.113453 pints.

Weight.—Gram. The weight of distilled water at 4 C. (39.2 F.) contained in a cube of the size of X (/1000 of a liter) is equal to a gram equals 15.43234874 grains, and measures 1 cubic centimeter.

measure is derived in this way: A cube is constructed of 1/10 of a meter, or one decimeter, in all its dimensions of length, breadth and depth. This vessel is the unit of capacity and is called a liter. This unit is too large—being the equivalent to about one quart—for use in measuring medicines, and just as we find no use for gallons, quarts and pints, but use fluid ounces, fluid drams and minims, so with the metric system, we throw aside the liter and use one of its subdivisions. In place of a cube one decimeter in all its dimensions we construct one that is one centimeter, or 1/100 of a meter in length, breadth and depth, and we call this vessel a cubic centimeter, using the abbreviated sign c.c. The unit of weight is called a gram and is expressed by gm. The weight which will exactly balance a cubic centimeter vessel filled with water gives us this unit called the gram. We have, then, for our units the meter, or measure of length; the cubic centimeter, or measure of fluid quantities; the gram, or measure of weight.

THE FRENCH OR METRIC SYSTEM OF WEIGHTS AND MEASURES.

A SHORT TABLE OF EQUIVALENTS EASY TO REMEMBER.

500 c.c in place of one pint.
500 gm. in place of one pound avoirdupois.
30 c.c in place of one fluid ounce.
30 gm. in place of one ounce weight.
4 c.c. in place of one fluid dram.
4 gm. in place of one dram weight.
1 c.c. in place of m. 15.
1 gm. in place of grs. 15.

REVERSING THEM:

One pint in place of 500 c.c.
One pound in place of 500 gm.
One fluid ounce in place of 30 c.c.
One ounce weight in place of 30 gm.
One fluid dram in place of 4 c.c.
One dram weight in place of 4 gm.

Fifteen minims in place of 1 c.c.

Fifteen grains in place of 1 gm.

One teaspoonful, or fluid dram, in place of 4 c.c.

One dessertspoonful, or 2 drams, in place of 8 c.c.

One tablespoonful, or 4 drams, in place of 16 c.c.

One wineglassful, or 2 fl. ounces, in place of 60 c.c.

One cupful, or 4 fl. ounces, in place of 120 c.c.

One tumblerful, or 8 fl. ounces, in place of 240 c.c.

The equivalents for fractional parts of a grain are quite easy to obtain mentally if the equivalent of one grain is memorized. This equivalent is 65 milligrams, and is written thus: 0.065 gm., or 65/1,000 of a gram. Sixty-five milligrams being one grain, then the half of a grain would be half of 65 milligrams, which, in round numbers, would be 0.033 gm. (33 milligrams).

1/3 grain would be 1/3 of 0.065 or 0.020 gm.
1/4 grain would be 1/4 of 0.065 or 0.016 gm.
1/8 grain would be 1/8 of 0.065 or 0.008 gm.
1/10 grain would be 1/10 of 0.065 or 0.006 gm.
1/30 grain would be 1/30 of 0.065 or 0.002 gm.
1/60 grain would be 1/60 of 0.065 or 0.001 gm.

ANTISEPTIC SOLUTIONS IN MOST COMMON USE.

Bichlorid of Mercury Solution.—The standard solution is 1:1,000, which should be colored with anilin blue and properly labeled. This is the solution most generally used at the present time for hand and surface disinfection. Like carbolic acid, it is never used in the disinfection of the mucous cavities or passages. For the irrigation of suppurating wounds and local application by hot, moist compresses the strong solution is diluted from two to five times for the purpose of diminishing the risk of intoxication, and, as is well known, a solution of 1:100,000 exerts an inhibitory action on pathogenic microbes.

STANDARD BICHLORID OF MERCURY SOLUTION.

Hydrarg. bichlorid cor.....61½ grs
Citric acid or sodium chlorid.....61½ grs
Water .....1 gal

To make 1:2000, take one pint of 1:1000 and a pint of boiled water.

To make 1:3000, take one pint of 1:1000 and two pints of boiled water.

To make 1:4000, take one pint of 1:1000 and three pints of boiled water.

Continue the same scale for weaker solutions.

CARBOLIC ACID SOLUTION.

Five per cent. is the standard solution. It should be colored with eosin to prevent mistakes. For hand disinfection the strong solution, 5 per cent., is used. For the disinfection of large accidental wounds and in preparing an extensive field of operation, a 2½ per cent. will suffice. The 2½ per cent. solution, made by mixing equal parts of the 5 per cent. solution and sterilized water, is the one usually employed for washing out suppurating joints after tapping, parenchymatous injections, hot, moist antiseptic dressings, and irrigation of suppurating wounds. Carbolic acid in any form should not be used in infants and young children, and must be used with great caution in aged, anemic, marasmic subjects and patients suffering from organic disease of the kidneys.

CARBOLIC ACID SOLUTION.

Five per cent. solution take 95 per cent. carbolic acid..6¼ oz.
Sterilized water .....1 gal

BORIC ACID SOLUTION.

Boric acid is a mild antiseptic, and in solution is used for indications similar to those in which Thiersch's solution is employed.

Four per cent. constitutes a saturated solution. Very few cases of intoxication have been reported from its use.

BORIC ACID SOLUTION.

Boric acid 4 per cent.....5 oz., 1 dr
Boiled water .....1 gal

The moist boric compress is an admirable substitute for the old-fashioned, filthy, germ-breeding poultices.

SALICYLIC ACID SOLUTION.

Salicylic acid is one of the safest and most valuable of all antiseptics known. Its introduction into surgery we owe to Thiersch. It has been used very extensively in the preparation of dressing materials, as it has been incorporated with nearly every substance employed as an absorbent covering for wounds. It is only slightly soluble in water, hence it has been used in the form of an emulsion (1:5) when a stronger preparation than a saturated solution was required. A 10 per cent. ointment with vaselin, lanolin or glycerin is one of the best applications for the toxic dermatitis caused by corrosive sublimate and iodoform.

SALICYLIC ACID SOLUTION 3:1000.

Salicylic acid	184 grs
Soda bicarb	120 grs

Mix well and gradually add boiled water to make one gallon.

THIERSCH'S SOLUTION.

A combination of salicylate and boric acid makes a very efficient and safe antiseptic, either in the form of powder or solution. Boric acid increases the antiseptic properties of salicylic acid.

THIERSCH'S SOLUTION.

Salicylic acid	½ dram.
Boric acid	3 drams.
Sterilized water	1 quart.

This solution, like acetate of aluminum solution, is non-toxic and non-irritant, and is used to meet the same indications. It is safe and useful in disinfecting the mouth, rectum and vagina, preliminary to an operation. It is the solution of choice in irrigating large suppurating cavities, as in the case of empyema, suppurative peritonitis and synovitis. It comes next in utility to acetate of aluminum solution for permanent irrigation. It is also the antiseptic solution of choice in the surgery of infants and young children.

ACETATE OF ALUMINUM SOLUTION.

Acetate of aluminum is a non-toxic, non-irritating, mild antiseptic.

Its use is limited almost entirely to the treatment of infected wounds, phlegmonous inflammation and permanent irrigation of suppurating joints and large abscess cavities.

A saturated solution can be used freely for weeks or months, without any risk of intoxication whatever. Acetate of aluminum is a remedy of the utmost value in antiseptic surgery.

ACETATE OF ALUMINUM SOLUTION, 1 PER CENT.

Alum	24 grs.
Acetate of lead	38 grs.
Boiled soft water	1 quart

A compress saturated with this solution and applied directly to the skin in dermatitis of all kinds promptly relieves the itching and burning, prevents the spread of the disease, and promotes the process of resolution.

CHLORID OF ZINC SOLUTION.

A 10 per cent. solution of chlorid of zinc is the strongest weapon in the attempt to transform a septic into an aseptic wound. The wound must first be thoroughly cleansed and dried and the suppurating surface freely exposed when the solution is applied with a cotton swab; after a few minutes the excess of the solution is washed away with a normal salt solution and the wound covered with a hot, moist antiseptic compress.

The chlorid of zinc solution penetrates the tissues deeper than any of the other antiseptic solutions and reaches the microbes some distance from the surface of the wound.

CHLORID OF ZINC SOLUTION, 10 PER CENT.

Chlorid of zinc	384 grs
Distilled or soft water, boiled	8 ozs.

BROMIN SOLUTION.

Bromin is a powerful antiseptic and was used quite extensively in the concentrated form during the Civil War in the treatment of hospital gangrene.

A solution of one-fourth of 1, to 1 per cent. made with potassium bromid is a valuable deodorant and disinfectant in the treatment of moist gangrene and profuse suppuration when used as an antiseptic in moist dressings or for irrigation or injection.

BROMIN SOLUTION.

Bromin	1 dram
Potassium bromid	2 drams
Water	1 pint

IODIN SOLUTION.

Iodin is probably the most potent antipyogenic known. The 1 per cent. solution used for irrigation has to be diluted one-half, and for antiseptic compresses it should not be used in greater strength than one-fourth of 1 per cent. Iodin solution is the one usually preferred in operations for open tubercular affections.

IODIN SOLUTION.

Iodin	1 dram
Potassic iodid	1 dram
Sterilized water	1 pint

POTASSIUM PERMANGANATE SOLUTION.

Potassium permanganate is a powerful deodorant and antiseptic. It has been used for a long time in solutions of varying strength to correct the odor of moist gangrene, foul ulcers and ulcerating and sloughing malignant tumors.

It has had an extensive trial in conjunction with oxalic acid in hand disinfection, a method which originated in the Johns Hopkins Hospital and which is still in use in that institution, but is seldom practiced elsewhere. This method was relied upon for nearly an entire term in the Rush Medical College Clinic in preparing the hands, but did not prove so satisfactory as alcohol, turpentine and bichlorid of mercury.

A 5 per cent. solution is used for hand disinfection. In the strength of one-tenth of 1, to 1 per cent. it is a deodorant that can be employed for the disinfection of the mouth and the interior of fetid abscesses.

LYSOL SOLUTION.

Lysol solution is a soapy fluid very closely resembling creolin chemically. Its antiseptic properties become apparent in a solution of 1 or 2 per cent. The toxic effects are much milder than those of carbolic acid, and as it does not irritate the skin it is often employed for hand disinfection and for preparing the cutaneous surface for operation.

PHYSIOLOGIC OR NORMAL SALT SOLUTION.

The normal salt solution is prepared by dissolving six-tenths of 1 per cent. of sodium chlorid in sterilized water. A teaspoonful of salt to a quart of water represents approximately the strength of this solution. The solution corresponds in its degree of alkalinity to the serum of blood, and it has come into the most extensive use in aseptic surgery. In cleansing recent wounds it should always take the place of sterilized water, as it does not damage the tissues like the latter.

PHYSIOLCGIC OR NORMAL SALT SOLUTION, 6/10 OF 1 PER CENT.

Sodium chlorid	368 grains
Water, sterilized	1 gal

ALCOHOL.

Alcohol is a reliable antiseptic and as such is used at the present time the world over. Its anti-putrefactive effect has been demonstrated for a long time in the museums in the preservation of organic material of all kinds. Its external use is not attended by any danger from absorption in toxic quantities, through the skin or granulating surfaces, by prolonged or extensive application, and it is, therefore, applicable for hand and surface disinfection under all circumstances, regardless of age and general condition of the patient.

It does not lose its antiseptic properties by age, as is the case with many of the more potent antiseptics. Its solvent action on fatty substances enhances its disinfecting power.

In my practice the local use of alcohol has been found very effective in the treatment of erysipelatous inflammation and other forms of acute superficial lymphangitis.

For local use it is generally diluted one-half, or 75 per cent.

IODOFORM EMULSION, 10 PER CENT.

Finely triturated iodoform, one ounce or one part by weight.
Glycerin, nine ounces or nine parts by weight.
Boil glycerin, bottle and cork for fifteen minutes; when cool add the iodoform powder and shake well.

One of the most important precautions in handling antiseptic solutions is to read carefully the labels.

ANTISEPTIC POWDERS.

For dry dressings in the treatment of small, recent wounds some kind of antiseptic powder is of great value in preventing infection. The antiseptics in powder form may not destroy the microbes on the surface of the wound and the adjacent skin, but they will prove efficient in inhibiting their growth.

For many years iodoform was used almost exclusively, but the odor, expense and comparatively feeble antiseptic properties of this drug are valid objections to its general use. It has been used in combination with boric acid, and the results have been equally as satisfactory as when the pure iodoform was used.

IODOFORM-BORIC POWDER.

Iodoform	100 parts
Boric acid	50 parts

To be effective, the antiseptic powder for permanent dressing should resist chemic changes to a maximum degree on exposure to atmospheric air or when brought in contact with the primary wound secretions.

For several years I have made use of a combination

of salicylic and boric acids, with the most satisfactory results.

The following is the formula for the—

BORO-SALICYLIC ACID POWDER.

Boric acid .....4 drams
Salicylic acid .....1 dram

This powder is particularly well adapted for the treatment of recent gunshot wounds.

ANTISEPTIC OINTMENTS.

The typical antiseptic dressing has reduced the use of salves in surgery to within very narrow limits. All the ointments in use at the present time contain one or more antiseptics, and are employed as a primary wound dressing in the treatment of small wounds, especially of the lips and face, to protect granulating surfaces and occasionally as a protection for skin-grafts.

The French surgeons are very partial to what they call the Antiseptic Pomade:

Antipyrin .....5 parts
Boric acid .....5 parts
Iodoform ..... 1 part
Vaselin .....50 parts

As a protection for granulating surfaces, and as a dressing after harelip operations and small wounds of the face, I have found the following to be very efficacious:

BORO-SALICYLIC OINTMENT.

Boric acid .....½ dram
Salicylic acid .....10 grains
Glycerin ointment .....1 ounce

CHLORAL HYDRATE OINTMENT.

Chloral hydrate .....5 parts
Gum acacia .....5 parts
Powdered camphor ..... 5 parts
Vaselin .....50 parts

The last-named ointment is a soothing application in all forms of dermatitis and burns.

UNGUENTUM CREDÉ.

The silver ointment of Credé is said to penetrate the intact skin and exert its antipyogenic effect on the bacteria in the tissues. It has been used with success not only in lymphangitis of the skin, but also in deep-seated phlegmonous inflammation. It is not essential, according to Credé, that the inunction should be made directly over the affected part in order to secure its antipyogenic effect on infected processes distant from the surface of the skin.

CHAPTER VIII.

PREPARATION FOR MAJOR AND MINOR OPERATIONS.

Ample experience has demonstrated that infection by contact is to be feared much more than infection by microbes suspended in the air. It is generally conceded that operation wounds are most frequently infected by contact with the hands of the operator or his assistants. The risk of infection increases with the number of assistants, and this statement applies with special force to new and inexperienced assistants, as is the case with college clinics in our country, in which the assistants serve for only three or four months at a time.

Since Eberth discovered numerous bacteria in normal perspiration in 1875, it has been found that the surface of the body is inhabited by a whole flora of pathogenic microbes. They are most numerous upon the hairy parts of the skin, in the folds and crevices, in the outlets of the glandular appendages and especially in the subungual spaces of the fingers.

Careful hand disinfection is an essential prerequisite to aseptic surgery. The hands of the assistants and nurses should be as carefully disinfected and kept so as those of the operator. Each hospital has its own method of rendering aseptic, hands and arms, also for the sterilization of instruments and the disinfection of the field of operation or injury.

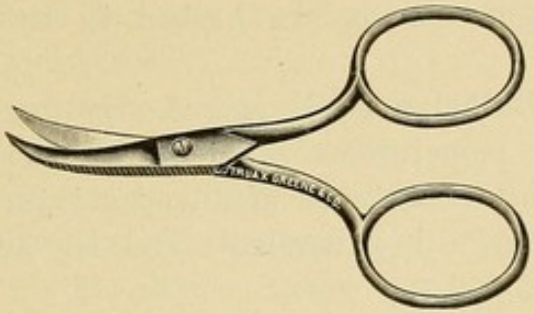
HAND DISINFECTION.

First.—Scrub for fifteen minutes with hot water and potash soap. hands and arms to elbows.

Second.—Trim, clean and scrape nails, scrub again in turpentine, again in hot water and potash soap,

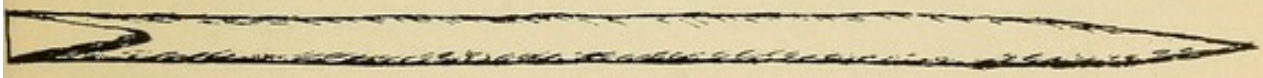
rinse with clear hot water to remove soap. (Soap destroys the antiseptic properties of bichlorid.)

The finger nails should be trimmed with German nail scissors. The metallic nail cleaner should never be used as it tears up the epidermis and irritates the under surface of the nail.



German Nail Scissors.

The orange stick used by manicures is the proper instrument for cleaning out the ungual folds and subungual spaces. It is flat on one end and pointed on the other. In using it the end of the stick used is frequently dipped in peroxid of hydrogen.



Orange Stick Nail Cleaner.

Third.—Alcohol.

Fourth.—Immerse in bichlorid solution, 1:1000, for five minutes, using nail brush, and finally wash thoroughly with alcohol.

The hands thus disinfected are surgically clean; therefore, nothing should be touched which is not aseptic.

If the operator calls for potassium permanganate, further preparations are necessary, such as the following:

Provide four basins, one containing 5 per cent. solution of potassium permanganate; the second, sterilized water; the third, a saturated solution of oxalic acid, and the fourth, a 1:1000 solution of bichlorid.

First.—The hands and arms to the elbows are soaked

in the potassium permanganate solution until the skin becomes brown.

Second.—The hands and arms are washed in sterile water.

Third.—The stain is thoroughly removed from the skin by scrubbing with the oxalic acid solution.

Fourth.—The hands are washed in the sublimate solution.

Fifth.—Alcohol is freely poured over the hands.

Adequate preparations for hand disinfection must be made in the treatment of all open injuries, for all operations surgical, gynecologic and all obstetric manipulations.

USE AND CARE OF RUBBER GLOVES.

Experimental research and clinical experience have demonstrated that all known methods of hand disinfection have failed in rendering the skin absolutely aseptic; hence the use of cotton and rubber gloves.

Mikulicz was the first to recommend the use of sterilized cotton gloves, and has continued their use up to the present time.

Very often as many as three or four pairs are used in the same operation, and as the cotton gloves do not give the same protection against infection as the rubber gloves, the latter are in more general use. In their care observe the following:

Wash gloves thoroughly in hot water and potash soap and rinse in clear water.

Examine each one carefully by filling with water, and those found to be punctured or torn lay aside to be repaired.

Wrap gloves in a towel and boil in clear water for five minutes. With surgically clean hands remove from the sterilizer and place in an aseptic basin containing sterilized water.

Upon a table that has been disinfected and covered with a sterilized sheet place the gloves and dry each one

with an aseptic towel, after which each glove should be well powdered with sterilized talcum powder, which should be rubbed over with the hand, care being taken to turn each one inside out so that both sides be well powdered.

To preserve asepticity for future use wrap each pair of gloves in a sterilized towel, place in a glass jar and keep in a cool place.

Before putting on the gloves the hands should be thoroughly dried and well powdered.

To prevent tearing, turn the cuff of the glove back over the palm and slip the hand in.

If the gloves become sticky during the operation wash in normal salt solution, dry with an aseptic towel and powder again.

Alcohol, ether or carbolic acid should not be used to disinfect rubber gloves, as these antiseptics render them sticky.

If the gloves worn by the operator or his assistants become punctured or torn, sterilized finger cots should be in readiness and put on immediately. This precaution will prevent the danger of contaminating the wound.

The hands should be as thoroughly disinfected as if the operation were to be performed without the use of gloves, and if it be necessary to remove them during the operation the hands should be again subjected to a thorough chemical disinfection.

To avoid the danger of tearing the gloves while removing them turn the cuff down upon the hand, and thus they can be rolled with ease over the fingers.

REPAIR OF TORN AND PUNCTURED RUBBER GLOVES.

Procure rubber cement and rubber dam used for repairing rubber gloves, also test tubes of various sizes upon which to place the punctured or torn finger, and wash with alcohol or ether.

Cut a round or square piece of the rubber dam large

enough to cover the punctured or torn finger, then apply the cement with a wooden spatula, immediately placing the prepared piece of rubber dam over the area, holding it firmly in position until it adheres to the glove.

Gloves should not be boiled for at least twelve hours after having been repaired.

The bottle containing the rubber cement should not be left uncovered longer than necessary, as the cement contains benzine and other volatile substances, and it should not be forgotten that these are highly inflammable and, besides, rapid evaporation takes place on exposure to the air.

DISINFECTION OF FIELD OF OPERATION.

By surface disinfection is meant the process resorted to for the preparation of the field of operation. The same means are resorted to in order to render the skin aseptic as in hand disinfection, with this difference, however, that in the disinfection of the hairy skin we can resort to more thorough means of mechanical removal of microbes from its surface by the use of the razor. The careful and thorough use of the razor not only removes the infected hair, but likewise scrapes away the superficial epithelial layers of the skin softened by the use of hot water and potash soap.

Potash soap is given the preference over the ordinary soda soap, because of its well-known deeper penetration of the epidermis of the skin. The extent of shaving and disinfection of the field of operation must necessarily vary according to the site and extent of the intended operation.

A safe rule to follow is to make the disinfection, if anything, too extensive. Thus in operations of any magnitude upon the scalp and large wounds of this structure and all operations on the skull and its contents the entire scalp must be shaved and disinfected.

In operations upon the breast, the axilla and half of the chest must be prepared, and if the glands of the neck are involved the entire neck must be included in the field of operation.

In amputations of the foot and lower third of the leg the disinfection must extend as far as the knee, and in all higher amputations it should include the whole limb and the corresponding side of the pelvis.

In all abdominal operations below the umbilicus, the pubes must be shaved and the surface disinfection must include the whole anterior surface and both sides as far as the breasts.

In operations on the stomach, liver and bile ducts, the field of operation extends from the pubes to the breasts.

A general warm bath, with liberal use of potash soap and a scrubbing brush, must precede disinfection of field of operation in all abdominal and pelvic operations, including hernia and varicocele.

In operations upon parts of the body very difficult to disinfect, such as the scalp, palm of the hand and sole of the foot, it is advisable to apply for two or three hours a potash soap poultice for the purpose of macerating the thick epithelial layers of the epidermis, preparatory to the chemical disinfection of the surface.

After the disinfection, the field of operation is covered with a warm compress of gauze wrung out of a 1:3000 or 1:5000 solution of mercuric bichlorid, over which are placed gutta-percha tissue and cotton pad, held in place by a bandage, until the final disinfection, which is made immediately before the administration of the anesthetic.

In the course of disinfection, after thorough scrubbing with hot water and potash soap, efforts are made to reach the glands of the skin, always hiding places of pathogenic microbes. This is effected, to a certain extent, by strong disinfectants which have the power of dissolving fat and penetrating the skin deeply. The

agents in general use for this purpose are alcohol, ether, spirits of turpentine and benzine. In my own practice, I give turpentine the preference. Alcohol is universally used in hand and surface disinfection and should never be absent from the operating room.

In preparing mucous cavities and tracts for operation, the difficulties of procuring an approximately aseptic condition are greatly enhanced. For reasons that do not call for any extended explanation, all strong antiseptic solutions are not applicable in such cases. The mucous membranes are active absorbing surfaces, and the use of solutions of carbolic acid, mercuric bichlorid and other potent antiseptics are fraught with danger. The free use of any of these agents in the vagina, uterus or rectum has frequently resulted in serious poisoning and, not in a few instances, in death.

The mechanical part of the disinfection is also much less satisfactory than in preparing the skin for operation. Disinfection of the mouth should invariably precede the use of a general anesthetic, as in doing so the danger of inflammatory complications of the air passages following anesthetization is greatly diminished. For this purpose and to prepare the cavity of the mouth for operation, the safest, most efficient and agreeable solution consists of a saturated solution of boric acid, with the addition of a teaspoonful of Listerin to each ounce.

The solution is applied to the mucous lining of the mouth with a soft tooth brush or cotton swab. In grave operations, such as excision of the superior or inferior maxilla and amputation of the tongue, the employment of this solution is preceded by thorough cleansing of the teeth, and the mucous membrane is swabbed with peroxid of hydrogen.

In operations upon the rectum, a brisk cathartic and high rectal enema are given, followed by irrigation and swabbing with Thiersch's solution.

Vaginal disinfection is more satisfactory. After

thorough scrubbing with hot water and potash soap, peroxid of hydrogen and pure alcohol are relied upon in the chemical disinfection of the mucosa. The vaginal disinfection is preceded by shaving and disinfection of the external genitals.

Catheterization should always be preceded by disinfection of the meatus with alcohol or a 1:1000 solution of mercuric bichlorid.

CHAPTER IX.

STERILIZATION AND DISINFECTION.

Both of these terms are employed to indicate the use of measures intended to remove, destroy or render harmless microscopic vegetable parasites, germs or microbes, which are the cause of all infective processes and infective diseases. By sterilization is meant the absolute absence of pathogenic microbes from instruments, solutions or dressing materials—a condition attained with any degree of certainty only by exposing these articles to a degree of heat sufficient to destroy bacterial life. Dry heat, steam and boiling are the processes which effect sterilization if the articles are exposed to the germ-destroying effect of heat for a sufficient length of time. Steam, oversteam and boiling are now the most common and widely accepted means of effecting sterilization.

The term disinfection applies more particularly to the means and measures resorted to in rendering infected wounds aseptic and in freeing the hands and the field of operation of all harmful bacteria as nearly as can be done by mechanical and chemical processes.

The use of the razor, potash soap and warm water is a preliminary mechanical means to prepare the way for a thorough disinfection by chemical agents, which are known to destroy or inhibit the growth of microbes, of which the most important are carbolic acid, corrosive sublimate, iodin, lysol, creasol and alcohol.

Physical sterilization is sterilization by heat. Dry heat, heated dry air, ranges in sterilizing power above the chemical means, but below hot water and steam, as dry heat has very little penetrating power.

Bacteria which do not contain spores are destroyed in dry heat after an hour and a half at a temperature

of 212 degrees F., while three hours' exposure at a temperature of 284 degrees F. is required to kill spores. Moist heat is the best germicide.

The thermal-death-point of surgical bacteria, which practically means pyogenic cocci which are not spore-bearing and the bacillus of tuberculosis and its spores, is correspondingly low when they are exposed to moist heat. The pyogenic cocci are all killed inside of ten minutes at a temperature of about 150 degrees F., while the tubercle bacilli and their spores are destroyed at a temperature of 212 degrees F. in five minutes.

Boiling for five minutes at a temperature of 212 degrees F. seems, therefore, to hold good for all practical purposes. Moist heat, as steam, is another excellent germicide, as it acts like hot water of the same temperature and it can be used where boiling is not practicable. The germicidal properties of steam depend upon its moisture, on its temperature and on its expulsion of air contained in the articles to be sterilized. Steam of a higher temperature than the boiling point is obtained either by conducting the steam evolved through heated pipes (called superheated steam) or by evolving steam under pressure (high steam).

All known pathogenic bacteria and their spores are destroyed in low steam at a temperature of 212 degrees F. maintained for five minutes. Low steam at a temperature of 212 degrees F. is, therefore, surgically perfect and easily generated.

Concerning the moisture, it is a well-established fact that the condensation of steam in the articles to be sterilized is a most important factor in the success of sterilization. The exact cause of this is not fully understood. Wet steam will sterilize, but dry steam will not. Wet or saturated steam is steam as delivered from a mass of water and holding water in suspension mechanically or as vapor. This is the sterilizing steam. Dry or superheated steam (steam gas) holds little or

no water in suspension. This is the non-sterilizing steam. It corresponds in effectiveness with dry heated air.

SPORES.

The spores of bacteria represent the seeds of flowering plants. Each spore develops into a bacterium, and thus one crop after another is produced. Most of the bacilli multiply by spores. The spores are much more refractory to destructive agents than the microbes into which they develop. This is particularly true of the bacillus of tuberculosis and tetanus.

STERILIZATION OF DRESSING.

Wrap in a separate towel, cotton, gauze, sponges, laparotomy compresses, sheets, bandages, doctors' gowns, nurses' gowns, and sterilize thirty minutes with moist heat and thirty minutes with dry heat. Note the time after the water has reached the boiling point.

The O'Neill aseptic dressing jar is a most convenient receptacle for preserving the asepticity of sterilized surgical supplies.

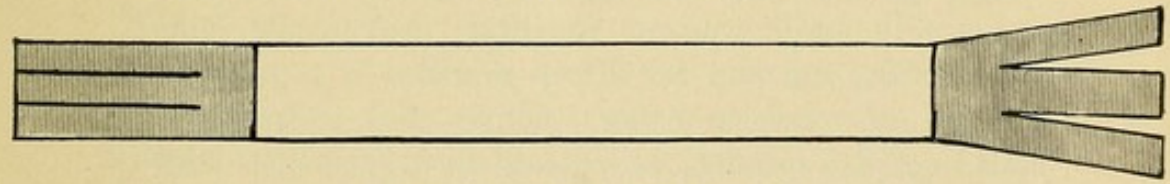
O'Neill's Aseptic Glass Dressing Jar.

The usual laparotomy dressing consists of one yard of sterilized gauze (hygroscopic) loosely applied and a

strip of absorbent cotton, eleven by fifteen inches, covered with sterilized gauze. This dressing is retained in place by two or more aseptic adhesive plaster strips. For the majority of wounds in abdominal sections a simple abdominal bandage held in place by perineal straps is required, but for hernia operations, or in any case where the incision is low in the abdomen, a gauze roller bandage is preferred. If the surgeon calls for collodion dressing give a three-inch strip of gauze and collodion in a small glass with a camel's-hair brush; also a thin film of cotton, which is placed over the gauze. When the wound is sealed with the collodion apply the usual laparotomy dressing.

ASEPTIC ADHESIVE PLASTER STRIPS.

Aseptic adhesive plaster strips used for holding in place abdominal or other dressings are found preferable to the ordinary long adhesive strips, as the sterilized



Aseptic Adhesive Plaster Strip.

bleached muslin strips occupy the space over the dressing, the adhesive plaster being attached to each end. In removing the dressing the adhesive strips need not be disturbed until no longer required, thus sparing the patient the discomfort that is caused by their removal at each dressing.

To remove the dressing the muslin must be cut in the center and laid back until the dressing is replaced, when the ends of the muslin are again brought in position over the dressing and secured with safety pins.

The strip consists of a piece of sterilized bleached muslin fifteen to eighteen inches in length and three inches in width, to each end of which is firmly stitched a piece of adhesive plaster, five by three inches, which should be cut in two places, (A) within one inch of its

attachment to the muslin, making it fan-shaped, (B) as is shown in figure above. Applied in this manner, the irritation caused by adhesive plaster is decreased.

INSTRUMENTS.

Place in the sterilizer (common wash boiler will answer) instrument trays, basins, pitchers, etc., and boil for fifteen minutes in a 1 per cent. solution of carbonate of soda. Disinfect the tables with carbolic acid, 3 per cent., or with alcohol, cover the floor of trays with sterilized gauze, reserving one tray and an aseptic brush for soiled instruments; cover the bottles with sterile gauze, and handle corks, covers, etc., with an aseptic gauze sponge.

A celebrated surgeon remarks: "Before an operation it is comparatively easy to render everything surgically clean, but it is extremely difficult to keep them so during the operation."

Place in an instrument sterilizer, instruments, pins and needles, and boil for fifteen minutes in 1 per cent. solution of soda carbonate. Knives and scissors are boiled for five minutes and placed in a glass dish with alcohol (heat dulls cutting edges). All instruments are injured by corrosive sublimate.

When instruments are sufficiently sterilized, the tables, trays and hands having been previously prepared, remove cover from sterilizer with an aseptic towel and arrange instruments in the trays in such order that each one may be readily found when called for by the surgeon. Before the operation the needles are threaded and kept in alcohol. Arrange on the table a bottle of alcohol, bottle of collodion, aseptic glass, camel's hair brush, iodoform powder, boro-salicylic acid, 4:1, small glass jar with sterilized safety pins, glass jar with three and eight-inch strips of iodoform gauze and a glass dish for knives and scissors.

Unless intimately acquainted with the surgeon's methods, it is well to have him inspect before the opera-

tion the instruments and sutures which you have prepared. Instruments which have become contaminated during an operation must not be used again until they have been sterilized by boiling.

PREPARATION OF MEDICATED DRESSING MATERIAL.

IODOFORM GAUZE.

Cut the gauze in lengths of five yards and sterilize for thirty minutes before medication. Handle with surgically clean hands. Sheets, towels and everything coming in contact with the gauze must be aseptic.

SOLUTION NO. 1.

Glycerin ..... ½ gallon
Water ..... ½ gallon

Mix and boil for fifteen minutes. When cold pour into a large stone jar which has been rendered aseptic.

SOLUTION NO. 2.

Iodoform ..... 3 ounces
Alcohol ..... 1 pint

Note.—The iodoform is not perfectly soluble in this quantity of alcohol; however, it answers the purpose.

Add No. 2 to No. 1, and while stirring briskly immerse thirty ounces or thirty yards of gauze (on an average a yard of gauze weighs an ounce); continue the motion until the gauze is thoroughly and evenly impregnated with the iodoform; otherwise the latter will sink to the bottom and the gauze will not retain the entire quantity. Then pass the gauze through an aseptic wringer; that is, one that has been scrubbed with potash soap, rinsed with sterile water and carbolic acid, 5 per cent. Fold the gauze, roll it tightly, wrap in waxed paper and seal. Preserve in a stone jar.

If more than thirty (30) yards of gauze is to be prepared, add to the remaining solution, if necessary, one ounce of glycerin and three ounces of iodoform dissolved in one pint of alcohol, as this is absorbed by each thirty yards of gauze. Then proceed as described above.

To improve the color of the iodoform solution add about one dram of tincture of curcuma for every thirty yards of gauze.

FORMULA FOR TINCTURE OF CURCUMA.

Powdered curcuma .....4 ounces
Proof spirit .....1 pint

Let stand till clear. Pour off clear liquid. Continue to add proof spirit till all color is extracted.

CORROSIVE SUBLIMATE GAUZE.

Corrosive sublimate .....10 grains
Glycerin ..... ½ pint
Distilled water .....32 ounces
Sodium chlorid .....½ ounce
Citric acid .....1 ounce

Mix well.

This solution will moisten sixty yards. Cut in lengths of five yards each and soak for some time to thoroughly saturate the gauze, fold and wrap in waxed paper, making air tight, and place in a tin box.

CARBOLIZED GAUZE.

Carbolic acid ..... 3 ounces
Glycerin .....24 ounces
Distilled water .....32 ounces

This solution will moisten sixty yards of gauze. Cut in five-yard lengths, fold, roll, wrap in waxed paper and keep in air-tight tin boxes.

ADHESIVE ANTISEPTIC GAUZE.

Adhesive gauze is frequently used in arresting surface oozing, as the mixture with which the gauze is impregnated is not only antiseptic, but also adhesive.

Carbolic acid .....1 part
Resin .....5 parts
Paraffin .....7 parts

SALICYLATED GAUZE, TEN PER CENT. SOLUTION.

Salicylic acid ..... 5 ounces
Alcohol .....24 ounces
Glycerin ..... 6 ounces
Sterilized water ..... 6 ounces

First.—Dissolve salicylic acid in alcohol.

Second.—Boil glycerin and water for fifteen minutes and add to the above solution.

This quantity will medicate sixty yards of gauze, which should be previously cut in five-yard lengths and sterilized.

Place in an aseptic glass, granite or glazed earthen jar and let stand for twenty-four hours that the gauze may become thoroughly moistened.

Handle with surgically clean hands, roll tightly, wrap in waxed paper and seal.

SALICYLATED COTTON, TEN PER CENT.

The above solution is also used in preparing salicylated cotton. For each one-pound roll of absorbent cotton the following quantity will be required:

Salicylic acid	2 ounces
Alcohol	2½ ounces
Glycerin	12 drams
Sterilized water	12 drams

The cotton should be sterilized, and with surgically clean hands spread upon a table that has been previously disinfected, and the entire quantity of the solution should be applied by lightly sprinkling it over the cotton, which is then tightly and evenly rolled that it may become thoroughly impregnated. Wrap in waxed paper and seal.

BORATED COTTON.

Immerse the absorbent cotton in a saturated solution of boric acid. Wring out and dry slowly. Do not open the roll of cotton until after it has been saturated thoroughly in the boric acid.

PREPARATION OF WAXED OR PARAFFIN PAPER.

Melt the wax or paraffin (the latter will answer and is much cheaper), and, while pouring it on the paper, iron evenly with a hot flatiron.

A more rapid and better method is to pass the paper immediately after its immersion in the melted material through the mangle in the laundry, being careful not to have the rollers too hot, as in this event the paper would be scorched.

For sealing the rolls of gauze, wax is preferable to paraffin.

Note.—Waxed or paraffin paper also serves an excellent purpose as a protective in the application of

stupes or poultices and is much less expensive than oiled silk or gutta-percha tissue.

Waxed paper is disinfected by immersing for five minutes in a 2 per cent. solution of formalin, after which each sheet is dried with a sterilized towel, rolled separately and placed in an aseptic glass jar.

DRAINAGE AND DRAINAGE MATERIAL.

Drainage is used to prevent the accumulation of serum, pus or wound secretions. This is effected by means of tubular or capillary drains.

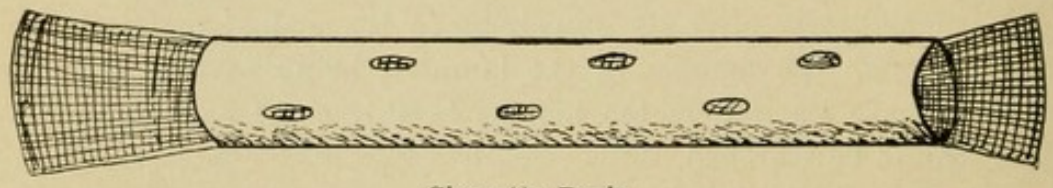
Tubular Drains.—Tubular drains are made of perforated rubber and glass tubing. A perforated glass tube loosely packed with gauze constitutes a combined tubular and capillary drain.

Capillary Drainage.—Capillary drainage is made with strips of iodoform gauze, hygroscopic gauze, or a skein of catgut or horse hair.

Mikulicz Drain.—The Mikulicz drain is a capillary drain on a large scale and consists of a square piece of iodoform gauze of requisite size, placed in a cavity, and filled with narrow strips of plain gauze until the requisite degree of compression is secured. This drain is used where there is parenchymatous oozing—it serves as a tampon to arrest bleeding and also acts as a capillary drain.

CIGARETTE DRAIN.

The cigarette drain is made by inserting hygroscopic gauze in a tube made of gutta-percha tissue.



Cigarette Drain.

The cementing of the margins of the gutta-percha is done by the careful use of chloroform, as an excess of chloroform dissolves the material. The gutta-percha

tube should be fenestrated, and the gauze made to project a slight distance from the openings of the tube.

SURFACE DRAIN.

The so-called surface drain is used in draining aseptic wounds for the purpose of preventing the accumulation of wound secretions underneath the skin. It is made by twisting a piece of gutta-percha tissue or protective silk long enough to reach beneath the layer of adipose tissue. These drains are placed between the sutures and are generally removed at the end of one or two days. All drainage material is to be sterilized by boiling.

CHAPTER X.

PREPARATION OF LIGATURE AND SUTURE MATERIALS.

CATGUT AND KANGAROO TENDON.

(Catgut: Made from submucosa of the intestine of sheep.)
(Kangaroo Tendon: Tendonous part of the tail of the kangaroo or wallaby, both Australian marsupial animals.)

The raw material contains fat and is infected with germs. Both of these absorbable animal tissues are sterilized by the same processes:—

FORMALIN CATGUT. (HOFMEISTER.)

First.—Roll the catgut, without any other preparation, in single layers on glass tubes, roll tightly, evenly, leaving a space between each turn, fasten firmly at each end so that it will not loosen during sterilization.

Second.— Soak in sulphuric ether for three days.

Third.—Immerse in solution of formalin, 4 per cent., for forty-eight hours.

Fourth.—Place the tubes in a basin under running water for twelve hours.

Fifth.—Boil the catgut on the tubes in clear water from ten to fifteen minutes. The water should reach the boiling point (212 degrees F.) before the catgut is put in.

Preserve in the following solution:

Alcohol	1 pint
Glycerin	1 dram, 24 drops
Iodoform	1½ ounces, 40 grains

The glass jar or bottle in which the catgut is preserved should be well shaken from time to time, especially before taking the catgut out for use, so that some of the particles of iodoform may remain in the catgut.

For fine and medium catgut use 2 per cent. formalin, omit the ether and boil from seven to ten minutes. The

formalin hardens the catgut and is also a powerful germicide. Catgut when boiled or immersed in a watery solution becomes soft and unsafe for tying. Therefore, absolute alcohol should be used. The glycerin dilutes the alcohol sufficiently and acts as a lubricant without tending to soften the catgut.

Catgut thus prepared is not only aseptic, but mildly antiseptic, and the iodoform does not irritate the tissues like carbolic acid and corrosive sublimate.

VON BERGMANN'S METHOD OF CATGUT STERILIZATION.

After removing the fat by immersion in sulphuric ether for from twenty-four to forty-eight hours, according to the size of the catgut, place the strands in a 1 per cent. solution of corrosive sublimate, dissolved in eighty parts of alcohol and twenty parts of water, the vessel to be shaken frequently.

AMMONIUM SULPHATE CATGUT. (ELSBERG.)

Selection of good raw material is necessary. The catgut is wound upon a square glass plate with projecting margins in order to expose the threads fully to the boiling solution, as they touch the plates only at four points.

The sulphate of ammonium is used in a saturated solution. The boiling is done in an enameled vessel and is continued for half an hour, when the plate is removed with a pair of sterilized forceps and rinsed in sterilized water. For a short time the catgut is then immersed in alcohol to harden it, when it is placed in sterilized oil of juniper, and is ready for use.

Catgut and silk thus treated are kept in bottles with a wide mouth, securely closed with a glass stopper, which is removed when the material is needed, and a nickel cover, sterilized by boiling, substituted. Through a central perforation the ends of the threads are drawn out.

CHROMICIZED CATGUT.

Chromicized catgut is more durable than catgut prepared in any other manner. Roll the catgut, without any other preparation, in single layers, on glass tubes, tightly, evenly, leaving a space between each turn, and fasten firmly at each end so that it will not loosen during sterilization. Soak in sulphuric ether three days, then immerse in a 4 per cent. solution of formalin for forty-eight hours. Place the tubes in a basin under running water for twelve hours. After this process boil the catgut on the tubes from ten to fifteen minutes.

Immerse in the following solution for one hour:

CHROMIC ACID SOLUTION.

Chromic acid	38½ grains
Carbolic acid	27 drams
Sterilized water	57 ounces

Preserve on tubes in alcohol.

IODIZED CATGUT. (CLAUDIUS.)

Immerse the raw coils of domestic or rough German catgut, without any preparation, in a solution containing 1 per cent. of pure iodin and 1 per cent. of potassic iodid. In eight days the catgut is absolutely sterile. Claudius preserves the material in the same solution, but experience has taught me that in three or four weeks the catgut becomes too brittle. I now preserve it in a 10 per cent. iodoform-alcohol mixture. I add iodoform in order to insure free iodinization for an indefinite time.

The bottle containing the catgut should be freely shaken every few days for the purpose of bringing the deposited iodoform in frequent contact with the threads. The iodin solution is prepared as follows:

Dissolve the potassic iodid in a small quantity of water, to which the iodin, finely triturated, is added, and the concentrated solution is then diluted to 1 per cent.

The solution and catgut are kept in a bottle with a wide mouth which is closed with an accurately fitting

glass stopper. The date is written on the label of the bottle. Catgut thus prepared and kept should be rinsed in a weak solution of carbolic acid before using. Catgut preserved in iodoform-alcohol requires no rinsing.

HORSEHAIR.

Wash thoroughly with hot water and potash soap. Place the threads in line and fasten at one end. Wrap in a piece of gauze (for the purpose of keeping it under the water) and boil for ten minutes in ¼ per cent. solution of soda carbonate. Change this solution and boil again ten minutes in clear water.

Preserve in a solution of hydrarg. bichlorid and alcohol, 1:1000.

SILKWORM GUT.

Wrap in a piece of gauze and boil for thirty minutes in a 1 per cent. solution of soda carbonate. Preserve in a solution of hydrarg. bichlorid, 1:1000.

BRAIDED SILK.

Roll the silk on glass spools and boil from fifteen to thirty minutes in a 1 per cent. solution of soda carbonate. Preserve in a solution of hydrarg. bichlorid and alcohol, 1:1000.

CHAPTER XI.

GENERAL ANESTHESIA

The anesthesia room should always be supplied with pure ether, chloroform, oxygen tanks, appliances for restoring suspended respiration, and antidotes for the toxic effects of the anesthetic.

The temperature of the room should be comfortable, and all noise and excitement carefully avoided.

All articles required should be in readiness before commencing the final disinfection of the field of operation. One-half hour before the appointed time the patient is conveyed to the anesthesia room.

The mouth is inspected and false teeth removed. The remaining teeth are brushed with warm water and soap, and the mouth is then rinsed thoroughly with clear water and a solution of boro-listerin. (Boric acid, saturated solution, 1 ounce; Listerin, 1 dram.)

The nasal cavities are cleansed with cotton swabs and syringed with Thiersch's solution.

The clothing is removed, and sterilized sheets placed under and over the patient. The head is covered with an aseptic gauze bandage, or an aseptic towel is wrapped around and pinned, after which the patient is dressed in a sterilized surgical suit.

The field of operation is then scrubbed with hot water and potash soap, washed off with warm water, and a gauze sponge saturated with turpentine is rubbed over the surface, which is again scrubbed with hot water and potash soap and rinsed with clear water and sponged with alcohol and warm bichlorid solution, 1:1000. A sterilized towel saturated with the same solution is wrung tightly, folded and placed over the disinfected area and covered with a dry aseptic towel.

The patient is then catheterized and the lower limbs

wrapped in flannel or a blanket and covered with a sterilized sheet, after which the anesthetic is administered.

In the absence of a qualified assistant, the educated nurse is often called upon to administer a general anesthetic and should, therefore, be familiar with the method and quick to discover signs of danger and prompt in anticipating them by judicious, intelligent treatment.

In emergency work anesthetics must often be given without any elaborate preparations, owing to the urgency of the case. When time permits, everything should be done to make ample preparations for all possible emergencies. The stomach should invariably be empty. Vomiting is likely to be provoked by the anesthetic and the food ejected might enter the air passages, causing immediate death from asphyxia, or, if this danger is passed over, an aspiration pneumonia is a more remote complication. If the anesthetic has to be given on a full stomach, the patient should be turned on one side, with the head in a dependent position during the act of vomiting, so as to favor the ejection of the food from the mouth.

The bowels and bladder should be evacuated, the former by cathartics and enema, the latter, if need be, by aseptic catheterization.

All unnecessary clothing must be removed, especially such as would interfere with the free movements of the chest and abdomen.

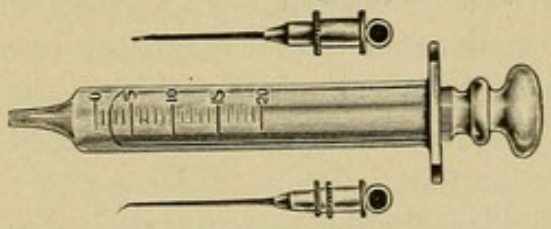
The patient is placed on the operating table, with the head on the same level as the body, or slightly lowered on a small pillow, or, what is still better, a firm compress.

Keeping the head in a slightly dependent position prevents the danger of aspiration into the air passages of the infected secretions of the mouth,—a fruitful source of bronchitis and pneumonia,—after the administration of a general anesthetic.

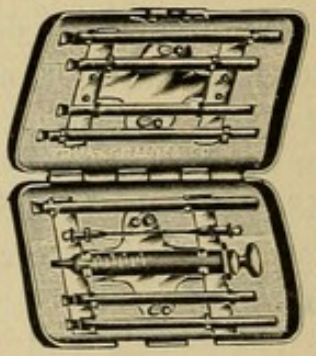
The position of the patient may have to be changed

if he is obese. Kraske and others have recently called attention to the danger which attends anesthetization of obese persons placed in the Trendelenburg position, and Trendelenburg himself has cautioned against this position in that class of patients.

Upon a small stand or chair at the head of the operating table, and within easy reach of the anesthetizer, are placed all articles needed during narcosis—ether, chloroform, tongue-holder, hypodermic syringe charged with a solution of 1/30 of a grain of strychnin, granules of digitalin, 1/100 of a grain, granules of atropin, 1/100 of a grain, capsules of nitrite of amyl, wash basin, tongue forceps, mouth gag, cotton or gauze swabs, a four-ounce bottle of whisky or brandy, a two-ounce



Luer's Hypodermic Syringe.



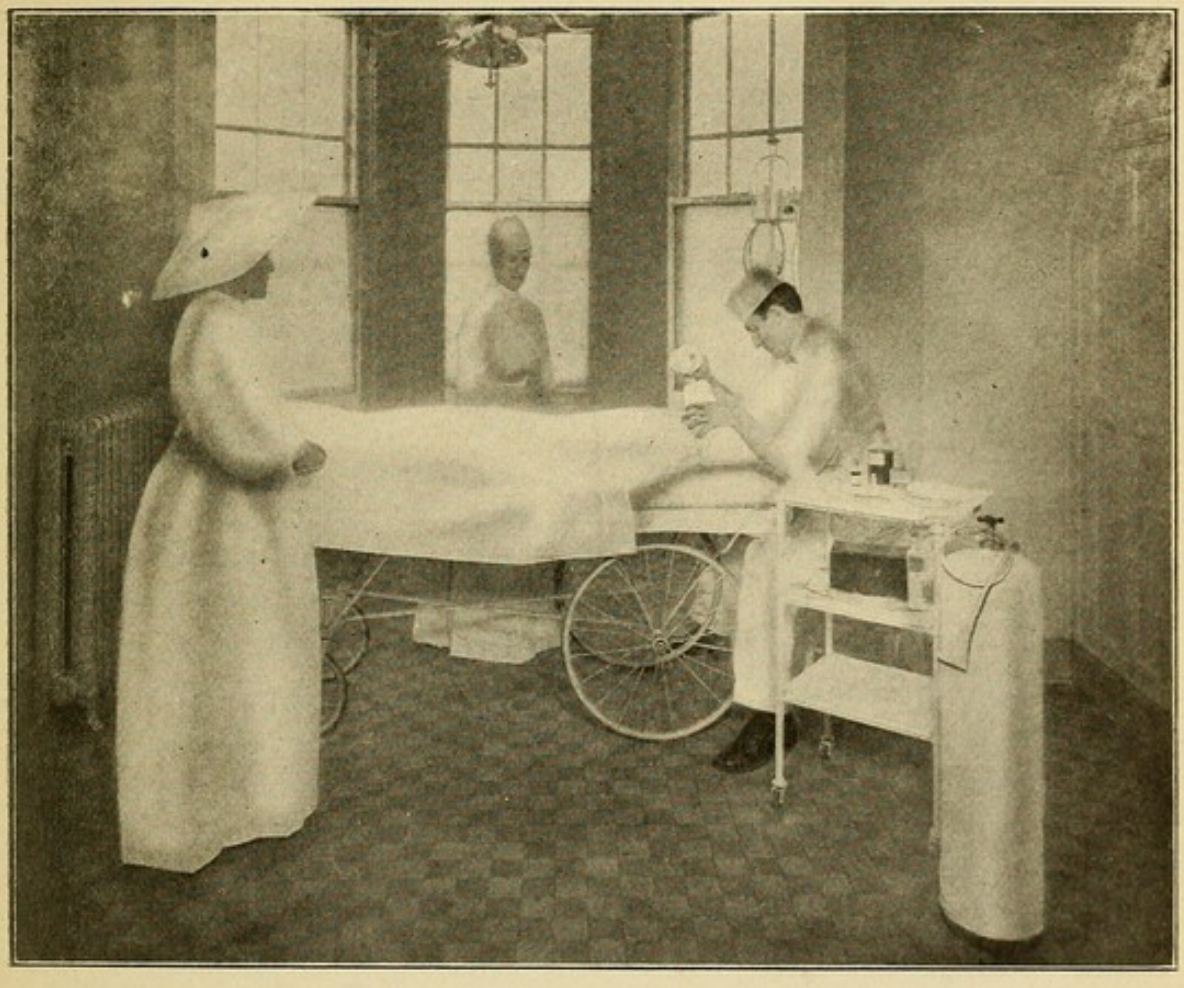
Luer's Hypodermic Syringe Case.

bottle of vinegar, an electric battery, a chloroform mask, an ether cone, a sponge holder, small gauze sponges, and a number of towels.

The anesthetic must be pure—Squibb's ether and chloroform can be relied upon.

In hospital practice the nitrous oxid, or laughing gas, is now frequently employed as a preliminary to ether and chloroform anesthetization.

Everything being in readiness for the narcosis, the surface of the body not to be exposed during the operation should be well protected with woolen blankets so as to prevent unnecessary and perhaps dangerous loss of body heat during the operation.



Proper Position of Patient and Anesthetizer and Stand for Anesthetic and Accessories.

The temperature of the room should not be lower than 75 degrees F. and not higher than 85 degrees F., according to the general condition of the patient and the nature and probable duration of the operation.

The skin exposed to the irritating action of the anesthetic is covered with oil, vaselin, butter, cream or any other fatty substance.

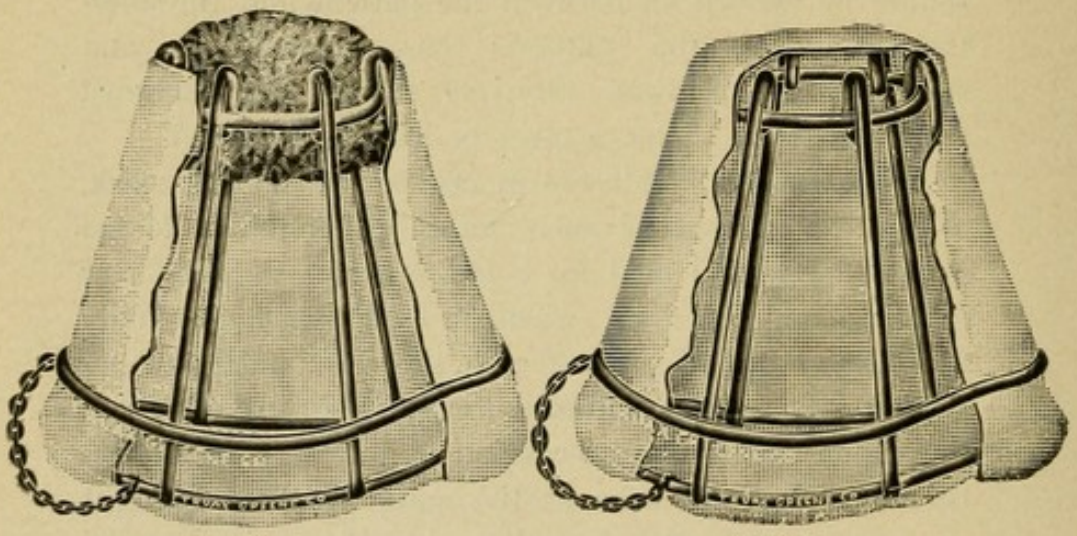
The anesthetizer takes his place at the head of the table, seated on a chair or stool of convenient height.

The patient's mind must be diverted as much as possible from the ordeal before him. With the exception of a few words of encouragement, no conversation should be carried on between the patient and the anesthetizer after the narcosis has commenced, and strangers and anxious relatives should be excluded from the room. Silence must be strictly enforced.

A few drops of chloroform are poured on the mask, or, in the absence of such, on a handkerchief folded once or twice and held for a few minutes at least four inches from the face, when it is brought gradually nearer, but not in contact with the face, until the patient has become accustomed to the irritating effects of the vapor. The same precaution is necessary in administering ether. As soon as the mask has been brought in contact with the face the chloroform is dropped upon it continuously, as an abundance of air passes through the loose meshes of the gauze, thus diluting the vapor of the anesthetic and furnishing the necessary amount of oxygen.

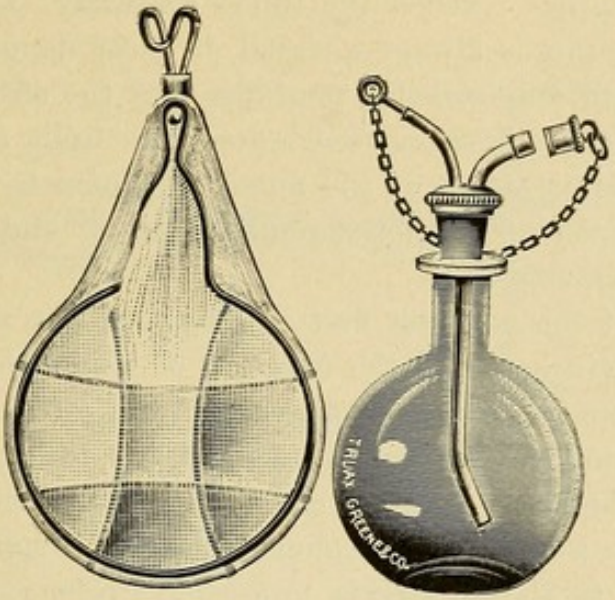
It is during the beginning of the narcosis that the patient's mind should be occupied and concentrated upon something foreign to the procedure he is undergoing. This can be accomplished in one of two ways: He is asked to count slowly until consciousness is lost (counting backward from one hundred rivets the attention of the patient more than counting in the ordinary way from one upward), or is requested to hold one of the upper extremities in a vertical position. The loss

of consciousness in the latter instance is announced by the dropping of the helpless limb. This stage of anesthesia will suffice for short operations and when it is intended to operate under partial anesthesia. Usually complete anesthesia is preceded by a stage of excitement of variable duration. It is during this stage that the anesthetizer feels keenly the weight of his responsibility. The patient shouts, prays, swears, sings, cries, laughs or fights, according to his temperament, habits, religious belief, occupation or social position in life. Tonic and clonic spasms, irregular respiration and cyanosis are some of the alarming symptoms of this

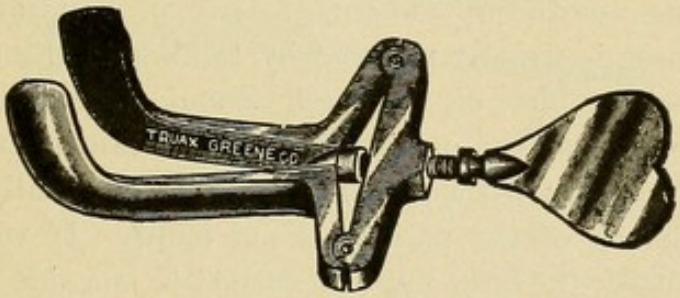


A. Senn's Chloroform Inhaler. B. Senn's Ether Inhaler.

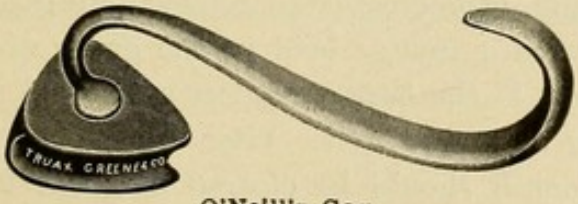
stage. This stage may subside in a few minutes, or may continue for ten or fifteen minutes, or even for a longer time. Under the continued administration of chloroform by the drop method the excitement and convulsive movements gradually subside, and the narcosis passes into the stage of tolerance or full anesthesia. This is announced by muscular relaxation, snoring, puffing of the cheeks and complete loss of consciousness and sensibility. The pupil is contracted, the eyeballs make asymmetric movements, the pulse becomes smaller, softer and more rapid, the respirations become more rapid and shallow. This is as far as it is advisable and



Esmarch's Chloroform Inhaler.



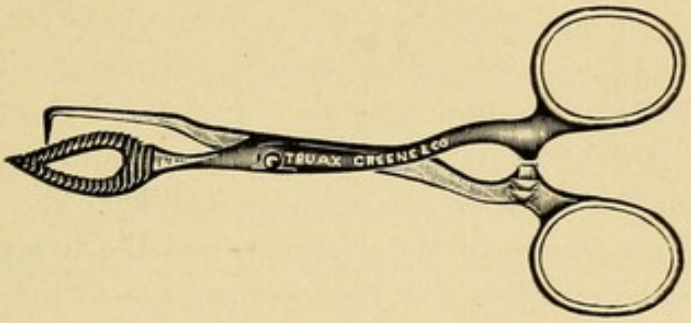
Heister's Gag.



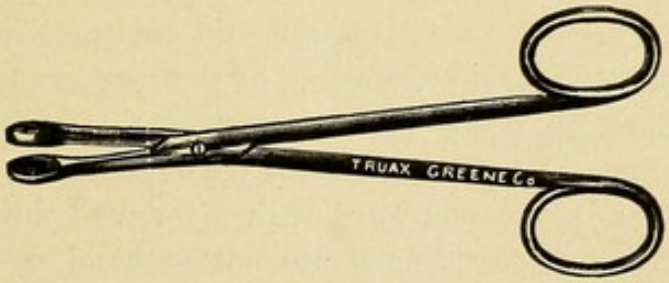
O'Nelll's Gag.

safe to carry the effect of the anesthetic. The disappearance of the corneal reflex is an indication that the anesthesia has reached the limits of safety. Dilatation of the pupils is always a signal of great danger and a strong and unmistakable reminder that the effect of the anesthetic has been carried beyond the limit of safety. The administration of the anesthetic must be immediately suspended until the pupils contract and the corneal reflex returns.

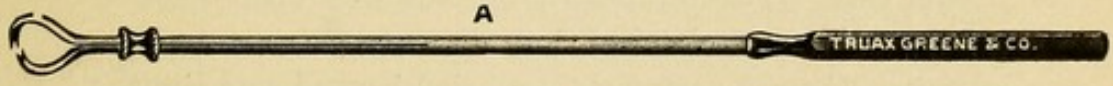
One of the common first ill effects of the anesthetic is the disturbance of the function of respiration. During the first few inhalations the patient often holds his breath, and respiration is renewed by asking the patient to breathe. In other cases the vapor of chloroform provokes a distressing cough, but the cough usually subsides as the anesthesia proceeds. Prolonged expiration interrupted by short inspirations is objectionable, because it interferes with the free entrance of the vapor into the bronchial tubes and consequently retards the complete anesthesia. The regularity of respiration in such cases is usually restored by talking to the patient or by a light blow on the chest. Should these fail, raise the foot-end of the operating table. Vomiting may occur during any of the stages of narcosis, especially when the stomach of the patient is not empty. If vomiting is provoked, the head must be turned to one side and on a level below that of the body to prevent entrance of foreign substances into the air passages. An abundance of mucus and saliva in the pharynx often provokes vomiting, in which case the removal of the irritating material with a sponge held in the grasp of a pair of long forceps is the best and most successful method of preventing or arresting it. After each attack of vomiting the mouth should be cleared of food, mucus and saliva by wiping with a sponge, towel or handkerchief before resuming the inhalation of the anesthetic. If, in spite of all precautions, food should find its way into the air passages an immediate tracheotomy may become



Senn's Tongue-Holding Forceps.



Esmarch's Tongue-Holding Forceps.



Sim's Sponge Holder.

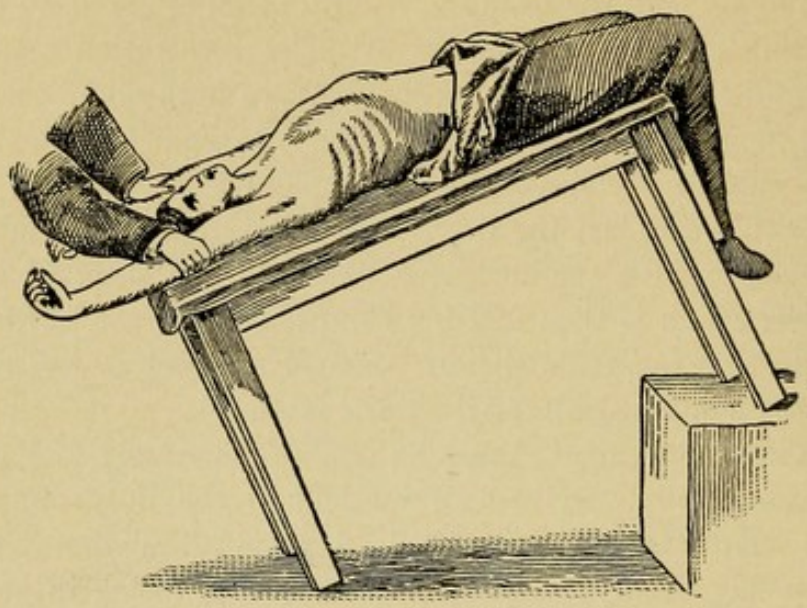
a necessity. A sudden arrest of respiration, which during the beginning of the narcosis is usually overcome by attracting the attention of the patient by talking to him, may become of the most serious import during the subsequent stages of the narcosis. After a few stertorous respirations and stormy, convulsive muscular movements, the rima glottidis is closed by muscular spasm, the abdominal wall makes a few inspiratory contractions, sinks in and remains boardlike. The maxillary bones remain in close contact, and the tongue falls backward in such a way that the passage to the larynx is narrowed to an extent incompatible with a normal supply of air to the respiratory passages.

The superficial veins of the forehead, temples and face become turgid, the face purple and the lips cyanosed. The pulse, at first slow, becomes rapid and, lastly, almost imperceptible. The cause of approaching asphyxia in such cases is spasmodic contraction of the muscles of the larynx or falling of the tongue backward. Prompt action is necessary to restore the embarrassed circulation. The mouth must be opened and the tongue grasped and drawn forward with a tongue-holding forceps (Senn's), or, if such are not at hand, a pair of mouse-toothed hemostatic forceps may be used. Lifting of the lower jaw forward by making pressure against its angles is another valuable expedient in clearing the pharynx. On drawing the tongue forward the air passage is cleared and the anesthesia continued with additional care. If respiration is not restored upon the removal of the mechanical impediments, as is so often the case when the narcosis is carried beyond safe limits, artificial respiration must be resorted to promptly and continued until respiration is re-established or all hope of restoring life has vanished. While this is being done an assistant maintains the patency of the respiratory tract by employing a mouth gag to open the mouth and a tongue-holding or hemostatic forceps to draw the organ forward. While artificial respiration is being

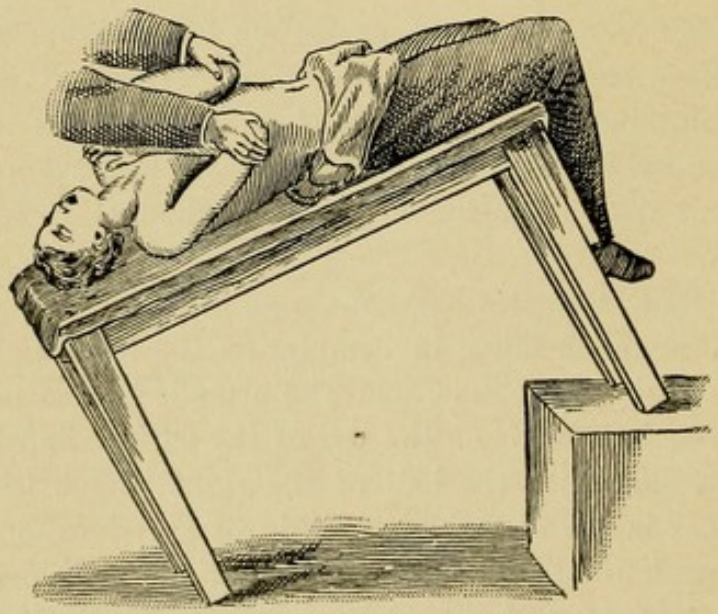
made, the foot of the table is elevated so as to incline the body, with the head downward, at an angle of 45 degrees. The one who makes artificial respiration stands behind the head of the patient, grasps both elbows with the arms extended and by traction brings the arms to the side of the head so as to expand the chest-wall to its utmost. Then the movement is reversed by bringing the arms with the forearms flexed to the sides of the chest, which is then forcibly compressed for the purpose of forcing out from the air passages as much as possible of the contained air (Sylvester's method).

These movements must be made deliberately and not spasmodically. Sylvester's method is the only one of the many methods of artificial respiration that have been suggested which is entitled to confidence in such cases. The respiratory movements are repeated eighteen to twenty times a minute, resembling in this respect normal respiration. Nothing is gained by increasing the frequency. The success of artificial respiration depends on the thoroughness with which every movement is made. If respiration is not restored promptly there is no reason for despair, as success has followed efforts continued for half an hour or more. The efforts should be maintained for at least half an hour, unless unmistakable evidences of death make their appearance and warrant the suspension of further attempts at resuscitation.

In desperate cases heart massage as advised by König will accomplish much in stimulating the flagging organ to renewed action. The one who attends to this part of resuscitation stands on the left of the patient and makes compression with the ball of the right thumb between the apex beat and the left margin of the sternum. The compression should be firm and rhythmic at the rate of 120 a minute, and should be continued until return of the pulsation in the carotid artery is noticeable and the pupils contract, or until such efforts have shown themselves fruitless.



Sylvester's Method of Performing Artificial Respiration.



Sylvester's Method of Performing Artificial Respiration.

During the time attempts are being made to restore respiration other means of counteracting the toxic effects of chloroform are employed. The most potent physiologic antidote for chloroform is strychnin. Horatio C. Wood advises heroic doses. In adults the first dose should not be less than one-sixth of a grain by subcutaneous injection. This may be safely repeated in ten or fifteen minutes if the nervous centers do not respond to the first dose.

Inhalations of nitrite of amyl stimulate the heart's action and are well calculated to relieve the stagnant capillary circulation. Slapping the chest with a towel wrung out of cold or hot water and the rubbing of the extremities are valuable agents in accomplishing the same object. Faradization of the phrenic nerve is another valuable resource in restoring respiration temporarily suspended by the toxic action of chloroform on the respiratory center. The two electrodes are applied: one on each side of the neck over the clavicle at the outer border of the sterno-cleido-mastoid muscle. Although the immediate cause of death from chloroform is generally its toxic action on the center of respiration, alarming and fatal complications may set in which are directly referable to its depressing effect on the heart muscle. Such accidents usually occur when least expected and with a suddenness that is appalling. In a moment the color of the face is changed to a deadly pallor; the pupils dilate and do not respond to light; the corneal reflex disappears; the lower jaw drops cadaver-like; the pulse is either very small, rapid and flickering or imperceptible; the heart sounds are inaudible; bleeding of the wound ceases; respiration, although shallow and irregular, may continue for a short time until it ceases after a few spasmodic efforts similar to those observed in a dying person. Such a terrible scene is fortunately rare, and when it does occur it is most frequently met in anemic patients and in those the subjects of organic disease of the heart. Nevertheless

it may occur in persons in perfect health, more especially if they are apprehensive, nervous and excited before the operation. Prompt action is urgently indicated in all cases of anesthesia in which heart depression follows as one of the toxic effects of the anesthetic. Inversion of the body is the first measure to be employed in such cases. To accomplish this in the shortest space of time the foot-end of the operating table is elevated to an angle of at least 45 degrees. This position relieves the existing cerebral anemia, and by doing so the heart center and the heart likewise are stimulated by the increased supply of blood. The patient is at the same time placed most favorably for artificial respiration, which becomes necessary if there is, as is often the case, at the same time an inhibition of the respiratory function. Heart stimulants by hypodermic injection are always indicated. Of these digitalis or digitalin, strychnin, alcohol and coffee will prove most effectual. Tincture of digitalis or digitalin, the former in half-dram doses, the latter in doses of from 1/100 to 1/50 of a grain every ten to fifteen minutes until reaction takes place, will prove most successful. In very grave cases it should be combined with strychnin in decided doses. Camphorated oil administered in the same way, in doses of two or three syringefuls, is a very powerful cardiac stimulant entitled to confidence in such cases. Alcohol, in the form of whisky, brandy, cognac or rum, can be given at short intervals by subcutaneous injections or by the rectum. The application of dry heat to the extremities and trunk should never be neglected. Friction with hot cloths is a potent vascular stimulant and will be useful in aiding the other remedies in restoring the general circulation.

The physiologic effect of ether is closely allied to that of chloroform, differing, however, from the latter in that the intracranial blood supply is rather increased than diminished under full anesthesia, and it is, therefore, less likely to cause depression of the heart's ac-

tion. The ultimate toxic effects on the brain and spinal cord are almost identical with those of chloroform, and hence its use demands the same preliminary preparations and precautions during its administration. The cone must be held at first at least six inches from the face, and as the patient becomes accustomed to the penetrating odor of the vapor it is brought slowly nearer until it rests evenly on the surface and close enough to prevent the entrance of air underneath it.

It must not be forgotten that ether is a highly inflammable substance, and on this account special care must be exercised in its use in operations where the aid of lamp light is necessary and in the use of the Pacquelin cautery near the ether cone. Accidents during ether narcosis are met by the same treatment as has been described under the head of chloroform anesthesia.

The subject of "General Anesthesia" may be summarized briefly as follows: Proper preparation of the patient; adequate supply of the different antidotes and means of restoring suspended respiration; pure anesthetics and slow, continuous inhalation; dilution of the vapor with a liberal supply of air; unremitting vigilance and prompt, efficient and persistent treatment when unfavorable or alarming symptoms make it necessary to interrupt the anesthesia.

LOCAL ANESTHESIA.

Local anesthesia is the ideal condition under which to operate, as it relieves the operator from all anxiety regarding the dangers incident to the administration of a general anesthetic. Ice applied for a sufficient length of time produces a decided local anesthetic effect which includes the whole thickness of the skin. The degree of cold is increased and its anesthetic properties intensified by mixing common salt with crushed ice. The ice and salt should be well mixed and applied in a gauze bag or in a towel. As soon as the skin is whitened by the cold an incision can be made through it with little or no

pain. This is one of the simplest and at the same time most efficient procedures for preventing pain in excising small tumors of the skin and incising superficial abscesses.

Sulphuric ether is also used in the form of a spray. An ordinary hand spray answers an excellent purpose. Under the action of the spray the skin is partly frozen in a very few seconds, and a small incision can be made without any pain.

The anesthetic area in this method of local anesthesia is small, as the spray must be concentrated for the purpose of producing the anesthetic degree of cold. During the local reaction from the freezing process the patient experiences a prickling pain in the part, which can be relieved to some degree by immersion in warm water.

More effective than ether are the chlorids of methyl and ethyl. The first is applied to the skin in a compress

Small Glass Tube of Chlorid of Ethyl.

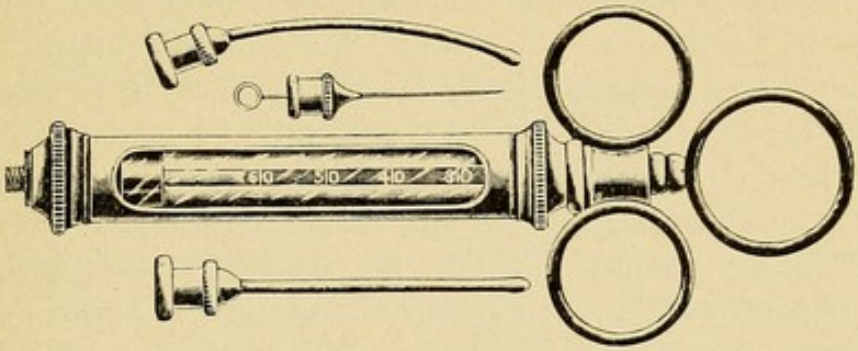
saturated with it, and held against the part to be frozen. The area of anesthetization is regulated in this instance by the size of the compress, possessing in this respect a decided advantage over the ether and chlorid ethyl spray. Chlorid of ethyl is so volatile that it boils at the temperature of the body.

For local anesthesia it is put up in glass tubes with a neck supplied with a metallic attachment from which the spray escapes under body temperature on removing the metallic cork. In using the spray the tube is held for a few moments in the hollow of the hand when the cork is removed and the spray begins.

The indications for the use of the chlorid ethyl spray are the same as for the ether spray.

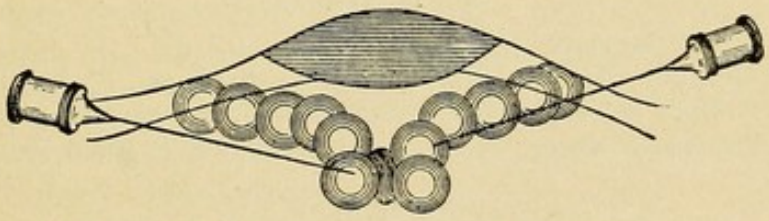
Cocain is one of the latest and most useful of local anesthetics. Applied to mucous surfaces in solution of

from 2 to 10 per cent., it produces a complete superficial anesthesia in from three to five minutes. It is used largely in ophthalmic surgery and operations upon mucous membranes. The surface must be carefully cleansed before the solution is applied. It has no effect upon intact skin. To procure anesthesia of the skin it is necessary to inject the solution into it, and not under it.



Lewis's Needles and Syringe for Infiltration Anesthesia.

If a certain area of skin is to be anesthetized, the injections are to be made with a hypodermic syringe with a fine point under the strictest aseptic precautions, using in preference a fresh solution, the asepticity of which can be depended upon. The needle point is entered obliquely, and enough fluid is injected to raise a circular portion of the skin, which then resembles a blister.



Showing Mode of Injecting Fluid Under an Abscess.

Tension is an important element in the anesthetization of the skin, as well as the local anemia produced by it. These punctures are made in a straight line if the incision is to be made in this direction, circular or oval, according to the nature of the operation, and sufficiently close together so that the different centers of local anes-

thesia touch each other. After the first puncture is made, the needle is always inserted through the skin already anesthetized.

Cocain is not an indifferent drug. Many cases of severe intoxication and a few deaths from its use have been reported. The toxic effects of cocain are manifested by pallor, dizziness, fainting, headache and delirium, symptoms which demand immediate suspension of its further use. To relieve this condition nitrite of amyl must be administered by inhalation, to be followed if the patient does not rally promptly, by subcutaneous injection of strychnin, and alcohol by mouth or rectum.

For subcutaneous use the cocain solution has been displaced almost entirely by Schleich's infiltration method. This method consists in the use of cocain and morphin in small doses in normal salt solution sufficient in amount to produce the necessary degree of tension and local anemia. Schleich recommends the following solutions, which are known as Nos. 1, 2 and 3, according to their strength:

SCHLEICH'S SOLUTION. NO. 1, STRONG.

Cocain muriate	0.2 gm. (3 gr.)
Morphin muriate	0.025 gm. (2/5 gr.)
Sodium chlorid	0.2 gm. (3 gr.)
Sterilized water	100 c.c. (3 2/5 fl. oz.)

NO. 2, NORMAL.

Cocain muriate	0.1 gm. (1½ gr.)
Morphin muriate	0.025 gm. (2/5 gr.)
Sodium chlorid	0.2 gm. (3 gr.)
Sterilized water	100 c.c. (3 2/5 fl. oz.)

NO. 3, WEAK.

Cocain muriate	0.01 gm. (1/6 gr.)
Morphin muriate	0.025 gm. (2/5 gr.)
Sodium chlorid	0.2 gm. (3 gr.)
Sterilized water	100 c.c. (3 2/5 fl. oz.)

To each of the solutions two drops of a 5 per cent. solution of carbolic acid may be added if they are intended for stock solutions to preserve them in a more nearly aseptic state.

Of the No. 1 solution, as much as 6.5 fluid drams may be injected during one operation; of the No. 2, as much as 3.4 fluid ounces, and of the No. 3, even a pint has been used with safety. The No. 2 solution is the one generally used, the strong and weak solutions being applicable only in exceptional cases. In infants and children, a general anesthetic is preferable to local infiltration by Schleich's method. No. 1, the strong solution, is seldom used.

Beta-eucain is now frequently used as a substitute for cocain, as it is less toxic and produces the same anesthetic effects. A 2 per cent. solution of this local anesthetic injected along the line of incision produces complete local anesthesia. A syringeful of a 2 per cent. solution (twenty minims) is injected into the subcutaneous tissues in three or four places and the syringe is again filled and used to moisten the wound, or inject if necessary, forty minims in all. The anesthesia thus produced lasts for half an hour.

Tropo-cocain is less irritating and toxic than cocain and consequently has been used quite extensively as a substitute for the latter drug as a local anesthetic by the infiltration method. The dose should not exceed from ½ to 1½ grains.

SPINAL ANESTHESIA.

Local anesthesia on a large scale has been practiced by injecting cocain or beta-eucain solution into the spinal canal. The injection is made with a hypodermic needle. The parts below the seat of injection are thereby rendered anesthetic.

This practice was first suggested by Corning and was revived and perfected by Bier. A large clinical experience has sufficed to render it almost obsolete at the present time.

CHAPTER XII.

PREPARATION OF PATIENT FOR LAPAROTOMY.

Except in emergency cases the preparatory treatment should be commenced three days before operation, during which time the patient is strictly confined to light, though nutritious, diet, and receives each day a warm bath, laxative, and, in operations on uterus or vagina, vaginal douche. To patients who have stricture of the esophagus, pylorus or intestine no cathartic is given, but, with the doctor's permission, give a high enema. For pyloric or intestinal obstruction wash out the stomach (gastric lavage).

On the evening before the operation and previous to shaving the abdomen denude the pubes with scissors and apply a potash soap poultice. After an hour remove the poultice and shave the entire abdomen, pubes and genitalia, scrub with hot water and potash soap; wrap a little cotton on the end of a match or probe to clean the umbilicus. Wash off with sterile water and scrub again, using turpentine and soap; rinse with warm water and dry with gauze; rub ether well into the skin, sponge with alcohol, then use warm bichlorid solution, 1:1000, and cover the field of operation with a three-yard compress of sterile gauze, saturated with warm solution of bichlorid, strength 1:3000 or 1:5000, oiled muslin or waxed paper, pad of cotton and inclose all in a snug abdominal bandage, held in place by perineal straps.

For abdominal and vaginal hysterectomy, also for operations on cervix, the vagina should be disinfected in the following manner: Wrap gauze around the index finger, and mop with hot water and soap; then use clear water, give a douche of bichlorid 1:4000 and pack cervix with a strip of iodoform gauze. One hour before

the operation remove the gauze and give corrosive sublimate douche and mop vagina thoroughly with alcohol before repacking.

Each of the following articles should be in readiness before commencing to prepare the patient: One pitcher of hot water, bottle of warm bichlorid, two basins, small bottle of turpentine, ether and alcohol, brush, potash soap, razor, probe tipped with cotton, several pieces of gauze, oiled muslin, gutta-percha tissue or waxed paper, cotton pad, abdominal binder, perineal straps, eight safety pins and a pair of scissors.

The patient receives a very light supper and no breakfast. One-half ounce of brandy diluted with water may be given four hours previous to the operation.

A specimen of urine should be placed in a sterile bottle for examination.

Five hours before the operation give a high enema of castile soap suds, followed by a small one of clear water to rinse the bowel.

Before leaving the room the patient is attired in clean clothing, including a pair of stockings; the hair plaited tightly in two braids.

After patient is placed on the operating table the head-nurse applies laparotomy sheet and surrounds field of operation with dry sterilized towels. The operator and his assistants, having completed the thorough disinfection of hands, are dressed in sterilized operating gowns and caps or sterile towels are pinned around each one's head. The head-nurse takes charge of the instruments, ligatures and sutures. Immediately before the incision is made she pours alcohol upon the hands of the operator and his assistants. She is then prepared to anticipate every want of the surgeon, beginning with the scalpel, following with forceps, scissors, etc., as may be required. Having provided a separate tray, she brushes the soiled instruments when necessary, and takes each needle from the surgeon when he has

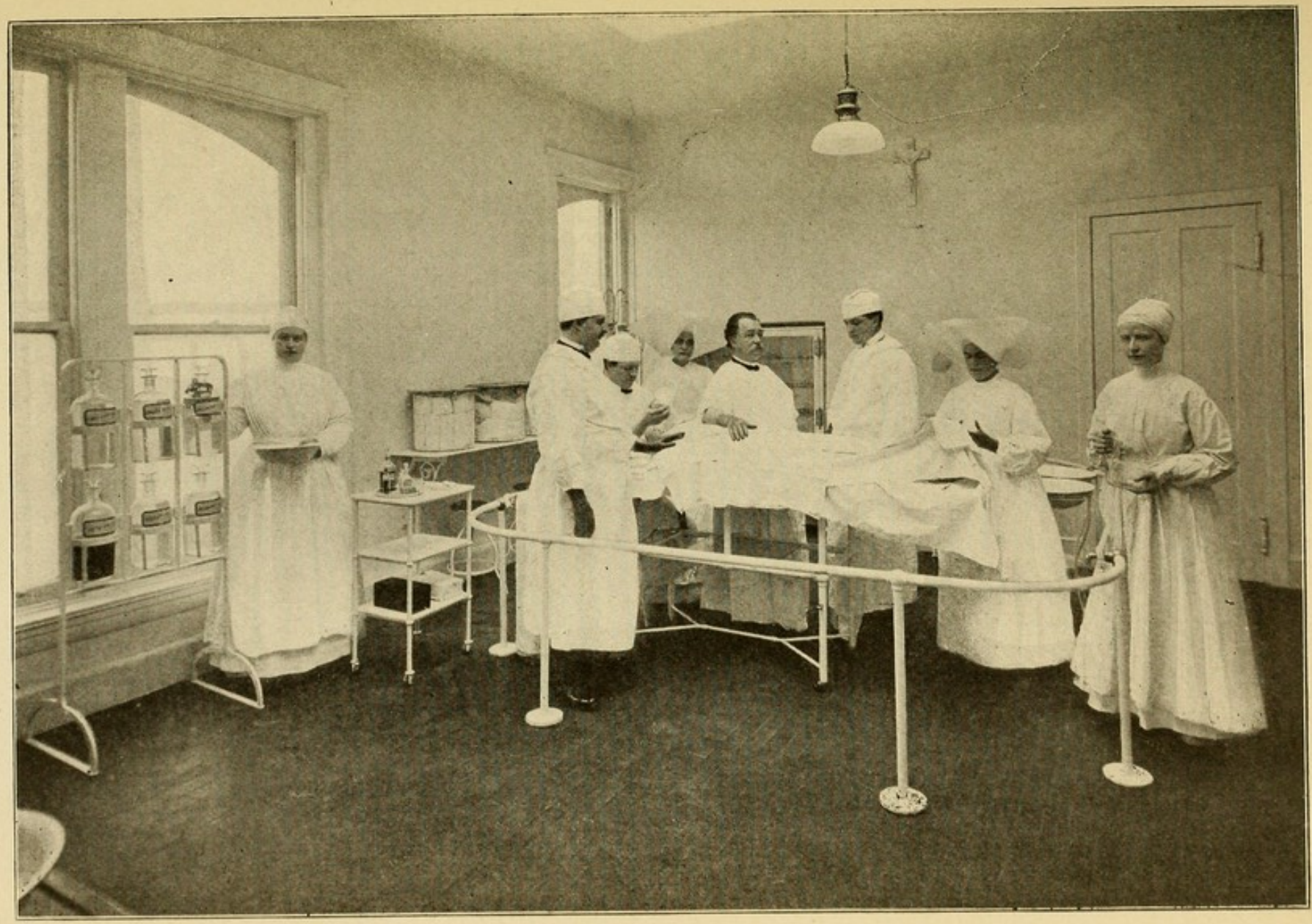
finished with it, for, if left lying about, serious injury to the patient may result.

The senior nurse takes charge of the sponges and laparotomy compresses. She stands conveniently near the assistant who is to do the sponging; if asked to do the sponging, she does not wipe, but merely compresses the bleeding parts, allowing the sponge to absorb what it will. After the peritoneum is opened, she hands the small sponges on a hemostatic forceps; this is called "steel-sponge." The laparotomy compresses will then be needed. These, before being handed to the surgeon, are wrung out of a hot solution of sodium chlorid, 6/10 of 1 per cent. (about 1 dram of salt to 1 quart of water, called physiologic solution). A hemostatic forceps is attached to the tape, which is securely fastened to an end of each of the compresses. The nurse, being accountable for compresses, keeps a record of them, and before the incision is closed she counts them again to make sure that none is left in the abdomen.

Upon the junior nurse devolves the care of the doctors' hands and brows. If anything not aseptic has been touched by them, she hands bichlorid solution, or, when only blood is to be removed, a basin of warm physiologic solution suffices.

For a laparotomy the temperature of the operating room should be 75 to 80 degrees F. Consequently the doctors will perspire profusely; a few drops of perspiration falling into the open wound might cause sepsis; therefore, to avoid this danger, the nurse must wipe the doctors' brows. This nurse must be on the alert to notice and supply every want, if so directed by the head-nurse.

One of the highest qualifications of a good nurse in the operating room is to anticipate the wants of the surgeon.



Senn's Operating Room, St. Joseph's Hospital, Chicago.

CHAPTER XIII.

AFTER-TREATMENT FOR LAPAROTOMY PATIENTS.

In the treatment after a laparotomy, the nurse should carefully observe the condition of the patient, and give timely information of the onset of serious complications, the most important of which are shock, secondary hemorrhage and peritonitis.

The patient is carefully conveyed without raising head or chest to the bed, which has been previously prepared with a rubber and a draw sheet, well supplied with hot-water bags or bottles, for armpits and lower extremities. Cover the hot-water bags and bottles that they may not burn the insensible patient. (Much harm has been done by not observing this precaution, and a number of suits for damages have been based upon carelessness or negligence in this respect.) The patient is placed in the dorsal (recumbent) position with the limbs flexed to relax the abdominal muscles, and a pillow placed under the knees to support them. This position is retained for forty-eight hours, during which time the patient is constantly watched. At the termination of this period the patient may be carefully turned on either side. Pulse and temperature should be taken immediately after every operation; temperature should be taken by rectum. (Never take aged persons' temperature in the axilla.)

Hypodermatic syringe, brandy, strychnin, nitroglycerin, digitalis, flannel bandages and blocks to elevate the foot of the bed should be kept in readiness.

All articles and medicines necessary in the after-treatment should be arranged on a table in the patient's room before the return of the patient from the operating room.

The distressing thirst is relieved by sips of hot water

given at short intervals or by fragments of cracked ice. No food by mouth should be given during the first forty-eight hours. In cases of persistent vomiting stimulants and food are administered by rectum.

A beginning tympanitis calls for an effective enema. Of the different enemata employed under such circumstances, none acts more promptly than one consisting of a pint of milk and an equal amount of molasses, which should be thoroughly mixed and heated to the usual degree of temperature (about 100 degrees F.).

DIET.

After a laparotomy the patient receives nothing in the form of nourishment by mouth for at least thirty-six hours. The mouth should be frequently sponged and the lips moistened. A piece of ice wrapped in gauze and rubbed over the lips is very soothing to the patient, and in cases of extreme thirst very hot water may be given in one-half ounce doses, but as seldom as possible. Small pieces of ice in the form of ice pills are sometimes allowed. Hot water, being a stimulant, is preferred to ice, which is a sedative. Another objection is the germs which it contains; however, the following is a point in favor of ice—nervous vomiting may be controlled by rubbing it over the lips. The best method in such cases is to give nothing by mouth, but to relieve thirst by rectal or subcutaneous injections of physiologic solution, thus securing for the stomach complete rest. When giving food or medicine by mouth assist the patient as much as possible. Fluids should be administered by the use of curved glass tubes or feeders; if extremely weak, nutritive enemata are prescribed.

In the absence of all bad symptoms, toward the end of the second day, the patient may have a little peptonized milk, beef essence, chicken broth or kumyss, varying in amount from one-half ounce to four ounces, according to the condition of the patient, increasing the quantity gradually. The majority of laparotomy cases

require a cathartic as soon as they recover from the effects of the operation. A teaspoonful of sulphate of magnesia dissolved in hot water and given every hour until the bowels move freely, is the best course to pursue in relieving the patient and in guarding against peritonitis. If the patient is vomiting and unable to take a cathartic and not relieved by the milk and molasses enema, give a high enema of magnesia sulphate, ounces two; glycerin, ounces four; and water, one pint; use the rectal tube.

A hot-water bag applied over the bladder often prevents the retention of urine; if obliged to catheterize, which should not be done under eight hours after operation, use a soft rubber catheter (Nélaton); see that it has been boiled and afterwards kept aseptic.

WOUND COMPLICATIONS—SHOCK, HEMORRHAGE, ETC.

Surgical Shock.—This may result either from injury or operation. It is characterized by its sudden onset and great prostration.

Symptoms.—Almost imperceptible pulse, subnormal temperature, feeble and often irregular and sighing respiration, countenance pale and body cold to the touch.

Treatment.—Elevate the foot of the bed (by force of gravity, the blood will flow toward the head); surround the patient with hot-water bags; give brandy hypodermatically and give strychnin, grain 1/30; repeat in three hours if necessary; atropin, grain 1/60, for the respiration.

Ether administered subcutaneously is also a prompt heart stimulant. Caffein or strong black coffee is a simple and excellent heart stimulant. Saline infusion subcutaneously, intravenous or by rectum, is frequently called for in such cases. With the doctor's permission have the patient inhale amyl nitrite; nitroglycerin may also be given. Camphorated oil given hypodermatically is a favorite stimulant, and should always be kept in readiness.

Internal and secondary hemorrhages often simulate shock very closely, but the symptoms appear gradually and correspond in severity with the amount of blood lost.

The most prominent symptoms are: Dilated pupils, extreme pallor of face, subnormal temperature, wiry, rapid pulse, frequent yawning, cold perspiration, extreme thirst followed in grave cases by convulsions and death.

Notify the doctor at once. Keep the patient quiet; give no stimulants, as they would increase the heart's action and thereby aggravate the hemorrhage; apply external heat. While waiting for the doctor, prepare physiologic solution, four-ounce rectal injecting syringe, flannel bandages and the following

Brandy.

Strychnin.

Digitalin tablets.

Nitroglycerin tablets.

Tincture of digitalis.

Hypodermatic syringe.

Amyl nitrite pearls, and napkin in which to crush and apply.

Electro-magnetic battery, with glass of water to moisten electrodes.

The doctor, after arresting the hemorrhage, may resort to intravenous infusion, or may order four to sixteen ounces of physiologic solution given by rectum.

If the patient is sinking rapidly, the nurse is allowed to make autotransfusion, by elevating the foot of the bed and by elastic compression or constriction, but only one limb at a time, taking care that the constriction never be continued for more than two hours at a time.

PERITONITIS.

(Inflammation of the peritoneum, which is the serous membrane lining the abdomen.)

This is the next danger to be apprehended after laparotomy.

Symptoms.—High temperature, quick, wiry pulse,

vomiting, distended abdomen and severe, continuous pains.

In the most serious forms of septic peritonitis the temperature is sometimes subnormal, pain absent as well as tympanites, but the pulse and dry tongue indicate the existence of progressive sepsis.

The milk-molasses, or a four-ounce enema of glycerin and water, equal parts, will sometimes relieve tympanitic pains immediately. However, the patient should have free defecation at once. Give a saline cathartic; the action of saline cathartics can be hastened by the administration of a turpentine enema (one-half ounce of turpentine; two ounces of castor oil to one quart of soap suds). A brisk saline cathartic promotes absorption of fluids and bacteria from the peritoneal cavity, and by so doing removes the essential cause of peritonitis.

Patients with tympanites should have the abdomen examined frequently for the first forty-eight hours.

One exception to the rule of giving a cathartic is when the operation is performed on the intestine and in the formation of an artificial anus. In the latter case the bowel is kept at rest until it is incised, which is usually done on the second or third day after the operation.

In cases of beginning peritonitis and intestinal obstruction, the nurse is, if requested, to administer a high rectal enema, for which she should prepare one gallon of soapsuds, adding four ounces of sulphate of magnesia; four ounces of castor oil and two ounces of turpentine; mix well. Place the patient on the right side; elevate the foot of the bed three feet, raise the irrigator five feet above the level of the patient; insert the rectal tube.

In the case of an adult, administer the whole gallon, which will take from one-half to one hour; assist the patient to retain the solution as long as possible, by compressing the anus with a towel, after which, to fa-

cilitate evacuation, lower the foot of the bed, and elevate the head of the bed at least two feet.

SEPTICEMIA.

(A general infective process from absorption of septic products usually the result of infection with pus microbes.)

Septicemia usually begins with a chill or sense of chilliness, followed by a gradual rise of temperature. The pulse is rapid, feeble and compressible. The tongue is usually furred and dry. Headache is often complained of in the beginning of the attack. The urine is scanty and heavily loaded with urates. Delirium, restlessness and insomnia are symptoms which denote approaching danger.

The debilitating effect of toxins on the heart are met by the timely and judicious administration of stimulants, during which the condition of the pulse should be frequently noted.

Treatment.—Alcoholic stimulants are to be given in doses sufficiently large to improve the character of the pulse and at sufficiently short intervals to maintain this effect without interruption. Brandy or whisky in doses of an ounce every two hours diluted with water is most to be relied upon, but champagne and Greek sherry are excellent substitutes. Concentrated liquid food, like beef tea, milk or eggnog must be given at regular intervals to assist the action of the stimulants in sustaining the heart's action.

Digitalis, strophanthus, strychnin and atropin in small doses are excellent cardiac tonics and stimulants, and are indicated in cases where the pulse is very rapid and soft, denoting a feeble peripheral circulation from a weakened heart.

SAPREMIA.

Sapremia is caused by the absorption of ptomains from putrefying substances in the body, as, for instance, a decomposing blood clot. The symptoms pointing to

intoxication usually yield promptly to the removal of the putrefying material and thorough disinfection.

PYEMIA.

Pyemia is one of the gravest of all wound complications. It develops in connection with a suppurating focus, and is indicated and characterized by severe chills at irregular intervals and an irregular temperature. If the patient lives long enough, suppuration in one or more parts of the body is to be expected. The general treatment of sapremia and pyemia is the same as that of septicemia.

CHAPTER XIV.

INSTRUMENTS, SUTURING MATERIAL AND DRESSINGS REQUIRED IN SURGICAL OPERATIONS.

Surgeons differ in their methods of closing an abdominal incision. Some use silver wire, others silk, silkworm gut or catgut, as suturing material. Some unite the incision with one row of sutures, which are made to include the entire thickness of the margin of the wound. Keith's long needles, armed with the silkworm gut, silk, or silver wire. are best adapted for this kind of suturing. Most surgeons now employ four rows of sutures. The first row includes the peritoneum, the second, the fascia of the recti muscles, the third, the skin and the underlying fat tissues, and the fourth, the skin only.

The peritoneum is sutured with very fine silk or No. 2 catgut, for which a fine, round, curved surgeon's needle is used. The second row consists of catgut sutures, No. 3, which are inserted with a larger, full-curved needle. The third row of silkworm gut sutures requires a large curved surgeon's needle. The horsehair sutures constitute the fourth row; for these sutures a small glover's needle or surgeon's needle answers the best purpose. The subcuticular suture (Halsted) is used by some in uniting the skin. These are fine catgut sutures, from which the epidermic layer of the skin is excluded.

GASTRO-ENTEROSTOMY.

(Gastro-enterostomy: Formation of a new opening between stomach and intestine.)

This operation is required for patients who are suffering from carcinoma or cicatricial stricture of pyloric orifice of the stomach. Required for the operation are the following instruments and suturing material:

Two scalpels.

Two tissue forceps.
Two artery forceps (8 inches).
Eighteen hemostatic forceps.
One needle holder.
Murphy's button.
McGraw's solid rubber cord.
One Kocher's director.
One probe.
One blunt hook.
One tenaculum.
One pair small blunt retractors.
One pair large blunt retractors.
One pair scissors, straight.
One pair scissors, curved, blunt point.
One pair scissors, curved, sharp point.
One pair Senn's perforated decalcified bone plates (large size).

LIGATURES AND SUTURES:

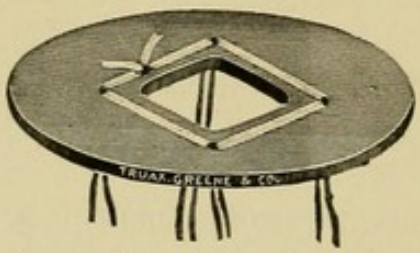
Catgut, No. 1 and No. 2, ten inches long.
Braided silk, No. 5, ten inches long.
Two cambric needles, with spring eye, for Lembert sutures.
Four cambric needles for braided silk, No. 5.
Two small round, curved needles for catgut, No. 2, for peritoneal sutures.
Three surgeon's needles for catgut, No. 3, to suture the fascia.
Three glover's or surgeon's needles for horsehair for superficial sutures.
Six glover's or surgeon's needles for silkworm gut for deep sutures.

DRESSINGS, ETC.:

Boro-salicylic acid powder, 4:1.
One-half yard sterilized gauze.
A large pad of sterilized cotton.
Abdominal bandage.
Perineal straps and safety pins.
Collodion in an aseptic glass.

Camel's-hair brush.
Two aseptic adhesive plaster strips.
Two dozen sterilized towels.
Twelve sterilized gauze laparotomy compresses.
Supply of sterilized gauze sponges.
Three sterilized sheets.
One sterilized laparotomy sheet.
Bichlorid, alcohol and physiologic solution for the hands.

The Senn bone-plates may be purchased already prepared, but the sponges that are in the bottle in which they are preserved should be moistened at least every six months with a solution of alcohol, glycerin and water, equal parts. When about to use the plates wash in carbolic acid, 5 per cent., and rinse in physiologic solution. The lateral or fixation sutures are attached to a cambric needle having a spring eye.



Senn's Decalcified Bone-plates.

GASTROSTOMY.

(Formation of a stomach fistula made necessary in carcinomatous and in some cases of cicatricial stricture of the esophagus.)

The fistula is made for the purpose of introducing food into the stomach. Preparations same as for gastro-enterostomy, with the addition of a non-fenestrated rubber tube the size of a large catheter and eight inches long and the exclusion of Murphy's button, bone-plates, and McGraw's rubber cord.

GASTRECTOMY.

(Excision of stomach.)

The same preparations as for gastro-enterostomy, excluding Murphy's button, McGraw's rubber cord and bone-plates.

ILEOCOLOSTOMY.

(Anastomosis between ileum and colon.)

Prepare second size plates, instruments, sutures, etc., as for gastro-enterostomy.

INGUINAL COLOSTOMY. (Maydl's Operation.)

(Incision of colon to form artificial anus.)

Two scalpels.
Two tissue forceps.
Six hemostatic forceps.
One needle holder.
One Kocher's director.
One probe.
One pair blunt hook retractors.
One pair deep hook retractors.
Three pairs scissors.
Glass cylinder, size of a large lead pencil, three inches long, covered with iodoform gauze, which should project well beyond the ends of the glass tube.

SUTURES:

Three small, round, curved needles for braided silk, No. 4, to suture the peritoneum to the colon.
Two surgeon's needles and two glover's needles in reserve.

Unless the symptoms are urgent, the colon is anchored in the abdominal incision by the first operation and the bowel is not opened until the second or third day after adhesions have formed. For the second operation prepare a square of oiled silk or gutta-percha tissue, 6 x 6 inches, with circular fenestrum in center; seal edges with chloroform to protect the wound; the cotton under the impermeable cover is sealed with collodion.

One tenotome.
Two tissue forceps.
Two hemostatic forceps.

A pad of cotton.
Hygroscopic gauze and bandage.
Sterilized sheets, towels, gauze sponges and gauze compresses.

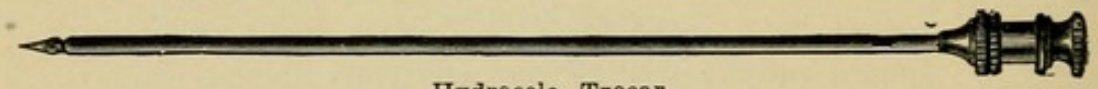
HERNIOTOMY.

(Operation for strangulation and radical cure.)

Umbilical hernia, inguinal hernia, femoral hernia, and ventral hernia.

Hernia is a protrusion of a viscus from its normal position. Viscus is any organ of the thorax or abdomen. (Hernia may also occur in various parts of the body.)

Two scalpels.
One bistoury, curved, probe pointed.
Two tissue forceps.
Two hemostatic forceps, long.
Eighteen hemostatic forceps.
One needle holder.



Hydrocele Trocar.

One pair retractors, small.
One pair retractors, large.
Three pairs scissors.
One pedicle needle.
One Kocher's director.
One probe.
One tenaculum hook.
One blunt hook.
One hydrocele trocar.

LIGATURES:

Catgut, No. 2, twenty inches long, for pedicle needle, for double ligature, used to ligate the sac and the omentum when it is diseased or can not be reduced. (Braided silk is sometimes used.)

SUTURES:

Three cambric needles for braided silk, No. 4, to suture the intestine if resection is made.

Three small curved needles for catgut, No. 3, to suture fascia of pectineus muscle to Poupart's ligament in femoral hernia.

(A hernial protrusion below Poupart's ligament constitutes a femoral hernia, which is more common in women.)

Three small round curved needles for catgut, No. 2, to suture peritoneum.

Six glover's or surgeon's needles for silkworm gut for wound sutures.

Two glover's or surgeon's needles for horsehair for superficial sutures.

DRESSING:

Boro-salicylic acid powder, 4:1, with collodion dressing.

Sterilized sheets, towels, gauze sponges, gauze compresses, safety pins, bandages and cotton.

Bichlorid solution, alcohol, plenty of hot and cold normal saline solution for the hands.

APPENDECTOMY.

(Excision of appendix vermiformis for appendicitis.)

Two scalpels.

Two tissue forceps.

Four hemostatic forceps, long.

Eighteen hemostatic forceps.

Three pairs scissors.

One needle holder.

One pedicle needle.

One pair small retractors.

One pair large retractors.

One Kocher's director.

One grooved director.

Sterile toothpick tipped with cotton to apply carbolic acid, 95 per cent., to cauterize the mucous membrane of the stump of the appendix.

Iodoform for the stump.

LIGATURES:

Catgut, No. 2, or braided silk, No. 5, 20 inches long, for pedicle needle, used to tie off the adhesions and the appendix.

Catgut, ten inches long, for single ligatures.

SUTURES:

Catgut, No. 1, for cambric needle, or braided silk, No. 4, used to bury the stump of the appendix by suturing over it the adjacent serous surfaces. For this purpose the purse-string suture of silk or catgut is now frequently resorted to.

(In all cases in which pus is found, large fenestrated tubular drains must be kept in readiness.)

Six glover's needles for silkworm gut for deep sutures.

Two small round curved needles for catgut, No. 1, or fine silk for peritoneal sutures.

Two small round curved needles in reserve.

Two rubber drains and narrow strips of iodoform gauze for capillary drainage.

DRESSING, ETC.:

Boro-salicylic acid powder, 4:1.

Sterilized gauze, one yard.

A large pad of sterilized cotton.

Two aseptic adhesive plaster strips.

Abdominal bandage.

Perineal straps.

Twelve sterilized towels.

Twelve sterilized gauze compresses.

Twelve sterilized safety pins.

Three sterilized sheets.

One sterilized laparotomy sheet.

Supply of sterilized gauze sponges.

Collodion in an aseptic glass and camel's-hair brush.

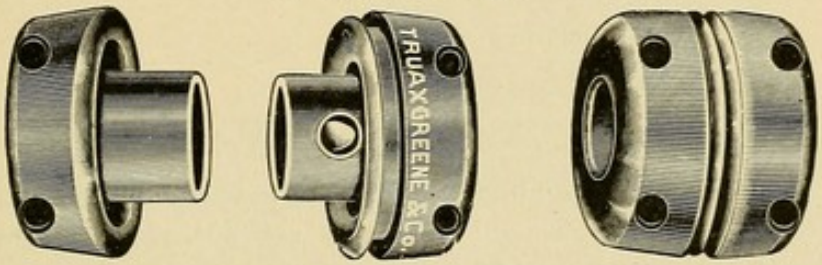
Bichlorid solution, 1:1000, alcohol and physiologic solution for the hands.

CHOLECYSTENTEROSTOMY.

(Formation of a communication between the gall bladder and the upper part of the small intestine.)

Two scalpels.
Two tissue forceps.
Two Billroth's hemostatic forceps.
Murphy's button, small.
Two long hemostatic forceps.
Eighteen hemostatic forceps.
Six Tait's hemostatic forceps.
Three pairs scissors.
One Kocher's director.
One grooved director.
One needle holder.

Murphy's Button.



Open. Closed.

One pair small retractors.
One pair large retractors.
Exploring syringe.
Large and small probes.
Fenestrated dull curette.
Small curved forceps.

LIGATURES:

Catgut, No. 2, ten inches long.

SUTURES:

Three round curved needles for braided silk, No. 7.
Three cambric needles for fine silk.
Six surgeon's needles for silkworm gut for deep sutures.

DRESSING, ETC.:

Sterilized gauze, pad of sterilized absorbent cotton, aseptic adhesive plaster strips, abdominal bandage, perineal straps, safety pins, sheets, towels, gauze compresses, gauze sponges.

CHOLECYSTOTOMY.

(Opening of the gall bladder.)

Cholecystotomy in two stages. In these cases the gall bladder is anchored by suturing with fine round curved needles and braided silk, No. 5, to the parietal peritoneum and the wound tamponed with iodoform gauze. On the third day, adhesions having formed, the gall bladder is opened and drained. It is well in every case of gall bladder operation to prepare the following:

One tenotomy knife.

One small dull curette.

One sharp curette.

Rubber tubing for drainage.

CHOLECYSTOSTOMY.

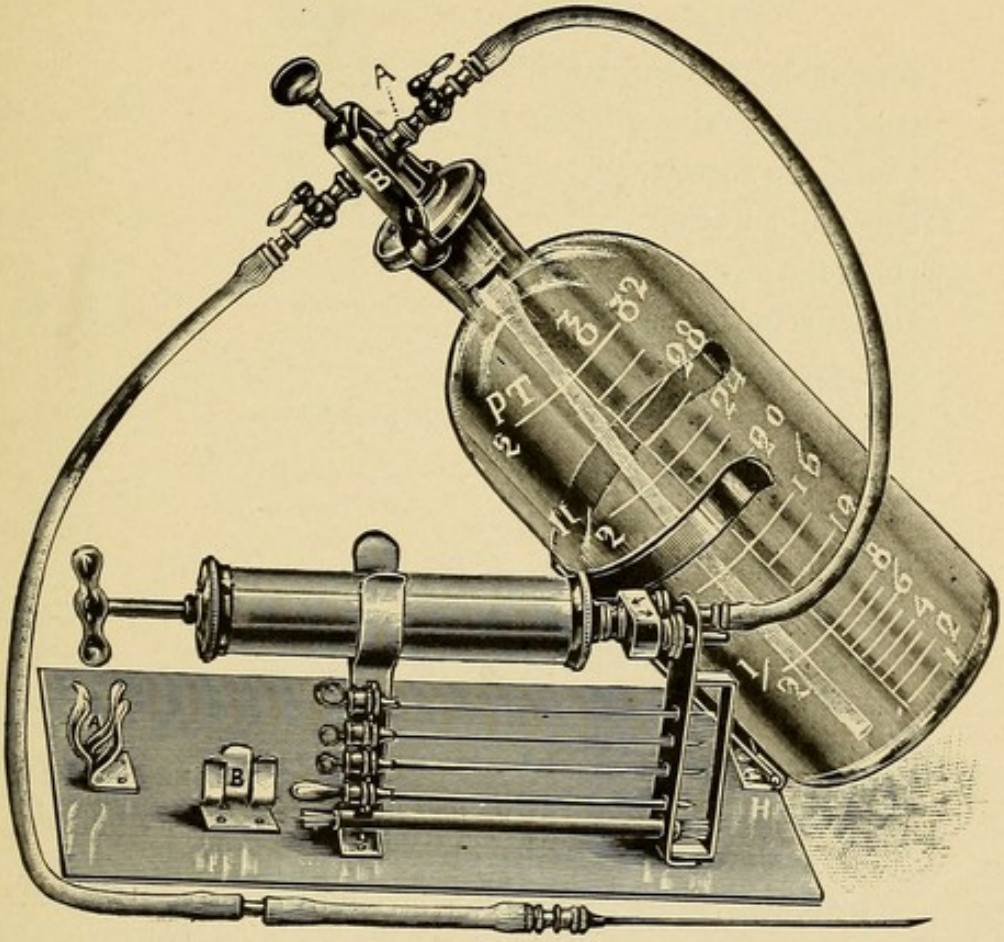
(Formation of a biliary fistula for obstruction of cystic or common bile duct caused by biliary calculus, cicatricial stenosis or malignant diseases.)

Operation is performed frequently for the removal of gallstones. Preparation same as for cholecystenterostomy. In all operations upon the gall bladder an exploring syringe and bottle aspirator should be kept in readiness and in good working order.

CHOLECYSTECTOMY.

(Excision of gall bladder.)

Requirements same as for cholecystenterostomy, minus the Murphy button and curettes, with the addition of one pedicle needle and braided silk, No. 8, or catgut, No. 4, twenty-four inches long, two pedicle forceps, and sterile toothpick with one point charged with pure carbolic acid.



Potain's Aspirator, with Bottle.

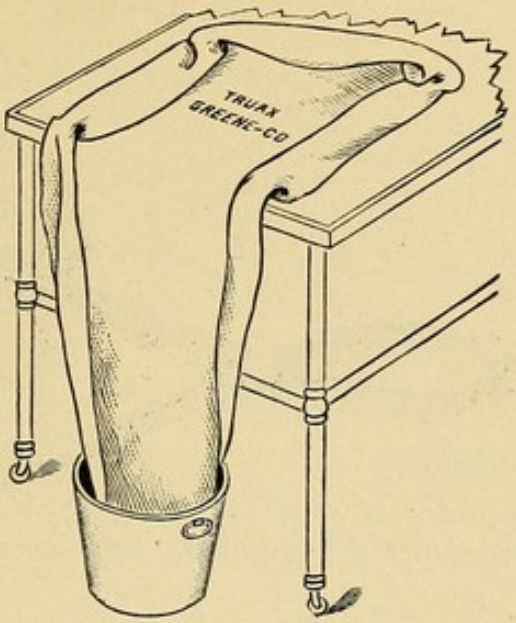
CHAPTER XV.

GYNECOLOGIC OPERATIONS—UTERINE CURETTAGE.

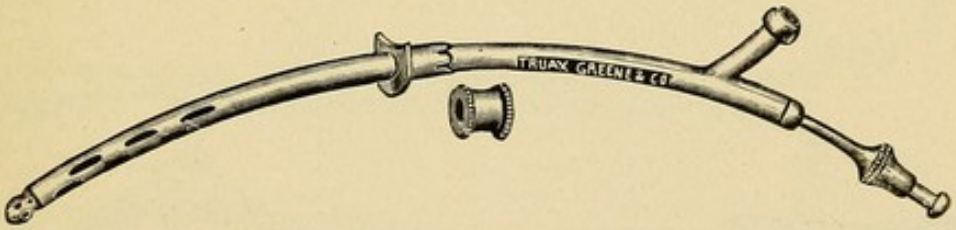
(Scraping the interior of the uterus.)

One small uterine dilator.
One large uterine dilator.
One sharp curette.
One dull curette.
One uterine sound.
One uterine probe.
One dressing forceps.
One uterine applicator tipped with cotton.
Two vaginal retractors.
One tenaculum forceps.
One vulsellum forceps.
One pair scissors.
Two tenaculum hooks.
One intrauterine douche tube.
One tissue forceps.
Four hemostatic forceps or sponge holders.
Tincture of iodin, vaselin, glycerin, iodoform powder, iodoform gauze strips, sterile lamb's wool and cotton. Either of the latter may be used for tampons.
Corrosive sublimate solution, 1:4000, boric-acid solution, 2 per cent.; one-half gallon each for irrigation.
Gynecologic suit, Dudley's pad, eight sterilized towels, three sheets, leg holders, sterilized gauze sponges, perineal dressing.

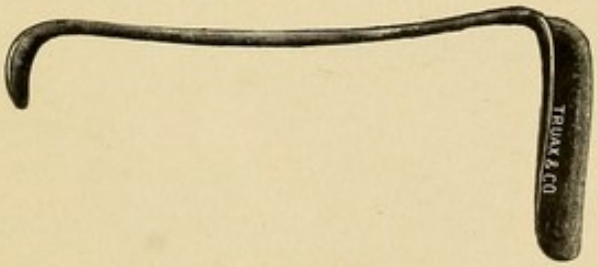
Caution.—The intrauterine douche tube is a very useful, though dangerous, instrument in the hands of an unskilled nurse.



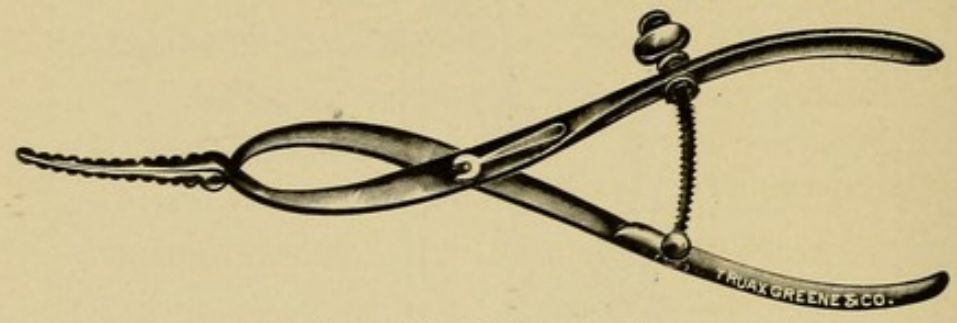
Dudley's Pad.



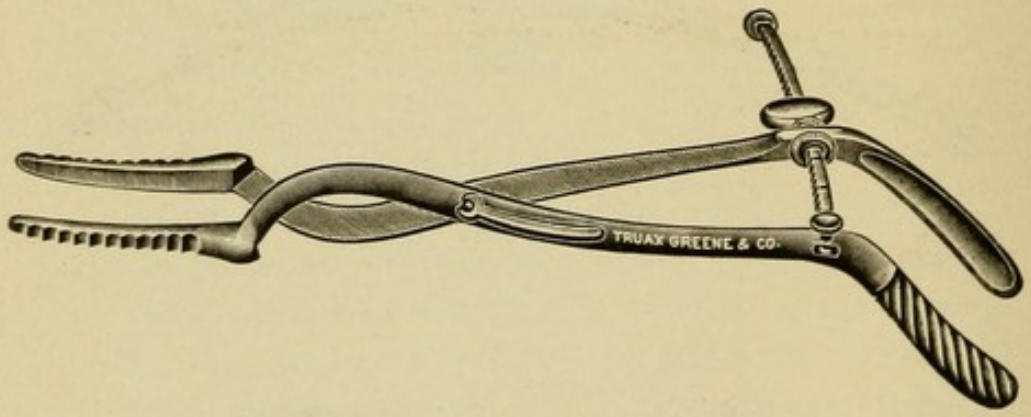
Wigmore's Intrauterine Douche Tube.



Speculum.



Leonard's Dilator, Small.



Wathen's Dilator, Large.

PREPARATION AND USE.

First.—Boil for fifteen minutes in soda solution.

Second.—Expel the air by allowing the solution to run freely before inserting.

Third.—Do not insert beyond the shield.

Fourth.—Hold in position while using.

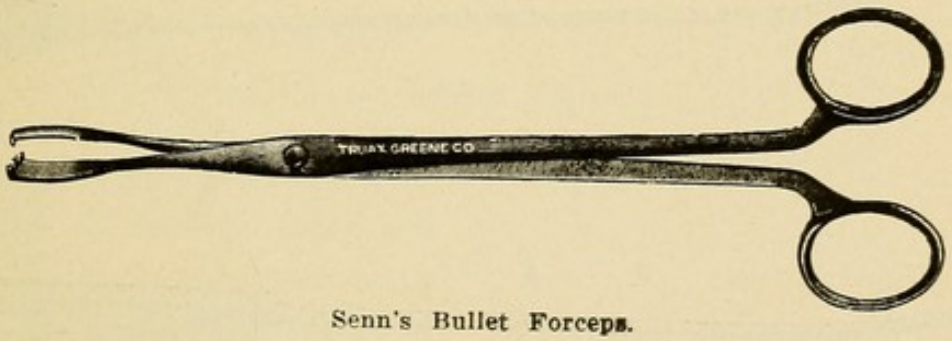
Fifth.—Use no force.

Sixth.—Attach a rubber tube to the back-flow canula and provide a basin for the escaping fluid.

PERINEORRHAPHY AND TRACHELORRHAPHY.

(Perineorrhaphy: Suture of the perineum.)
(Trachelorrhaphy: Suture of the cervix.)

Two scalpels.
Two tissue forceps.
Twelve artery forceps, Kocher's.
Senn's bullet forceps.

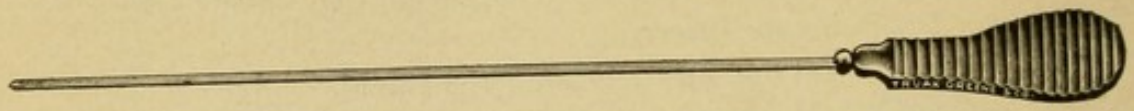


Senn's Bullet Forceps.

One vulsellum forceps.
One tenaculum forceps.
One needle holder.
Two tenaculum hooks.
Two pairs scissors, straight and curved on the flat.
One uterine dressing forceps.
One uterine sound.
One uterine douche tube.
Two vaginal retractors.

LIGATURES:

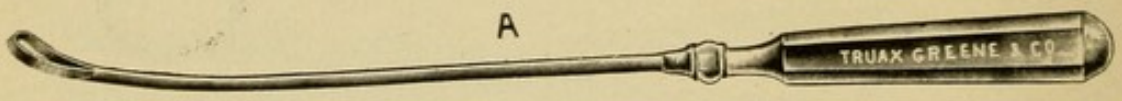
Catgut, fine and medium, ten inches long. If silk is called for, give No. 5 and No. 7.



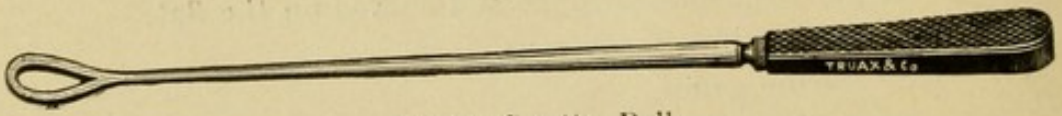
Emmet's Plain Applicator.

Sim's Uterine Probe.

Simpson's Uterine Sound.



Uterine Curette, Sharp.



Uterine Curette: Dull.

SUTURES:

Two Hagedorn needles (full curve) for braided silk. No. 8, for stay sutures.

Two surgeon's needles (full curve) for medium catgut.

Two curved round needles for medium catgut.

Three full-curved Emmet's needles for catgut.

Three Emmet's needles, quarter-curved, for silkworm gut.

Bichlorid solution, 1:4000, for irrigation.

Boric-acid solution, 2 per cent., for irrigation.

Vaselin (hand vaselin on an aseptic sponge).

Pure iodoform.

DRESSING, ETC.:

Five strips of iodoform gauze, three inches in width.

Two strips of iodoform gauze, eight inches in width.

Sterilized cotton pad.

"T" bandage.

Leg holders.

Eight sterilized towels.

Three sterilized sheets.

Sterilized gauze sponges.

Gynecologic suit.

If the leg holders are not convenient, fold a sheet in triangular shape, roll it towards the point, place under the knees of the patient, drawing them up, bring one end over the shoulder and under the opposite arm and tie.

After operation, a towel should be pinned around the limbs to hold them in position. These patients are confined to light diet for a few days.

COLPORRHAPHY.

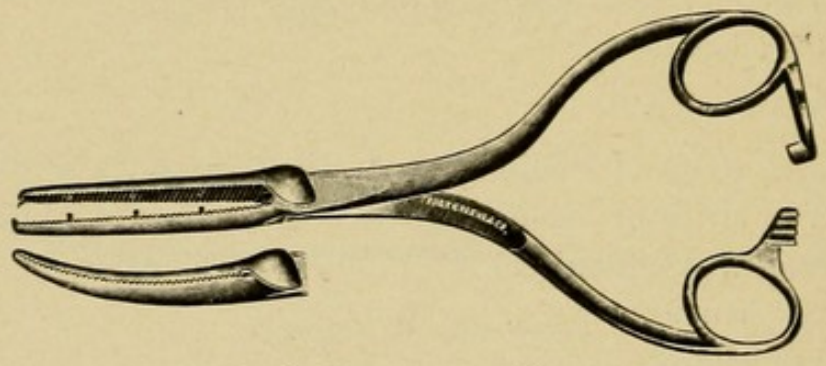
(Suture of the vagina.)

Same preparation as for perineorrhaphy.

VAGINAL HYSTERECTOMY.

(Excision of uterus. Removal of uterus through the vagina.)

One scalpel.
One bistoury.
Two tissue forceps.
Two vulsellum forceps, six pronged.
Two vulsellum forceps, four pronged.
Two vulsellum forceps, two pronged.
Eight clamp forceps, eight inches.
Eight Kocher's artery forceps.
Pozzi's hysterectomy forceps.



Pozzi's Hysterectomy Clamp.

Four long, curved, artery forceps, Pean's.
Three long, curved, artery forceps, Spencer Wells.
One uterine dressing forceps.
Two pairs vaginal retractors.
One pair scissors, curved, blunt pointed.
One pair scissors, curved, sharp pointed.
One pair scissors, straight.
Two Sim's specula in reserve.
Two tenaculum hooks.
One pedicle needle.
One Sims' self-retaining catheter.
One elastic rubber catheter.

LIGATURES:

Catgut, No. 4 and No. 5, twenty-four inches long, for two pedicle needles for double ligature.

Catgut, No. 2 and No. 3, ten inches long, for single ligatures. If silk is called for, give No. 7 or No. 8, same length.

Sutures may be required. Prepare round curved needles, small, medium and large, for catgut.

DRESSING, ETC.:

Six strips of iodoform gauze, eight inches in width.
Three strips of iodoform gauze, three inches in width.
Hygroscopic gauze.
Sterilized cotton pad.
"T" bandage.
Gynecologic suit.
Three sheets.
Eight towels.
Gauze sponges.
Dudley or Kelly's pad.
Leg holder.

SOLUTIONS:

Boric acid, 2 per cent.; bichlorid, 1:4000. One-half gallon of each for irrigation.

OOPHORECTOMY OR SALPINGO-OÖPHORECTOMY.

(Excision of Fallopian tube and ovary for pyosalpinx.)

HYSTEROPEXY.

(Abdominal Fixation of Uterus.)

Pyosalpinx, pus in the Fallopian tube; hydrosalpinx, water in the Fallopian tube; ovarian tumor, solid, cystic or dermoid.

Two scalpels.
Two tissue forceps.
Six long hemostatic forceps.
Twenty-four hemostatic forceps.
One needle holder.
Two curved pedicle forceps.
Two vulsellum forceps, two pronged.
One "T"-shaped artery forceps.
One pedicle needle.

One Kocher's director.
One grooved director.
One exploring syringe.
One bottle aspirator.
Rubber drains.
Two glass drains (Keith's) lightly packed with a strip of iodoform gauze.
Three pairs scissors.
One pair deep retractors.
One pair small retractors.
One small probe.

LIGATURES:

Catgut, No. 2, ten inches long, for single ligatures.
Catgut, No. 4 and No. 5, twenty-four inches long, for pedicle needle for double ligatures. (If braided silk is called for, give No. 8, the same length.)

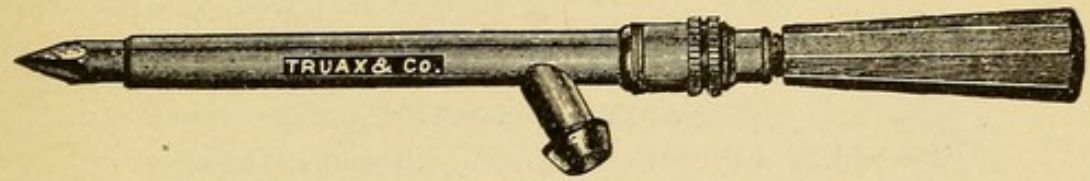
SUTURES:

Six glover's or surgeon's needles for silkworm gut for deep sutures.
Two round curved needles for catgut, No. 1, or fine silk for peritoneal sutures.
Two surgeon's needles for catgut, No. 3, for fascia sutures.
Two glover's needles for horsehair for skin sutures.
Two cambric needles and two small round curved needles in reserve.

DRESSING, ETC.:

Boro-salicylic acid powder, 4:1.
One yard sterilized gauze.
Pad of sterilized cotton.
Aseptic adhesive plaster strips.
Abdominal bandage.
Perineal straps and safety pins.
Twelve sterilized towels.
Twelve sterilized gauze compresses.
Three sterilized sheets.
One sterilized laparotomy sheet.

For ovarian tumor prepare one ovarian trocar with rubber tubing attached and two cyst-holding forceps. (Senn's bullet forceps.)

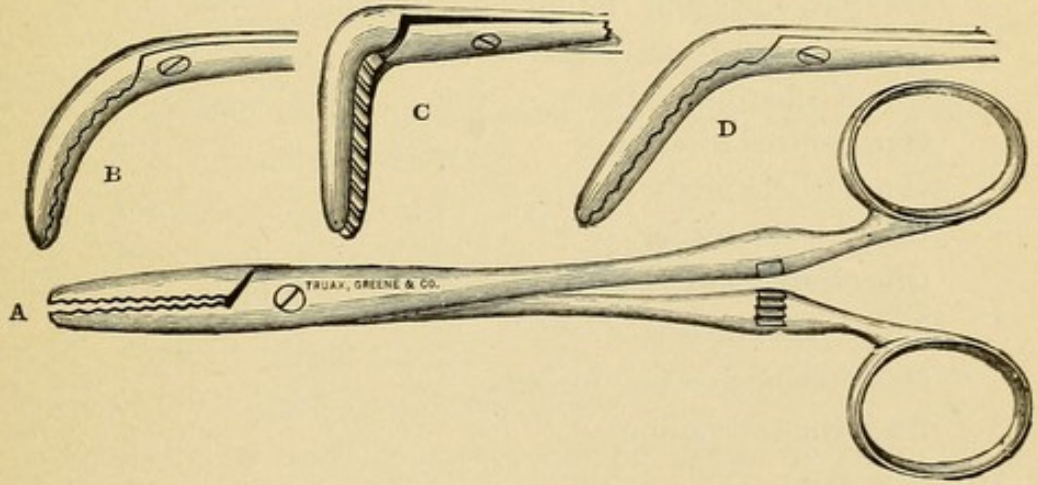


Emmet's Cyst Trocar.

ABDOMINAL HYSTERECTOMY OR HYSTEROMYOMECTOMY.

(Removal of the body of the uterus for cancer or myoma by the abdominal route. Removal of tumors of the uterus by same route.)

Hysterectomy for carcinoma of the uterus is performed either through the abdomen or vagina, or both operations are combined. Requirements same as for



Spencer Wells' Pedicle Forceps.

the preceding case, minus the trocar, with the addition of the following:

Four cambric needles for catgut, No. 4.
Three large round curved needles for catgut, No. 4.
Four long straight hemostatic forceps.
Four long curved hemostatic forceps.
Aseptic rubber cord or tubing for uterine constrictor.

MYOMECTOMY.

(The removal of a uterine tumor by enucleation either by the vaginal or abdominal route.)

Preparation the same as for Cesarean section, minus the obstetrical appliances.

CESAREAN OPERATION.

(Removal of usually living child by abdominal incision.)

The Porro operation accomplishes the same, but includes at the same time the supravaginal removal of the uterus.

Two scalpels.
Two tissue forceps.
Two hemostatic forceps, long.
Twenty-four hemostatic forceps.
Six hemostatic forceps, Tait's.
One "T"-shaped artery forceps.
Two pedicle forceps.
One pair retractors, large.
One pair retractors, small.
One Kocher's director.
One grooved director.
One pedicle needle.
One needle holder.
One elastic constrictor of rubber cord or tubing.
Three pairs scissors.
One uterine dressing forceps.
One Sims speculum.

LIGATURES:

Catgut, No. 2 and No. 3, ten inches long.

SUTURES:

Three cambric needles for catgut, No. 4, or fine silk, to suture the uterus.
Three large curved round needles for catgut, No. 4.
Six glover's or surgeon's needles for silkworm gut for deep sutures.

Two glover's needles for horsehair for superficial sutures.

Two round, curved needles for catgut, No. 1, or fine silk, to suture the peritoneum.

Two surgeon's needles for catgut, No. 3, to suture the fascia.

Two fine, round, curved needles and two fine cambric needles in reserve.

One-half yard of braided silk to tie the umbilical cord.

Fluid extract of ergot, olive oil, toilet powder and a warm blanket.

DRESSING:

Boro-salicylic acid powder, 4:1.

One-half yard of sterilized gauze.

Pad of sterilized absorbent cotton.

Aseptic adhesive plaster strips.

Abdominal bandages.

Perineal straps.

Collodion in an aseptic glass and camel's-hair brush.

Twelve sterilized towels.

Twelve sterilized safety pins.

Twelve sterilized laparotomy sponges.

Supply of sterilized gauze sponges.

Three sterilized sheets.

One sterilized laparotomy sheet.

Strips of iodoform gauze, 3 and 8 inches in width.

Perineal dressing consists of a pad of sterilized absorbent cotton, covered with sterilized gauze, and "T" bandage.

SOLUTIONS:

Corrosive sublimate solution, 1:1,000, alcohol, and a liberal supply of hot saline solution for hand and surface disinfection.

OBSTETRIC NOTES.

(Promptitude in answering a call.)

"It is during the first stage of labor that the nurse is likely to be summoned, and she should answer the call as promptly as possible so as to have time to make all necessary preparation for the birth of the child without hurry."—CLARA WEEKS.

Nurse's obsteric bag should contain:

Thermometers (clinical and bath).
Ether cone.
Hypodermic syringe.
Medicine dropper.
Graduated medicine glass.
A glass and a rubber catheter.
Fountain syringe.
Scissors and forceps.
Bottle of bichlorid tablets.
Small bottle of acetic acid.
Boric acid, two ounces.
Carbolic acid.
Small package of absorbent cotton.
Braided silk, tape or cord.
Safety pins, two sizes.
Sterilized gown.

If previous arrangements have been made with the expectant mother, the nurse will frequently be asked to make a list of articles needed, so that ample provision may be made. The following contains the essential articles, but a more ample one, according to the means or taste of the individual may be given:

FOR THE BABY WILL BE NEEDED:

Blanket.
Pair of round pointed scissors, not too sharp, to cut the umbilical cord, and tape or braided silk with which to tie it. (Heavy Chinese silk is the best.)
Bottle of olive oil.
Castile soap.

Absorbent cotton.
Small soft sponge.
Box of talcum powder.
Four dozen cotton diapers in four sizes.
Four flannel bands, eighteen inches long and about six inches wide.
Four long-sleeved flannel shirts.
Six flannel skirts.
Eight plain slips.
Several soft flannel wraps.
Two dozen nickel-plated safety pins.

FOR THE MOTHER:

Four or six plain night dresses.
One or two flannel wrappers of light material.
One pound of sterilized absorbent cotton.
Two rolls of sterilized gauze.
Six muslin bandages.
Rubber sheet.
Bed-pan.
Three basins.
Fountain syringe.
Sterilized glass catheter.
Ice.
Brandy, ergot, chloroform, ether.

The parturient woman must be regarded in the light of a surgical case, and everything that is brought in contact with the genitals must be aseptic. Careful hand disinfection and the use of sterilized absorbent dressings are as important here as in the treatment of wounds.

FOR THE DOCTOR:

A supply of sterilized towels.
A sterilized nail brush.
A liberal supply of hot and cold sterilized water.
Tablets of corrosive sublimate.
Alcohol.

CHAPTER XVI.

OPENING OF AN ABSCESS.

(An abscess is a circumscribed cavity containing the fluid product of suppurative inflammation.)

The nurse must here remember the aseptic precautions to be observed, in order to prevent further infection or mixed infection, and must, therefore, disinfect the skin sufficiently far beyond the line of incision.

One scalpel.

One bistoury.

One tissue forceps.

One probe.

One sharp spoon.

One pair scissors.

Three hemostatic forceps.

One glass syringe.

Fenestrated rubber drains.

SOLUTIONS:

Peroxid of hydrogen, bichlorid, 1:3000, for irrigation.

Prepare iodin, 1 per cent.

DRESSING, ETC.:

A heavy compress of hygroscopic gauze moistened with saturated solution of acetate of aluminum, hot.

Waxed paper or oiled muslin, cotton, bandages, safety pins.

Wounds that suppurate profusely are dressed every day and sometimes twice a day. Heat and moisture in the form of hot antiseptic fomentations relieve pain, reduce swelling and inhibit suppuration.

OPERATION FOR HARELIP.

(Harelip: Congenital fissure of lip.)

If the operation is performed without an anesthetic, the child's arms must be fastened to the sides of the body with a towel or a broad bandage held in place with safety pins.

One tenotome.
One scalpel.
One needle holder.
One Kocher's director.
One probe.
One pair sharp retractors.
Two tissue forceps.
Two tenaculum hooks.
Two blunt hooks.
Two pairs scissors.
Six artery forceps.

SUTURES:

Three surgeon's needles for catgut, No. 1.
Three glover's needles for silkworm gut.
Three glover's needles for horsehair.

DRESSING, ETC.:

Narrow strip of sterilized gauze.
Narrow strip of adhesive plaster.
Cotton, collodion in an aseptic glass, camel's-hair brush, safety pins, one-inch roller bandage, six towels, gauze sponges.

CHEILOPLASTY.

(Plastic operation on cheek.)

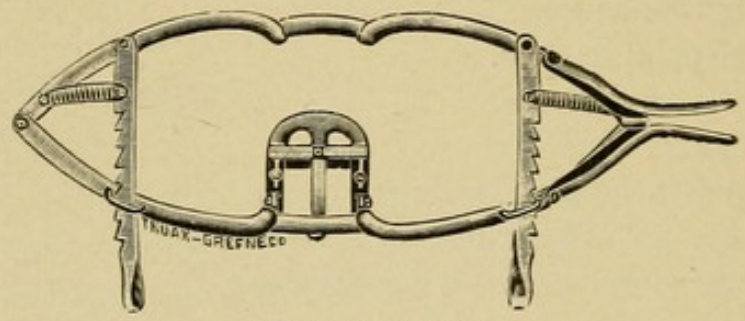
Same preparations as for harelip.

STAPHYLORRHAPHY.

(The suture of cleft-palate, congenital palatine fissure, groove or cleft.)

Whitehead's gag.
One tenotome.
One staphylorrhaphy knife, double edge, sharp point.
One staphylorrhaphy knife, double edge, probe point.

One staphylorrhaphy knife, curved, probe point.
One staphylorrhaphy hook.
One needle holder.
One tenaculum hook.
One blunt hook.
One periosteal elevator, curved.
Two tissue forceps.
Two pairs scissors.
Six hemostatic forceps.
Six sponge holders.
Two lead discs for tension suture.
Silver wire and silk suture.
Two staphylorrhaphy needles with handles.
One Kocher's director.



Whitehead's Gag.

One probe.
A supply of small sponges.
Narrow strips of sterilized and iodoform gauze.
Thiersch's solution for disinfection of mouth.

RHINOPLASTY.

(Plastic operation on the nose.)

Two scalpels.
One tenotome.
Two tissue forceps.
Twelve hemostatic forceps.
One Kocher's director.
One grooved director.
One probe.
One pair sharp retractors, three pronged.
One pair sharp retractors, six pronged.

One pair scissors, straight, blunt pointed.
One pair scissors, curved, sharp pointed.
One pair scissors, small.
One needle holder.

LIGATURES:

Catgut, fine and medium, ten inches long, for single ligatures.

SUTURES:

Three surgeon's fine needles, full curved, for fine catgut, if buried sutures are required.
Three surgeon's medium-sized needles for medium-sized braided silk for tension sutures.
Three surgeon's needles for silkworm gut for flap sutures.

If the surgeon takes the flap from the forehead prepare silver wire, lead plates, perforated shot, forceps to crush the lead plates (sequestrum forceps), razor and two Tait's forceps, with two cambric needles used to spread the grafts. The arm or thigh of the patient is prepared according to the method given for surface disinfection before operation.

When the flaps are taken from the cheek, the skin-grafting appliances are not necessary.

DRESSING, ETC.:

A salt-solution compress.
Gutta-percha tissue.
Absorbent cotton.
Bandage.
Safety pins.

The wound from which the grafts are taken is dressed according to the method given for the skin-grafting operation:

Twelve sterilized towels.
Sterilized gauze sponges.

TRACHEOTOMY.

(Incision of the trachea.)

Two scalpels.
Two tissue forceps.
Two tenaculum hooks.
Two blunt hooks.
Two pairs scissors.
One tracheotomy tube.
One pair three-pronged retractors.
One probe.
One grooved director.
Six hemostatic forceps.

SUTURES:

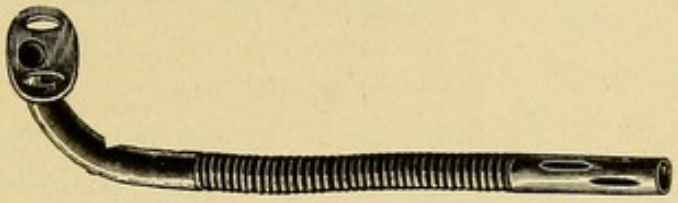
Two surgeon's needles for catgut No. 2.
Two glover's needles for silkworm gut.

DRESSING, ETC.:

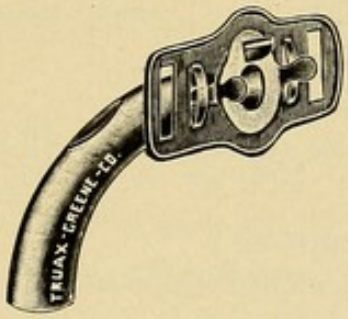
Boro-salicylic acid powder, 4:1.
Strips of sterilized gauze.
Gutta-percha tissue or oiled silk, 4x4.
Two-inch cotton roller bandage.
Gauze sponges.

Two pieces of narrow tape, each 11 inches long. Attach one strip to each side of the tracheotomy tube, and tie around the neck to hold the tube in position. The outer tube should not be removed by the nurse, but she removes the inner one every hour, or oftener if so directed by the physician. The movable or inner tube should be washed in a solution of salt water (one dram of salt to a quart of water) and swabbed out with a chicken feather or cotton mop which has been sterilized. Before replacing the inner tube, the tube in the trachea should also be cleaned, to remove the mucus that collects in and around the tube, thus rendering free the entrance and escape of air.

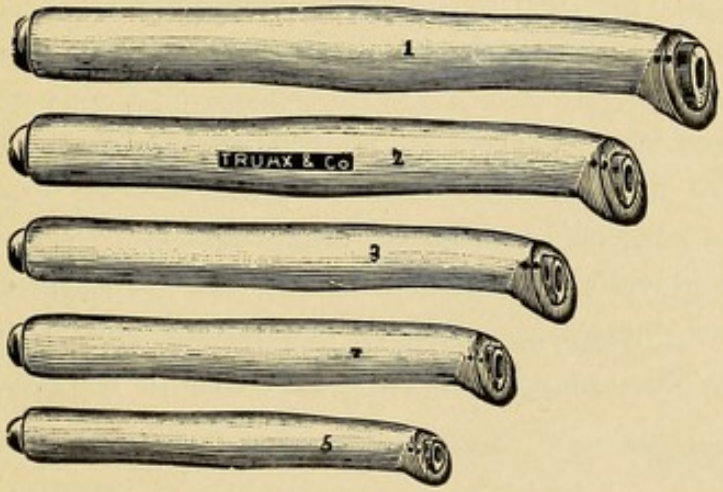
The temperature of the tracheotomy room must not be less than 80 degrees F., and the atmosphere should be saturated with steam.



König's Large Tracheal Canula.



Trousseau's Double Tracheotomy Tube.



Dwyer's Intubation Tubes.

ADENECTOMY.

(Excision of diseased lymphatic glands; it here refers to tubercular glands of the neck.)

Two scalpels.
Two tissue forceps.
Two blunt hooks.
Two tenaculum hooks.
Twelve artery forceps.
One pair scissors, straight, blunt pointed.
One pair scissors, curved, blunt pointed.
One pair scissors, curved, sharp pointed.
One pair sharp retractors.
One pair blunt retractors.
One artery needle (aneurysm needle).
One probe.
One Kocher's director.
One grooved director.
One needle holder.

LIGATURES:

Catgut No. 1 and No. 2, ten inches long.
Aneurysm needle for catgut No. 2, twenty inches long. for ligation of large blood vessels.
Braided silk may be required.

SUTURES:

Three large, curved, round needles for catgut No. 4, for muscle suture.
Two surgeon's needles for catgut No. 2.
Six glover's or surgeon's needles for silkworm gut.
Two glover's or surgeon's needles for horsehair.
Two fine, round, full-curved needles in reserve.

DRAINAGE:

Three-inch strip of iodoform gauze for capillary drainage.
Folded gutta-percha tissue for surface drainage.
Fenestrated rubber tubes.

Dressing, etc.:

Boro-salicylic acid powder, 4:1.
One-half yard of sterilized gauze.
Large pad of sterilized cotton.
Two aseptic gauze roller bandages.
Two plaster-of-Paris roller bandages.
Six sterilized gauze compresses.
Ample supply of sterilized sponges.
Twelve sterilized safety pins.
Twelve sterilized towels.
Three sterilized sheets.
Collodion in an aseptic glass, and camel's hair brush.

Solutions:

Iodin, 1 per cent.
Hot and cold physiologic solution.
Iodoform glycerin emulsion, 10 per cent.

MAMMECTOMY.

(Excision of the breast.)

Two scalpels.
Two tissue forceps.
One needle holder.
One aneurysm needle.
Two blunt hooks.
One pair sharp retractors.
One pair deep retractors.
One Kocher's director.
Three pairs scissors.
Twenty-four hemostatic forceps.

Ligatures:

Catgut No. 2 and No. 3 ten inches long.

Sutures:

Two surgeon's needles for catgut No. 2 for buried sutures.
Three large curved surgeon's needles for silk No. 8 for tension sutures.
Six glover's or surgeon's needles for silkworm gut.
Three glover's needles for horsehair.

DRAINAGE:

Strips of iodoform gauze three inches in width.
Strips of iodoform gauze eight inches in width.
Folded gutta-percha tissue for surface drainage.
Two fenestrated tubes, large and medium.

DRESSING, ETC.:

Boro-salicylic acid powder, 4:1.
Three yards of sterilized gauze.
Large pad of sterilized cotton.
Two aseptic gauze roller bandages, 7 inches wide and 5 yards long.
Six sterilized gauze compresses.
A supply of gauze sponges.
Twelve sterilized safety pins.
Twelve sterilized towels.
Three sterilized sheets.
Collodion in an aseptic glass, and camel's hair brush.

SOLUTIONS:

Plenty of hot and cold physiologic solution.
Corrosive sublimate solution, 1:1,000.

NEPHROPEXY.

(Nephropexy: Fixation of the kidney. Nephrorrhaphy: Suture of kidney.)

Two scalpels.
Two tissue forceps.
Two Senn's bullet forceps.
Six artery forceps.
Three pairs scissors.
One needle holder.
One pair small retractors.
One pair large retractors.
One Kocher's director.

LIGATURES AND SUTURES:

Catgut No. 2 and No. 4.
Three round curved needles for catgut No. 5, or silk, as the surgeon may direct, with which to suture the kidney.

Two glover's or surgeon's needles for silkworm gut.
One glover's needle is used to scarify the kidney.

DRESSING, ETC.:

Six three-inch strips of iodoform gauze for tamponing the wound.
Three yards of sterilized gauze.
Large pad of sterilized cotton.
Two gauze roller bandages.
Two strips adhesive plaster two inches wide, and long enough to encircle the body.
Twelve sterilized towels.
Eight sterilized safety pins.
Three sterilized sheets.
Small pad four inches long, three inches wide and three inches thick, made of cotton or gauze, to be placed under the kidney in front when dressing is applied.
A hard circular pillow, two feet in length, eighteen inches in circumference, covered with rubber sheeting and sterilized towels.

NEPHRECTOMY.

(Excision of the kidney.)

Same preparation as for nephrorrhaphy, with the addition of:

Two eight-inch clamp forceps, straight.
Two eight-inch clamp forceps, curved.
One pedicle needle for strong silk or catgut No. 4, with which to tie the pedicle.
Exploring syringe.
Paquelin cautery.

VARICOTOMY.

(Excision of varicose veins.)

Esmarch's constrictor.
Two scalpels.
Two tissue forceps.
Twelve hemostatic forceps.

Two tenaculum hooks.
Two blunt hooks.
One needle holder.
One artery (aneurysm) needle.
One probe.
One Kocher's director.
One pair sharp retractors.
One pair blunt retractors.
Two pairs scissors.

LIGATURES:

Catgut No. 2, twenty inches long, for aneurysm needle to ligate veins.
Catgut No. 2, ten inches long, for single ligatures.
Braided silk No. 5, may be required.

SUTURES:

Two surgeon's needles for catgut No. 2 for buried sutures.
Six glover's or surgeon's needles for silkworm gut.
Two glover's needles for horsehair.
Two small round curved needles in reserve.

DRAINAGE:

Two-inch strips iodoform gauze for capillary drainage.
Folded gutta-percha tissue for surface drainage.

DRESSING, ETC.:

Boro-salicylic acid powder, 4:1.
Sterilized gauze.
Large pad of sterilized cotton.
Two aseptic gauze roller bandages.
Posterior hollow splint, well padded.
Sterilized gauze sponges.
Twelve sterilized safety pins.
Twelve sterilized towels.
Two sterilized sheets.

SOLUTIONS:

Bichlorid solution, 1:1,000.

Alcohol.

Hot and cold physiologic solution.

Note.—The limb is kept in an elevated position until the wound is healed.

DERMATOPLASTY—SKIN GRAFTING.

This operation consists in transplanting living skin to cover cutaneous defects caused by injury, operation or disease. Four methods are employed:

First. Reverdin's small grafts of the cuticle only.

Second. Thiersch's larger grafts, including entire thickness of true skin.

Third. Wolfe's large grafts of skin devoid of subcutaneous fat.

Fourth. Krause's large grafts with underlying fat tissue.

Carefully disinfect the skin from which grafts are to be taken and provide the following:

Aseptic razor.

One sharp curette, if grafting is to be done on a granulating surface.

Two artery forceps.

Two cambric needles.

For the Wolfe and the Krause methods a sharp scalpel and a dissecting forceps will be required.

The wounds to which the grafts are applied should be dressed with narrow strips of gutta-percha tissue, rendered aseptic by washing with soap and water, rinsing thoroughly in sterilized water, immersing in two per cent. formalin solution for one hour; again rinsing in sterilized water, and placing in physiologic solution until required for use.

Sterilized gauze, cotton, roller bandage and safety pins.

Note.—Great care must be taken in applying the bandage. If too much pressure is put on the grafts

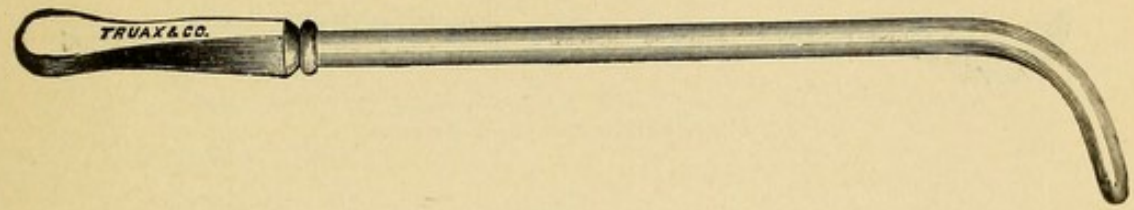
they will die. These wounds are sometimes dressed with a light compress of sterilized gauze saturated with a warm physiologic solution over which gutta-percha tissue is applied.

A quart of this solution should also be provided in a basin, into which the surgeon may dip the razor before cutting the grafts.

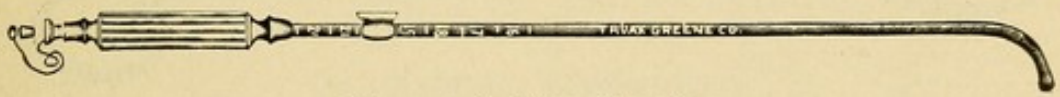
LITHOTOMY BY PERINEAL SECTION.

(Incision into the bladder through the perineum for stone.)

One scalpel.
One bistoury, probe pointed.
Two tissue forceps.
Two artery forceps, 8 inches long.
Twelve artery forceps, Kocher's.
One Wheelhouse staff.
Two lithotomy forceps.
Three lithotomy staffs.
One lithotomy scoop.
One Kocher's director.
One grooved director.
One needle holder.
One pair scissors, curved, blunt pointed.
One pair scissors, curved, sharp pointed.
One pair scissors, straight.
One pair sharp retractors.
One pair blunt retractors.
One blunt hook.
One tenaculum hook.
One probe.
Three steel sounds.
One silver catheter.
Three soft rubber catheters, Nos. 7, 9 and 11. (Nélaton.)
One large rubber drain, not fenestrated.



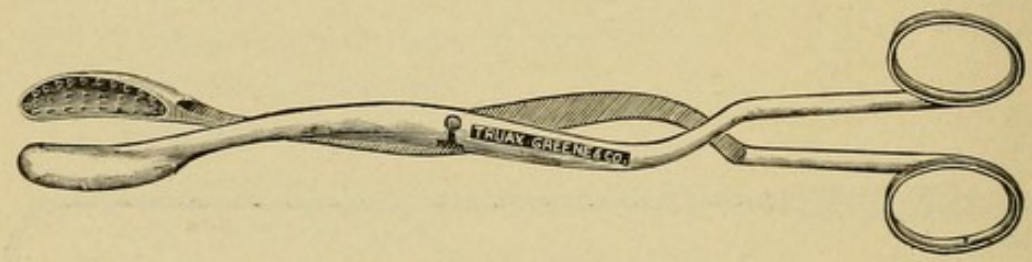
Van Buren's Curved Sound.



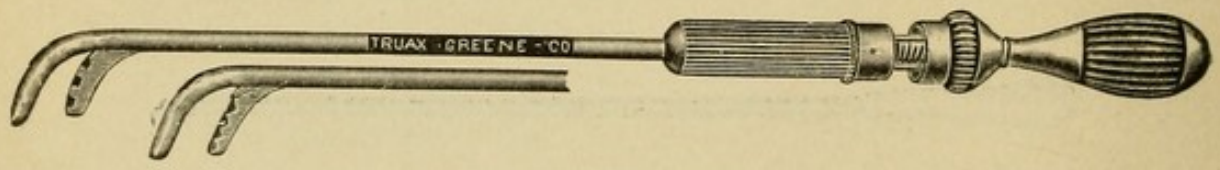
Thompson's Stone Searcher.

Wheelhouse's Staff.

Little's Director and Scoop.



Little's Lithotomy Forceps.



Bigelow's Lithotrite.

LIGATURES:

Catgut Nos. 2 and 3, ten inches long. If braided silk is called for supply Nos. 5 and 8, 10 inches long.

SUTURES:

Two surgeon's needles for silkworm gut.
Two round curved needles for catgut No. 2.
Two small curved needles for braided silk in reserve.

DRESSING, ETC.:

Boro-salicylic acid powder 4:1.
Iodoform gauze strips three and eight inches in width.
Sterilized gauze, cotton, gauze sponges and "T" bandage.
Eight sterilized towels.
Three sterilized sheets.
Gynecologic suit.
Boric-acid solution, 2 per cent. for irrigation.

SUPRAPUBIC LITHOTOMY.

(Incision above pubes into the bladder for stone.)

Requirements the same as for perineal lithotomy, omitting the staffs, with the addition of the following:

Senn's sigmoid catheter with rubber tubing attached.

Senn's sigmoid catheter for suprapubic drainage of the bladder.

Bladder syringe.
Rectal bag.
Two long strips of adhesive plaster.
The usual abdominal dressing.

PROSTATECTOMY.

(Excision of prostate gland.)

Prepare same as for perineal section, with addition of traction forceps.

OPERATION FOR PHIMOSIS.

(Circumcision.)

One scalpel.
One tissue forceps.
One needle holder.
One probe.
Two pairs scissors.
Three hemostatic forceps.

SUTURES:

Two fine surgeon's needles for catgut No. 1.
Two cambric needles in reserve.

DRESSING, ETC.:

Boro-salicylic acid powder, 4:1.
Vaselin.
Narrow strips of sterilized gauze and gauze sponges.
Sterilized cotton.
Collodion in an aseptic glass, and camel's hair brush.
Strips of adhesive plaster one-half inch wide and seven inches long.
Sterilized towels.

VARICOCELE.

(Dilatation of the spermatic veins.)

Two scalpels.
Two tissue forceps.
Twelve hemostatic forceps.
One pair sharp retractors.
One pair dull retractors.
One pair blunt-pointed scissors.
One pair sharp-pointed scissors.
One needle holder.
One aneurysm needle.

Kocher's director.
One grooved director.
One blunt hook.

LIGATURES:

Aneurysm needle for catgut No. 2, twelve inches long, to ligate dilated veins.
If braided silk is called for, supply No. 5 or No. 7.

SUTURES:

Two surgeon's needles for catgut No. 2.
Six glover's or surgeon's needles for silkworm gut.
Two glover's or surgeon's fine needles for horsehair.

DRESSING, ETC.:

Boro-salicylic acid powder, 4:1.
Sterilized gauze.
Sterilized cotton.
Sterilized gauze sponges.
Gutta-percha tissue.
Collodion in an aseptic glass, and camel's hair brush.
Gauze roller bandage.
Two strips adhesive plaster two inches wide and twenty-four inches long.
Three sterilized sheets.
Twelve sterilized towels.

RECTAL FISTULA.

(Abnormal tube-like passage about the anus, giving vent to pus or other secretions.)

Select and prepare the following instruments:
One scalpel.
One bistoury.
One Sim's speculum, small.
One rectal speculum.
One probe.
One grooved director.
One pair sharp retractors.
One pair blunt retractors.
One sharp spoon.
One needle holder.

Two pairs scissors.
Two tissue forceps.
Six hemostatic forceps.
One glass syringe for peroxid of hydrogen.
Thiersch's solution for irrigation.
Dudley or Kelly's pad.
Gynecologic suit.
Paquelin cautery.
Leg holders.
One rectal tampon.

LIGATURES:

Catgut No. 2.

SUTURES:

Two small fistula needles for catgut No. 2.
Three surgeon's needles for catgut No. 3.
Three surgeon's needles for silkworm gut.

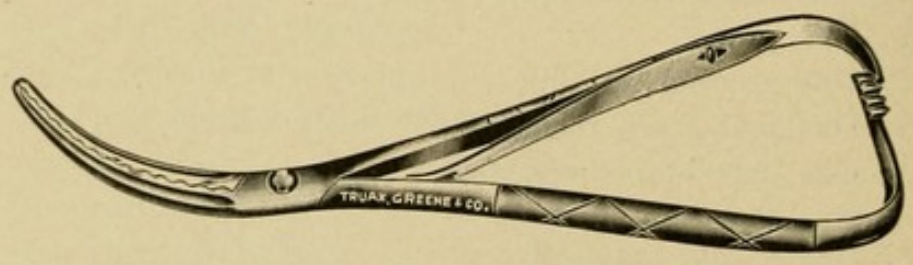
DRESSING, ETC.:

Boro-salicylic acid powder, 4:1.
Six iodoform gauze strips.
Sterilized gauze, cotton and "T"-bandage.
Sterilized sponges.
Safety pins.
Eight sterilized towels.
Three sterilized sheets.

OPERATION FOR HEMORRHOIDS BY THE USE OF THE CLAMP AND CAUTERY.

(Hemorrhoids: Swellings caused by varicose hemorrhoidal veins.)

One Sim's speculum, small.
One pile clamp (Adams').



Adams' Hemorrhoid Clamp.

One pair scissors, blunt pointed.

Six Kocher's artery forceps.

Paquelin cautery in good working order.

Rectal tampon.

This tampon is made of a piece of rubber tubing the size of the thumb, and twelve inches in length, covered with iodoform gauze. Into this tube is inserted a glass cylinder three inches in length, over which the rubber tubing should extend two inches. An umbrella of iodoform gauze 12x12 inches is fastened to the tube by tying a silk ligature over it at a point corresponding with the glass cylinder. Strips of sterilized gauze are used in packing the space between the tube and umbrella or mantle of gauze after the tube has been inserted into the rectum.

The rectal tampon is removed forty-eight hours after operation. During this time the patient is kept on liquid diet. In removing the tube traction is made on the mantle of iodoform gauze until the packing is brought within easy reach, when it is removed with forceps, and the tube can be extracted without causing any pain.

Bowels should be evacuated the third day after the operation. For this purpose castor oil is generally preferred.

Vaselin.

Sterilized gauze sponges, gauze strips three and eight inches in width, cotton, and "T" bandage.

Six sterilized towels.

Leg holders.

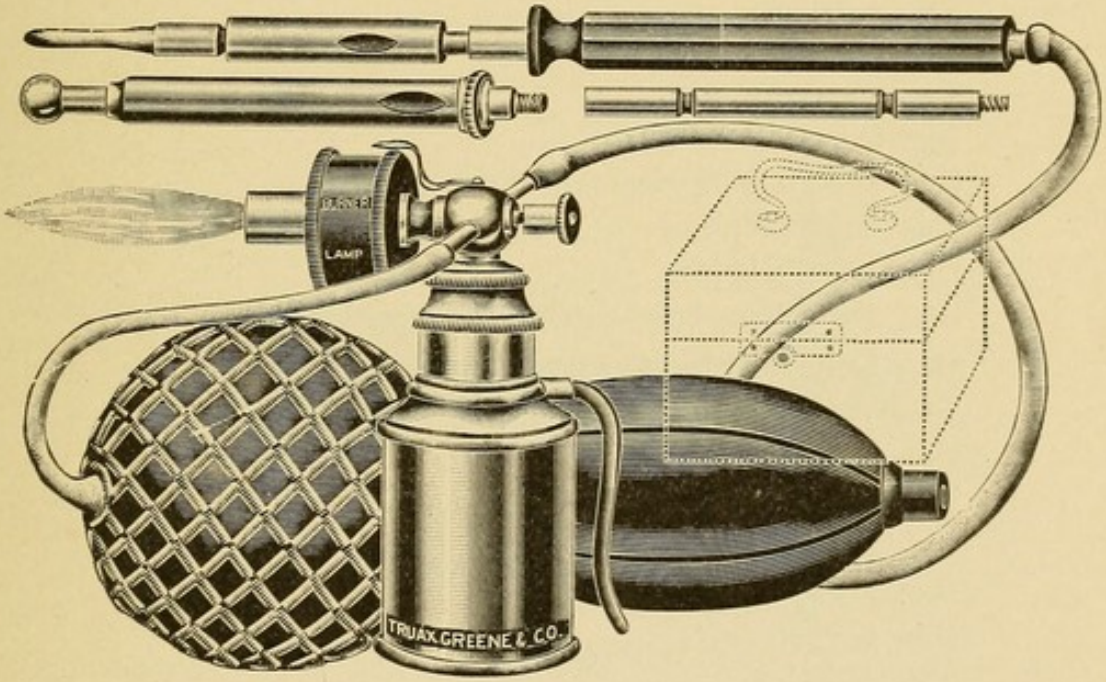
Thiersch's solution for irrigation.

Gynecologic suit.

Dudley or Kelly's pad.

Paquelin or thermo-cautery is a form of actual cautery, in which the heat is produced by blowing benzine vapor into a heated platinum point (platinum: silver-white, almost infusible metal).

When the cautery is to be used, the nurse should test it before the operation. Never blow the benzine vapor into the platinum point until the point is well heated in the flame of an alcohol lamp or Bunsen burner; then commence by pressing the bulb slowly. Place the bottle containing the benzine in a basin of hot water; this will hasten the heating of the point. See that the rubber tube through which the benzine vapor is conveyed is not twisted or doubled. Next, keep the platinum point in the flame until it is well heated. Sometimes the cause of the cautery not working is due to the benzine, which should be renewed frequently. When the surgeon has finished with the cautery, it should be burned out immediately. This is done by placing the point in the flame until the platinum is again well heated, then quickly removing the rubber tube attached to the handle, and pressing the tube between the thumb and index finger to prevent evaporation. Great care must be taken in handling the cautery, as the benzine is highly inflammable. When in use the handle of the cautery should be wrapped with moist sterilized gauze.



Improved Thermo-cautery.

CHAPTER XVII.

OPERATIONS ON BONES AND JOINTS.

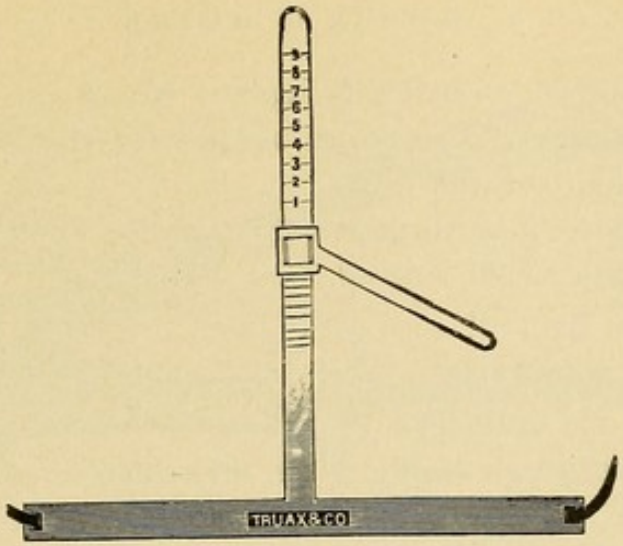
CRANIECTOMY.

(Opening of the skull for cerebral hemorrhage; tumor of the brain, or fracture of the skull, or epilepsy.)

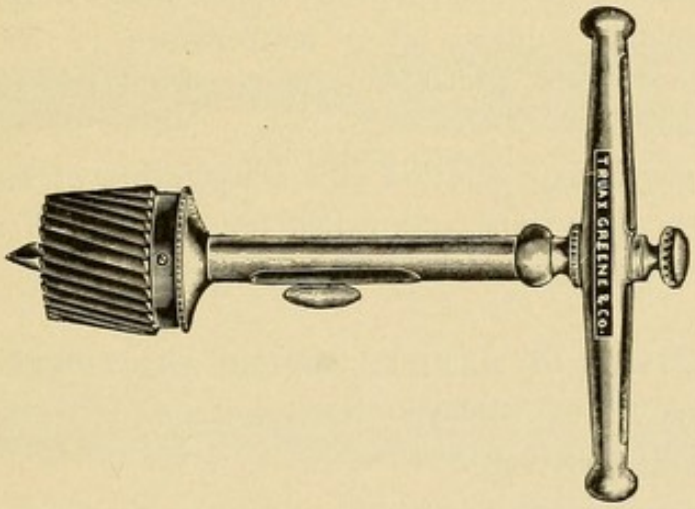
Two scalpels.
One tenotome.
Two tissue forceps.
Eighteen artery forceps.
One Senn's periosteal elevator.
One large trephine.
One small trephine.
One De Vilbiss bone-cutting forceps.
One bone-cutting forceps.
Two pairs retractors, sharp and blunt.
One fine probe.
Two blunt hooks.
One Kocher's director.
One grooved director.
One gouge.
Two chisels.
One mallet.
One needle holder.
One small bone drill.
Wilson's cyrtometer.
One foot of silver wire to serve as an electrode for the galvanic battery, which is sometimes used when the operation is for epilepsy.

LIGATURES AND SUTURES:

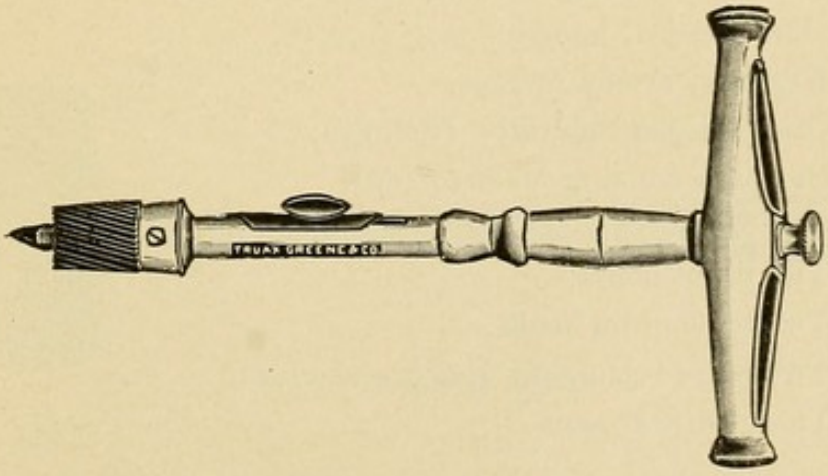
Catgut No. 1 and No. 2, or fine braided silk.
Two small round curved needles for catgut to suture the dura mater (outer membrane of the brain and spinal cord).



Wilson's Cyrtometer.



Conical Trephine.



De Vilbiss Trephine.

Two surgeon's needles for catgut No. 2.
Four glover's or surgeon's needles for silkworm gut, for flap sutures.
Two glover's or surgeon's fine needles for horsehair, for superficial sutures.

DRESSING, ETC.:

A few strands of catgut or horsehair are sometimes used for drainage.
Collodion in an aseptic glass, and camel's hair brush.
A large aseptic absorbent dressing.
Three plaster-of-Paris bandages.

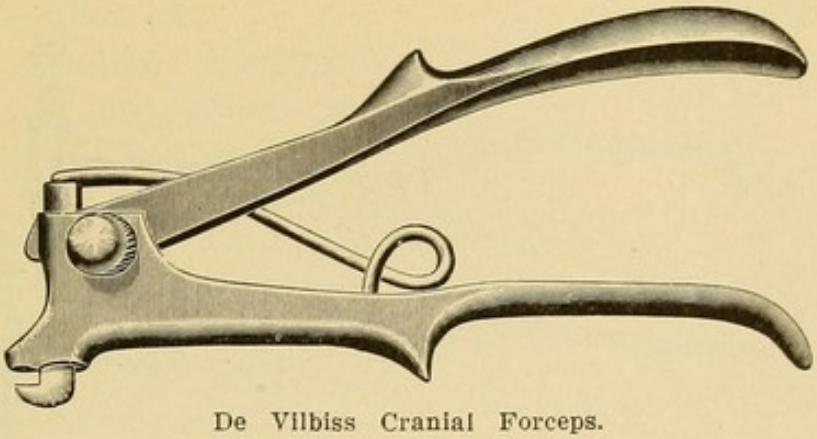
SOLUTIONS:

Tincture of iodin and a probe tipped with cotton.
Physiologic solution at a temperature of 100 degrees F., in which to preserve bone temporarily removed.
Hot physiologic solution at a temperature of 120 degrees F. is sometimes called for, with which to arrest troublesome capillary hemorrhage.

EXCISION OF MAXILLA—UPPER AND LOWER.

(Maxilla—the jaw.)

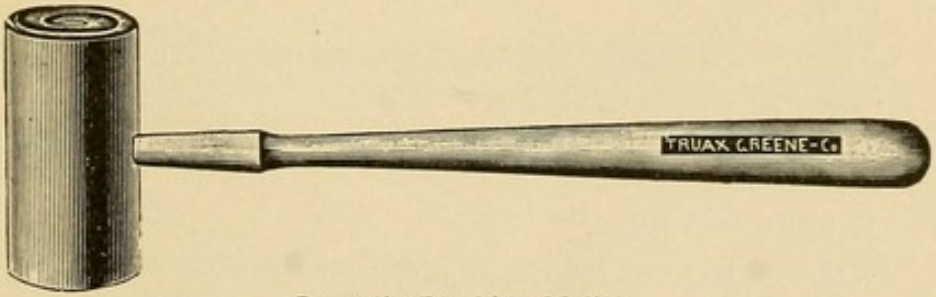
Two scalpels.
Two tissue forceps.
Two artery forceps, long.
Two bone-cutting forceps, large.
One lion-jaw bone-holding forceps.
Eighteen artery forceps.
One periosteal elevator (Senn's).
One cross-cutting bone forceps.
One probe.
Two blunt hooks.
Two tenaculum hooks.
Two pairs retractors, sharp and blunt.
Three pairs scissors.



De Vilbiss Cranial Forceps.

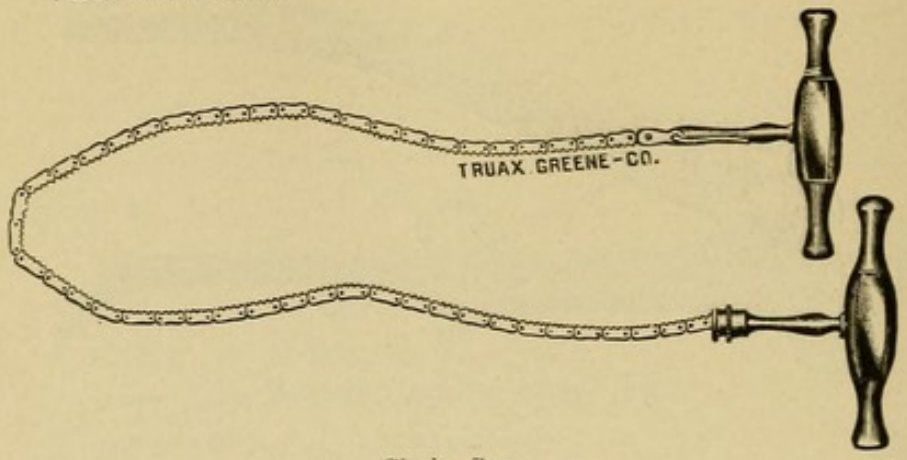
Von Brun's Chisel.

Macewen's Gouge.



Bryant's Rawhide Mallet.

One chain saw.



Chain Saw.

Two chisels.
One gouge.
One wood or rawhide mallet.
One Kocher's director.
Two dental forceps, incisor and molar.
One needle holder.
Paquelin cautery.

LIGATURES AND SUTURES:

Catgut, No. 2 and No. 3, ten inches long.
Two surgeon's needles for catgut, medium, for muscle sutures.
Two surgeon's needles for catgut, fine, to suture the mucous membrane.
One surgeon's large curved needle for silk, No. 8, for the tongue.
Six glover's or surgeon's needles for silkworm gut for the flap.
Two glover's or surgeon's fine needles for horsehair for superficial sutures.

DRAINAGE:

Mikulicz's drain.
Narrow strips of iodoform gauze.
Rubber tubing.

DRESSING, ETC.:

Boro-salicylic acid powder, 4:1.
One yard sterilized gauze.
Large pad sterilized absorbent cotton.
Sterilized gauze sponges.
Sterilized gauze compresses.
Two sterilized gauze roller bandages.
Twelve sterilized safety pins.
Twelve sterilized towels.
Three sterilized sheets.
One ounce of compound tincture of benzoin.

RESECTION OF RIB FOR EMPYEMA.

(Empyema: Pus in pleural cavity.)

Two scalpels.
Two tissue forceps.
Two artery forceps, long.
Six artery forceps.
One bone-cutting forceps.

Liston's Bone cutting Forceps.

One lion-jaw holding forceps.
One Senn's periosteal elevator.

Senn's Periosteal Elevator.

One probe.
One Kocher's director.
One grooved director.
Two pairs scissors.
One exploring syringe.

LIGATURES AND SUTURES:

Catgut, No. 2.
Two surgeon's needles for silkworm gut.
Two glover's needles.

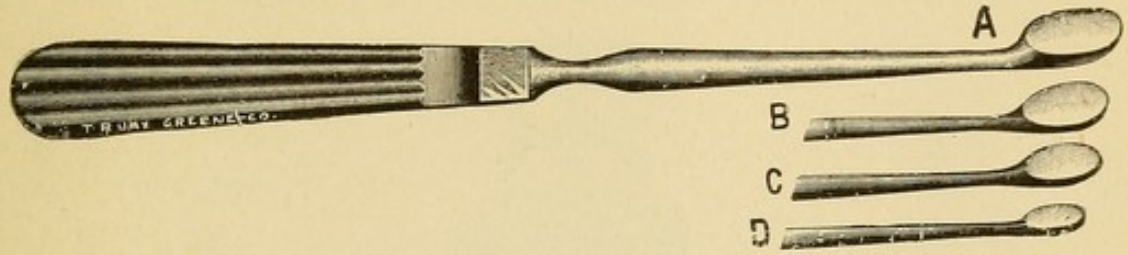
DRESSING, ETC.:

Boro-salicylic acid powder, 4:1.
Strips of iodoform gauze three inches wide.
Strips of iodoform gauze eight inches wide.
Sterilized gauze sponges.
Three yards sterilized gauze.
Large pad of sterilized cotton.
Two gauze roller bandages.
Sterilized safety pins.
Six sterilized towels.
Three sterilized sheets.
Two large rubber tubular drains.

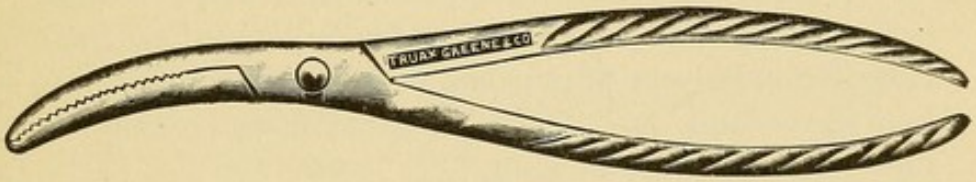
SEQUESTROTOMY.

(Operation for the removal of a sequestrum, fragment of necrosed bone.)

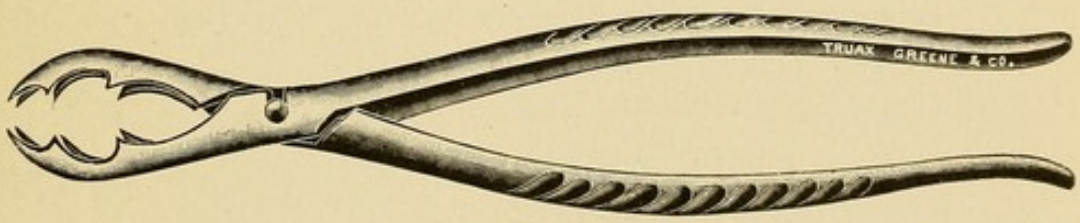
Esmarch's constrictor.
Two scalpels.
Two tissue forceps.
Twelve hemostatic forceps.
One sequestrum forceps.
One bone-cutting forceps.
One periosteal elevator.
One sharp spoon, small.
One sharp spoon, medium.
One sharp spoon, large.
Two gouges (round chisel).
Two chisels.
One wood or rawhide mallet.
One Kocher's director.
One grooved director.
Two probes, long and short.
One pair sharp retractors.
One pair blunt retractors.



Volkmann's Sharp Spoons.

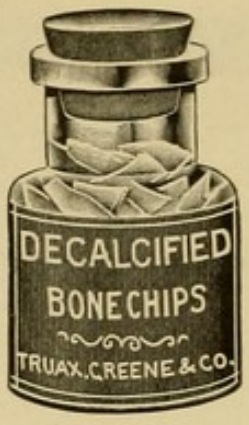


Sequestrum Forceps.



Mathieus Bone-holding Forceps.

One pair scissors, curved, blunt.
One pair scissors, straight.
Decalcified bone chips.



Senn's Decalcified Bone Chips.

Before using, immerse the decalcified chips in a 5 per cent. carbolic acid solution for five minutes, then rinse thoroughly in physiologic solution, place on sterilized gauze, and dust lightly with iodoform powder before handing to the surgeon.

Ligatures and Sutures:

Catgut, No. 2 and No. 3.
Two surgeon's needles for catgut, No. 2, for muscle sutures, called buried sutures.
Two large curved needles for silk for tension sutures.
Six glover's or surgeon's needles for silkworm gut.
Two glover's needles for horsehair for superficial sutures.

Dressing, Etc.:

Drainage tube.
Boro-salicylic acid powder, 4:1.
Strips of iodoform gauze, 3 and 8 inches wide.
One pad of sterilized cotton.
One yard of sterilized gauze.
Two gauze roller bandages.
Two cotton roller bandages.
Posterior hollow splint, well padded.

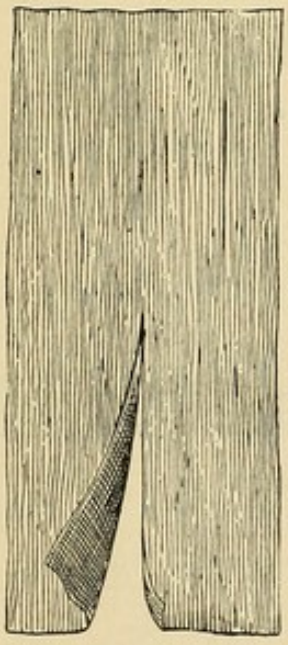
Plaster of Paris bandages and a roll of absorbent cotton in reserve.
A supply of sterilized gauze sponges.
A supply of sterilized gauze compresses.
Twelve sterilized towels.
Three sterilized sheets.
Twelve sterilized safety pins.

SOLUTIONS:

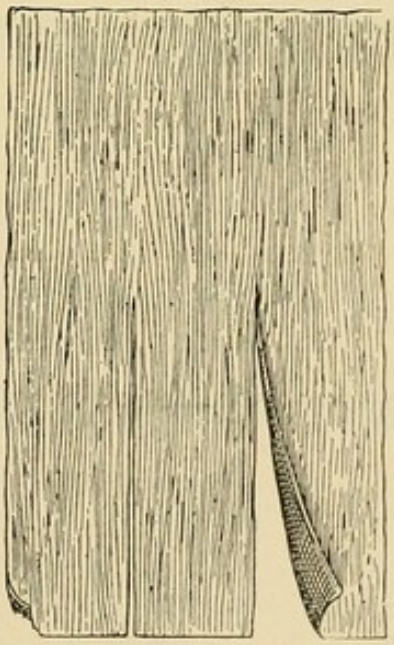
Iodin, ½ to 1 per cent.
Lysol, 2 per cent.

AMPUTATION OF LEG.

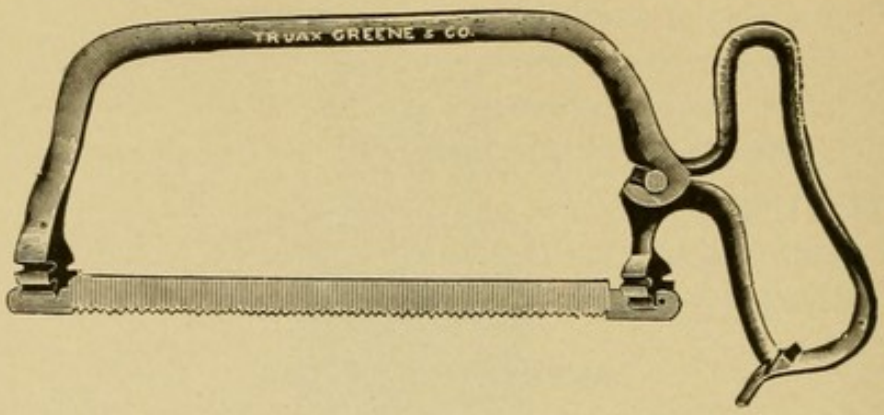
Esmarch's constrictor.
Two scalpels.
One amputating knife.
One Catlin knife (used only for amputations below the knee and elbow).
Two tissue forceps.
Twenty-four hemostatic forceps.
One pair retractors.
One pair gauze retractors.



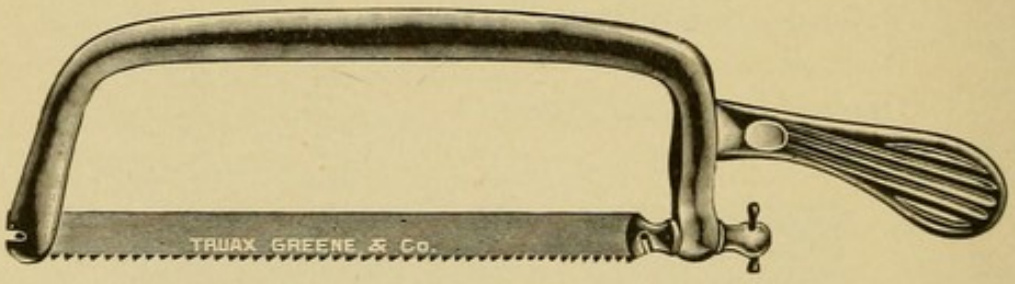
Gauze Retractor, for One Bone.



Gauze Retractor, for Two Bones.



Windler's Amputating Saw.



Butcher's Saw.

Langenbeck's Metacarpal Saw.

One bone-holding forceps (lion jaw).
One bone-cutting forceps.
Senn's periosteal elevator.
One amputation saw.
One pair scissors, straight.
One pair scissors, curved.

LIGATURES:

Catgut, No. 2 and No. 3, ten inches long.

SUTURES:

Two surgeon's needles for catgut, No. 2, for buried sutures.
Two surgeon's needles for catgut, No. 3, to suture muscles.
Six glover's or surgeon's needles for silkworm gut to suture flaps.
Two glover's needles for horsehair for superficial sutures.

DRAINAGE:

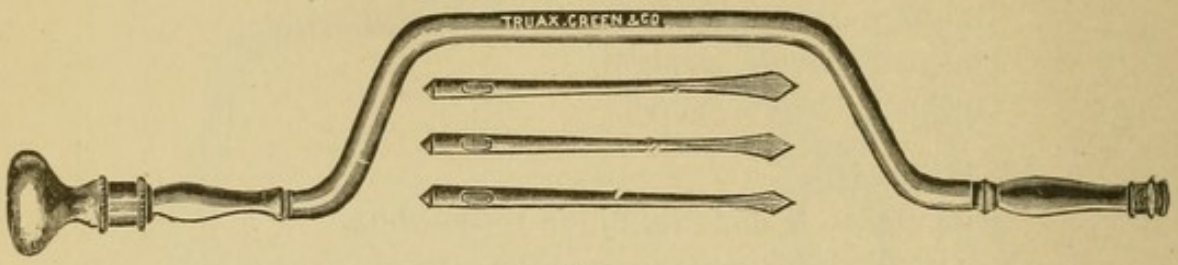
Fenestrated rubber tube.
Strips of iodoform gauze.
Strands of catgut.

DRESSING, ETC.:

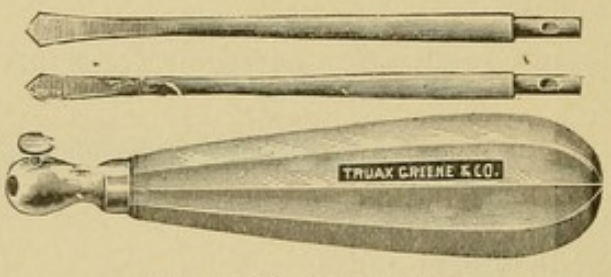
Boro-salicylic acid powder, 4:1.
Two yards sterilized gauze.
Large pad of sterilized absorbent cotton.
Two gauze roller bandages.
A supply of sterilized gauze compresses and sponges.
A well-padded hollow posterior splint.
Safety pins.
Twelve sterilized towels.
Three sterilized sheets.

The limb must be placed in an elevated position at an angle of at least 45 degrees for two days or more.

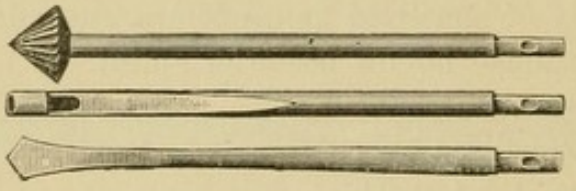
In this or any other case, when the blood soaks through the dressing and bandage, dust over the blood stains with boro-salicylic powder and apply a pad



Langenbeck's Bone Drills.



Brainard's Bone Drills.



Brainard's Bone Drills.

of cotton and bandage. This will prevent the germs from getting into the wound through the wound secretion in the moist part of the dressing, which is a good culture medium for microbes.

RESECTION OF JOINTS.

The requirements for this operation are the same as those for the amputation of a leg, omitting the amputating knives and adding the following:

Two chisels.
Two gouges.
Two long artery forceps.
One mallet.
One Volkmann's sharp spoon.
One set of bone drills.
One scroll saw.
Silver wire.
Decalcified bone chips.
Iodoform glycerin emulsion and 1 per cent. iodin solution.
Thermocautery (sometimes used to check bleeding from the vessels of the bone).

ARTHRECTOMY.

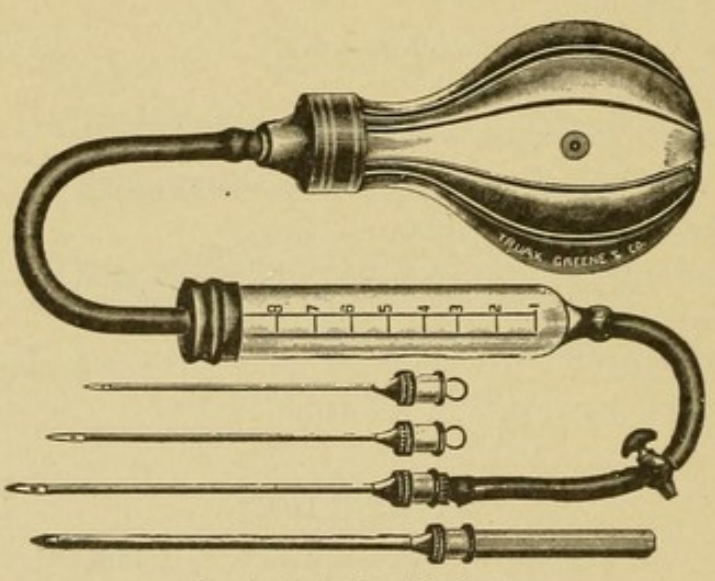
(Excision of soft structures of joints.)

Preparation same as for resection of joints.

TAPPING AND INTRAARTICULAR MEDICATION OF JOINTS.

The trocar should invariably be boiled in soda solution before tapping, and the hands of the surgeon and the point of puncture should be as carefully disinfected as in the preparation for a major operation. The small trocar that accompanies my syringe for making intraarticular injections is very well adapted for puncturing and evacuating any of the joints that are ordinarily subjected to this method of treatment.

To prepare the syringe for use, the rubber cap is removed from the top of the glass cylinder, which is then filled with the fluid to be injected, after which the cap is replaced. Before making the puncture with the needle or trocar the stop-cock should be opened and the air expelled from the rubber tube and canula or needle by filling them with the fluid. The scale on the cylinder of the syringe is graduated in drams. A 10 per cent. emulsion of iodoform in glycerin is most frequently used in this manner.



Senn's Injecting Syringe.

CHAPTER XVIII.

PLASTER OF PARIS DRESSING.

Plaster of Paris was first used as a material for fixation dressing in surgery by Mathysen in 1852. It appears in the market as an impalpable, white and highly hygroscopic powder. It is used in the form of bandages, impregnated with the dry powder, and as a cream.

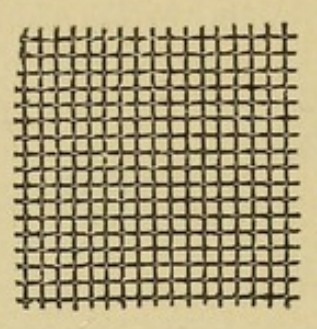
To prepare the bandages, take a fabric with large meshes, such as crinolin, cheese cloth or plain gauze, cut the bandages in desirable width and length, roll them firmly and, in unrolling them, pass them through a heap of plaster on a bare table and rub the plaster well into the meshes of the cloth, when they are ready to be rolled again, but this time somewhat loosely to render them more permeable to the entrance of water when they are to be used.

For the fingers, the bandages should not be more than an inch in width; for the limbs and head, three to four inches, and for the body, from four to six inches.

Powder and bandages must be kept in a tin box to guard against absorption of moisture, which ruins the setting quality of the plaster. When the bandages are to be used, the skin is first protected by a gauze or flannel bandage. Immediately before using the plaster of Paris bandage immerse it in a basin of warm water until it is completely covered. If several bandages are to be used as many as four to six may be immersed at the same time. When all air bubbles have escaped from the bandage take it out, squeeze it lightly and commence the bandaging. It must never be applied too tightly, for after drying, it contracts somewhat. Reverses must be avoided and, instead, make spiral turns to avoid unequal pressure.

With a view of strengthening the bandage and to

shorten the time necessary to support limbs or body the surgeon often incorporates in the bandage a firm support, and for this purpose nothing equals in efficiency and ease of application strips of wire gauze or screen. The cutting of the metallic strips is done with wire-cutting scissors. Good plaster should set firmly in the course of half an hour to an hour. If it does not set properly, too much water has been used or the plaster has become moistened before its use. In the latter event the plaster must be baked in an oven before it is used again in the preparation of plaster of Paris bandages.



Wire Gauze.

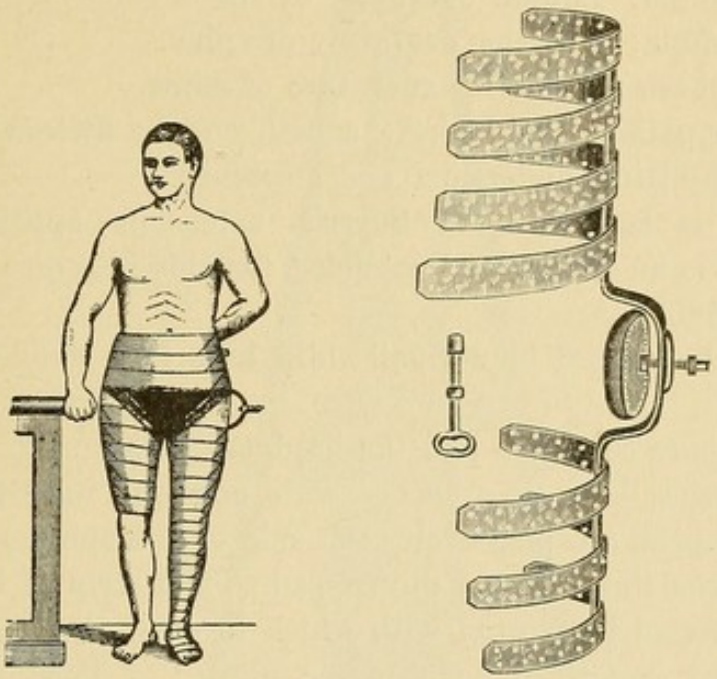
The plaster of Paris cream is prepared in a Delf dish by mixing equal quantities of plaster and cold water under constant stirring until the mixture has the consistence of thick cream. It hardens into a compact mass in about five to ten minutes and must, therefore, be applied quickly.

Plaster cream is often employed in strengthening the plaster of Paris bandage and to render its outer surface smooth. If the setting, either of the bandage or the cream is to be hastened, a little salt, alum or cement powder is added.

The plaster of Paris fixation dressing is extensively used in the treatment of fractures, fixation of joints and immobilization of the spine and in the treatment of tuberculosis of this part of the skeleton (Pott's disease).

SENN'S FIXATION SPLINT FOR FRACTURE OF THE NECK OF THE FEMUR.

The patient receives a bath and wears a pair of knit drawers. Having been placed in Sayre's suspension apparatus, the splint is applied on the injured side with plaster of Paris bandages from toes to border of ribs, on the other side from knee to same level.



Senn's Fixation Splint for Fracture of Femur.

For this purpose prepare:

One roll of cotton.

Wire gauze.

Six three-inch, and five seven-inch roller bandages.

Two dozen wide plaster of Paris bandages and a stool- or box upon which the patient may stand.

In more impacted fractures an anesthetic is necessary to enable the surgeon to effect immediate and perfect reposition. In these the dressing is applied with patient in dorsal recumbent position, the pelvis resting on a pelvic support.

These patients require a fracture bed, which should consist of iron and measure 6½ feet in length, 2½ feet

in height and 3 feet in width and be provided with an adjustment to tighten the springs. It should be furnished with a hard hair mattress, weighing about 25 pounds.

SAYRE'S JACKET.

A plaster of Paris jacket to support the spine in the treatment of:

Scoliosis: Lateral curvature of spine.

Lordosis: Anterior curvature of spine.

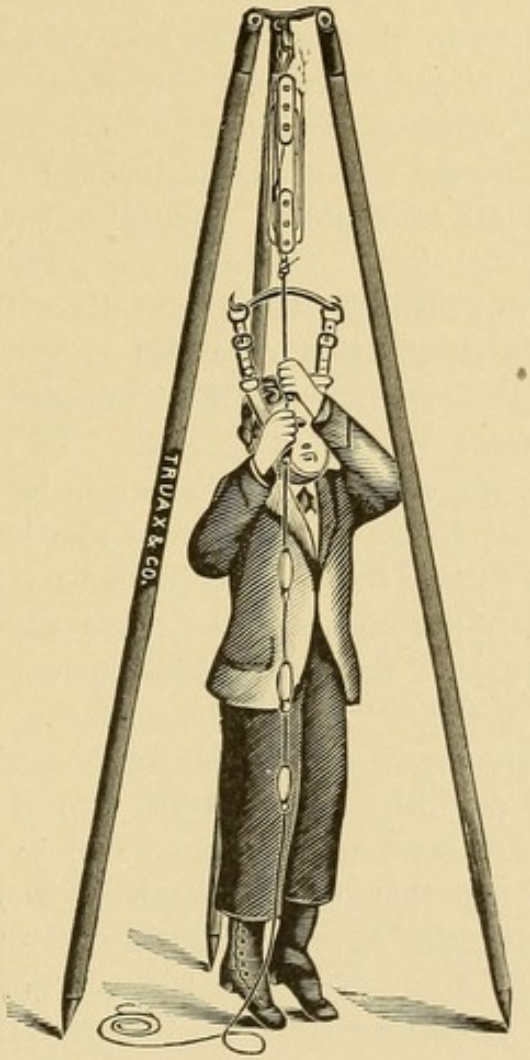
Kyphosis: Posterior curvature of spine.

The patient should have a bath and be attired in a smooth-fitting undershirt and stockings.

He is suspended in Sayre's extension apparatus, which is an iron tripod intended for this purpose. (See page 180.)

If the patient be a small child have him stand on a stool.

Prepare cotton to pad the headgear, two muslin pads six inches long, two inches wide and one inch thick. These pads are placed on each side of the spine, a pad of cotton to serve as a dinner-pad. Tie a strip of bandage around the cotton with which to draw it out when the cast is formed. One dozen plaster of Paris bandages from four to six inches wide.



Sayre's Extension Apparatus, with Tripod.

CHAPTER XIX.

SURGICAL INSTRUMENTS.

Surgical instruments are the implements employed by the surgeon in his operative work. The construction of instruments and their care have been revolutionized since aseptic surgery has come into general practice. On the whole, the size of the instruments has been reduced, and all attempts at ornamentation of handles have been abolished. The surgeons have taught the mechanics to construct all instruments with a view to render their sterilization easy and effective. Modern surgical instruments are devoid of unnecessary grooves, notches, creases and sharp corners. The ideal instrument is smooth, so that its surfaces can be wiped clean with the least difficulty. The nurse who knows how to sharpen the cutting instruments has mastered one of her valuable accomplishments. The nurse who knows the names and uses of the different instruments anticipates the wishes of the surgeon in the operating room. The surgical instruments are no longer housed in velvet-lined boxes or filthy pocket cases. In the operating room they are kept in glass cases, and in going from place to place, they are wrapped in aseptic towels, while canvas rolls have supplanted the old-fashioned pocket cases. Many of the instruments must be tested before the operation, such as the Paquelin cautery, clamps and catch forceps. After the operation, the instruments should be carefully cleansed and thoroughly wiped before they are laid away in the glass case or canvas roll.

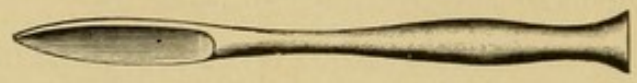
Sterilization of the instruments before an operation can always be relied upon by boiling in a 1 per cent. solution of carbonate of soda for fifteen minutes. The carbonate of soda prevents the rusting of the instru-

ments. The dipping of an instrument into alcohol or even pure carbolic acid can not be depended upon for rendering it surgically clean.

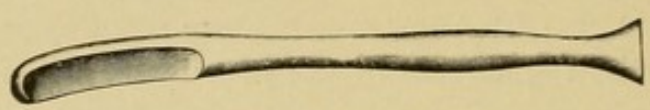
CARE OF INSTRUMENTS AFTER OPERATION.

Collect, count and unlock instruments. Cleanse in the following manner: Brush with warm water to remove blood, and again with hot water and potash soap, place under hot-water faucet, and allow the boiling water to run on them, dry immediately with gauze. To remove rust from instruments, use sapolio sparingly, as otherwise the surface of the instrument will in time become injured.

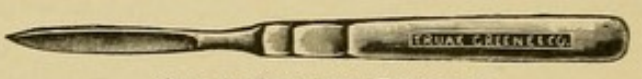
It has been deemed advisable to select and illustrate, both in and out of the text, the instruments in general use, so that the nurse may become conversant with their names and uses.



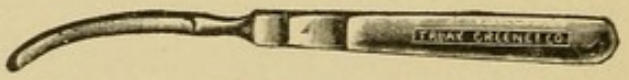
Tenotome, Sharp Pointed.



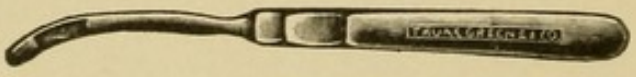
Tenotome, Blunt Pointed.



Senn's Straight Bistoury.



Senn's Curved Blunt-pointed Bistoury.

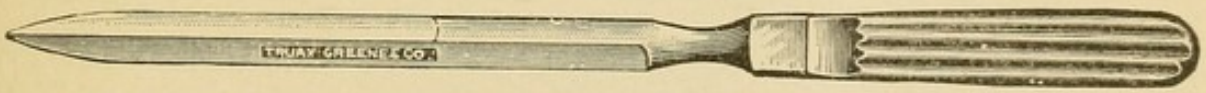


Senn's Hernia Knife.

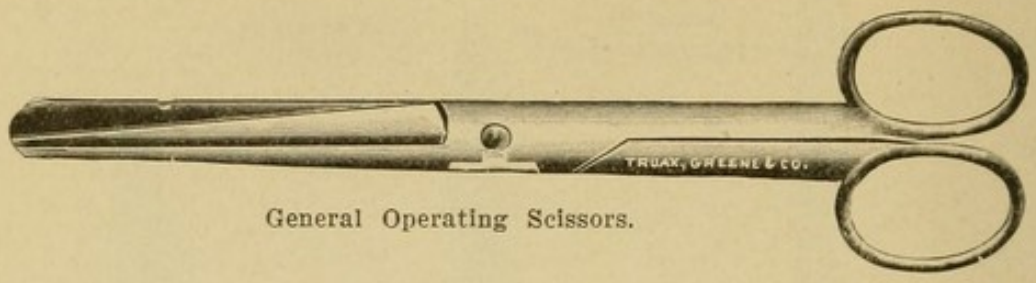
Liston's
Amputating Knife.

Senn's Scalpel.

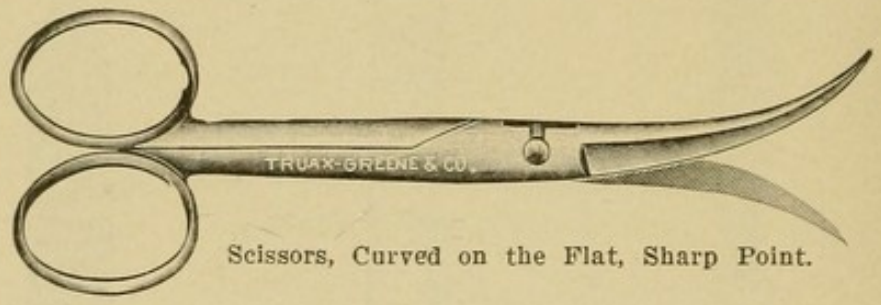
Scalpel.



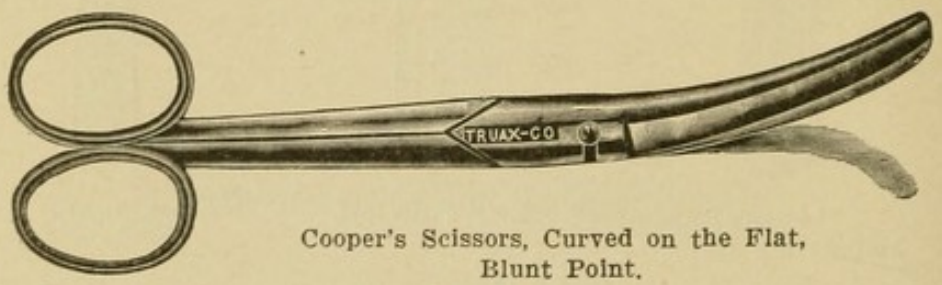
Liston's Catlin, Small.



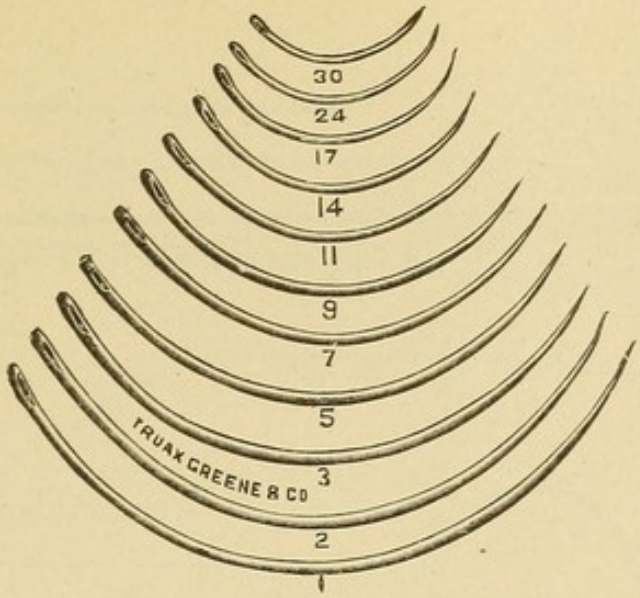
General Operating Scissors.



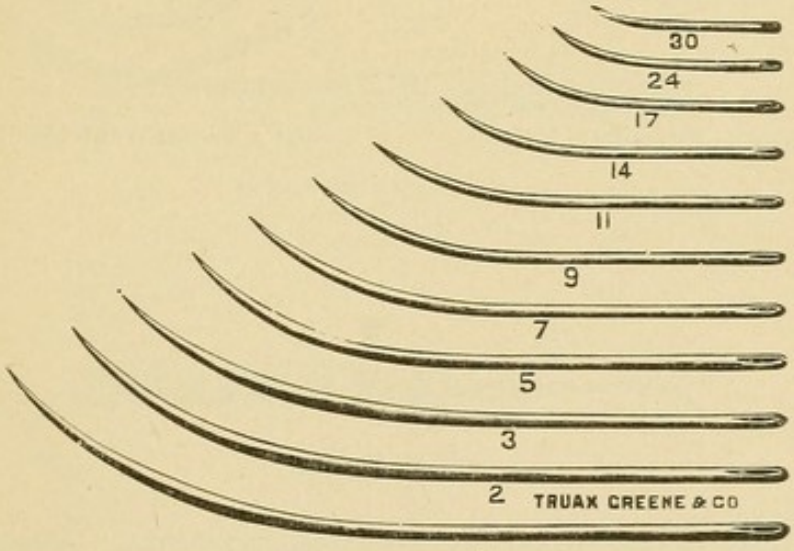
Scissors, Curved on the Flat, Sharp Point.



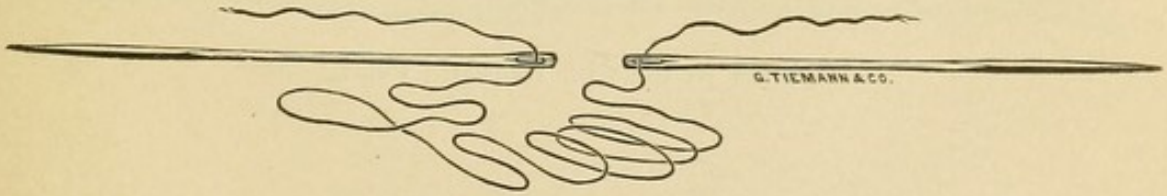
Cooper's Scissors, Curved on the Flat,
Blunt Point.



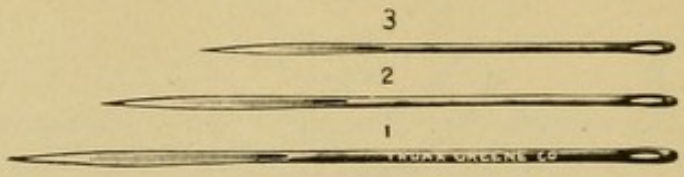
Surgeon's Full Curved Needles.



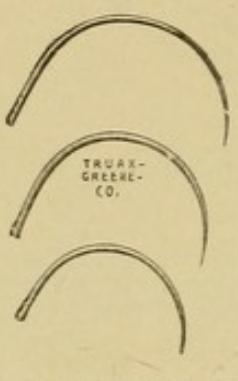
Surgeon's Half-curved Needles.



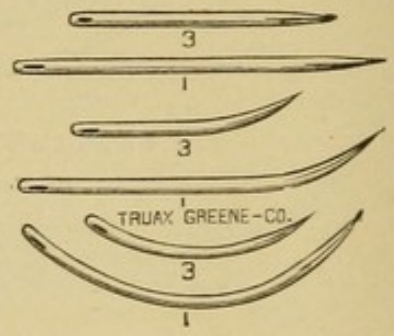
Keith's Abdominal Needles.



Glover's Needles.



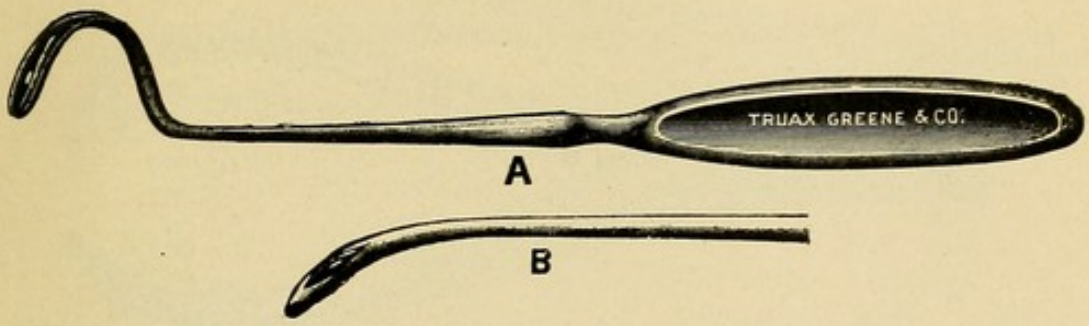
Kelly's Intestinal Needles.



Emmet's Trocar-point Needles.

Senn's Needle.

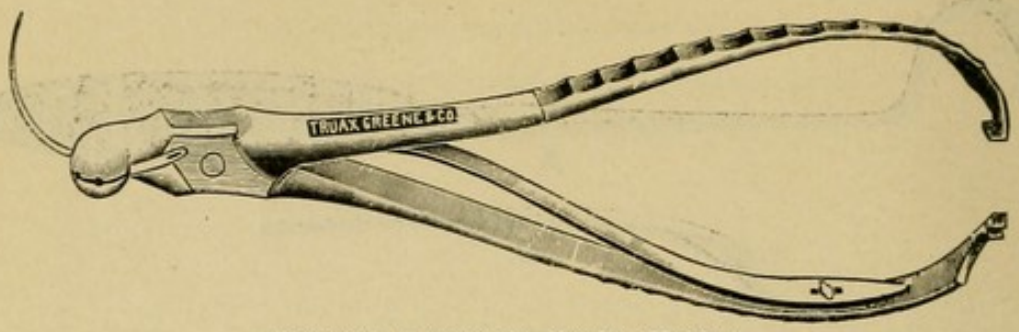
Peaslie's Needle with Hagedorn Point.



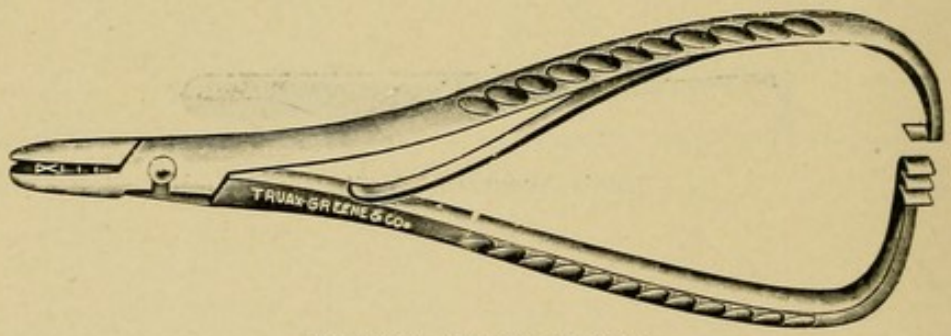
Transfixion or Pedicle Ligature Carrier.

Senn's Aneurysm Needle.

Reverdin's Long-curved Needle.

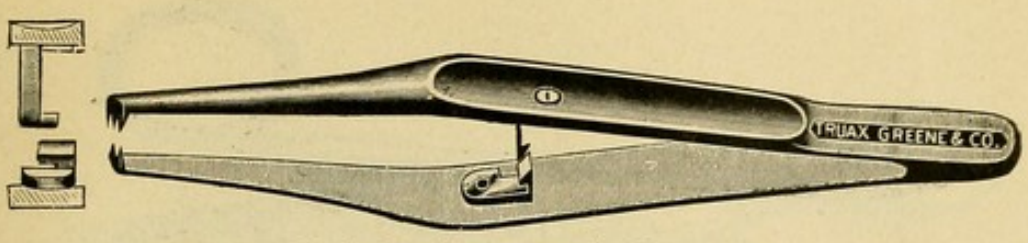


Truax's Automatic Needle Holder.



Mathieu's Needle Holder.

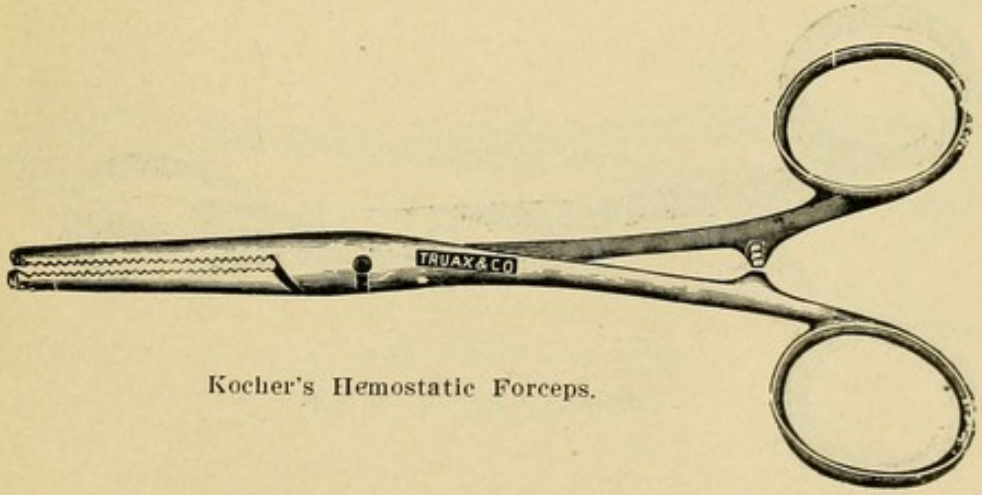
Senn's Slide-catch Tissue Forceps.



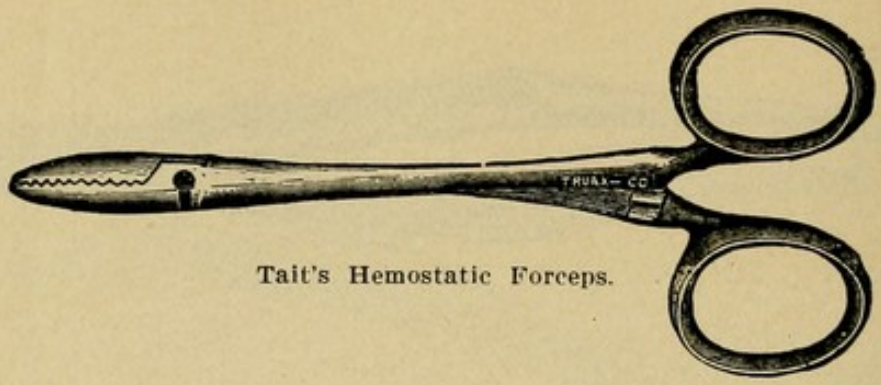
E. J. Senn's Automatic Forceps.

Tissue Forceps.

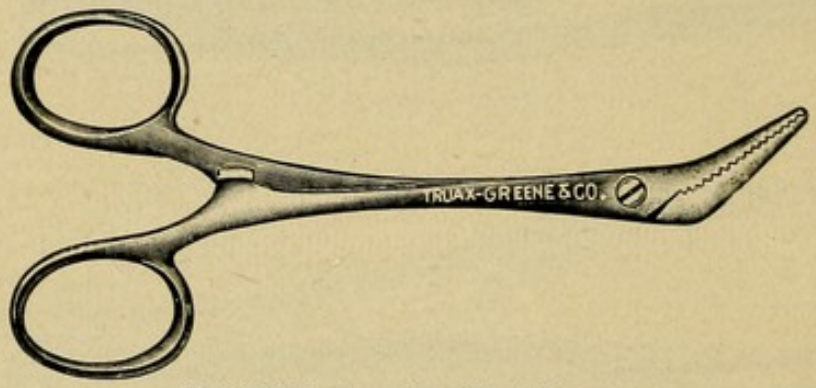
Plain Dressing Forceps.



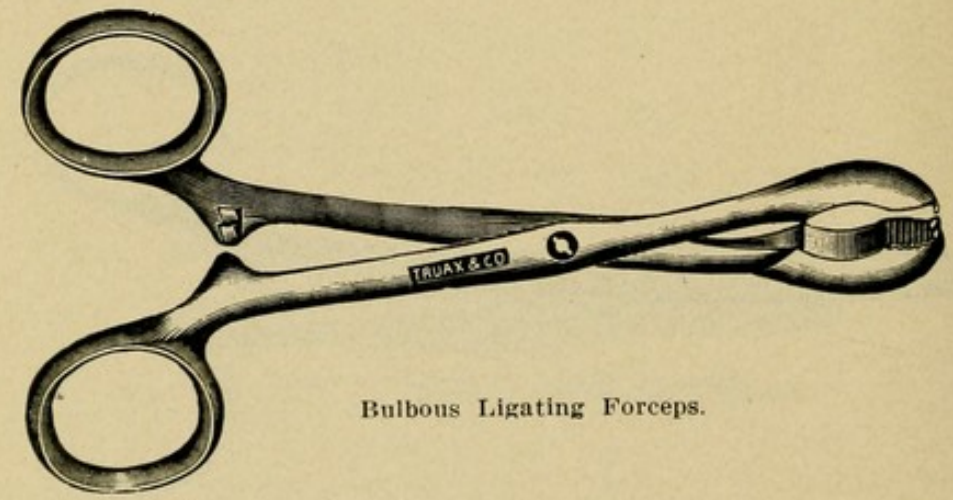
Kocher's Hemostatic Forceps.



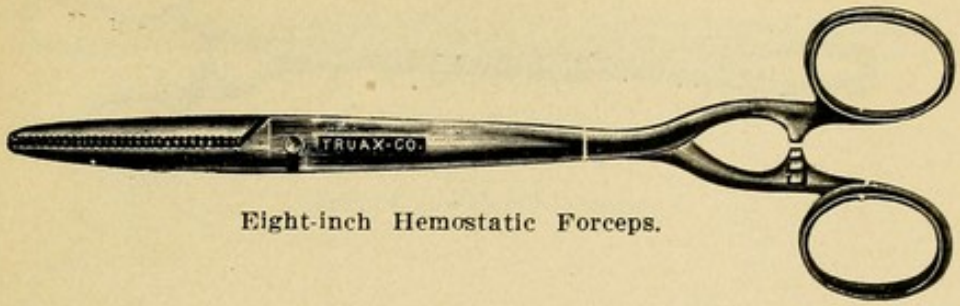
Tait's Hemostatic Forceps.



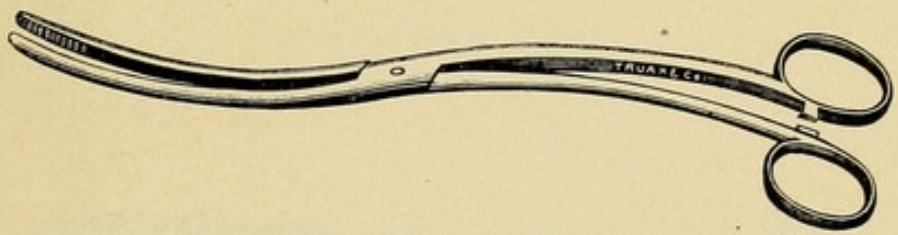
Thornton's Angular Bent Forceps.



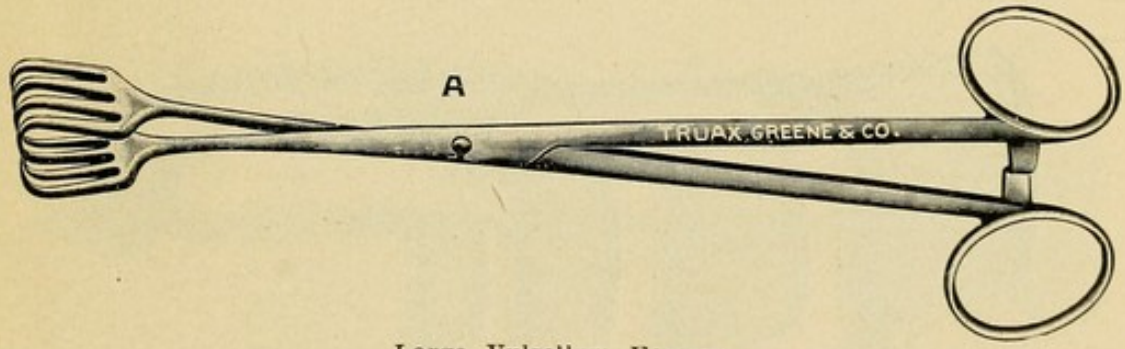
Bulbous Ligating Forceps.



Eight-inch Hemostatic Forceps.



Bozeman's Dressing Forceps.

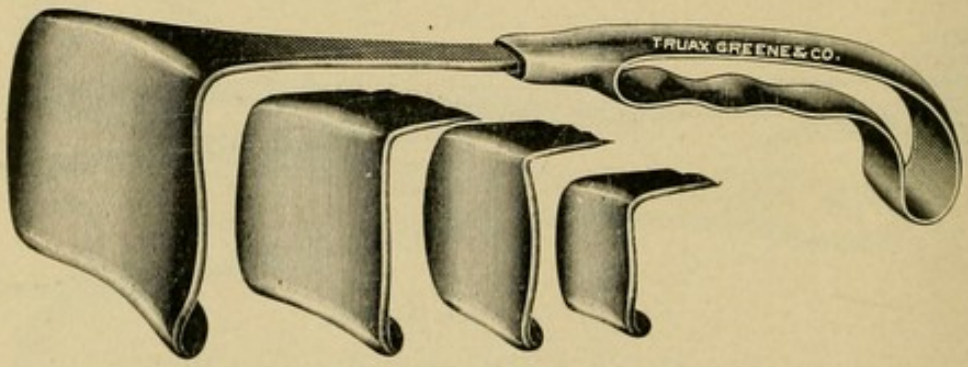


Large Vulsellum Forceps.

Jacob's Vulsellum Forceps.

Senn's Double Retractor.

Volkmann's Four-pronged Blunt Retractors.

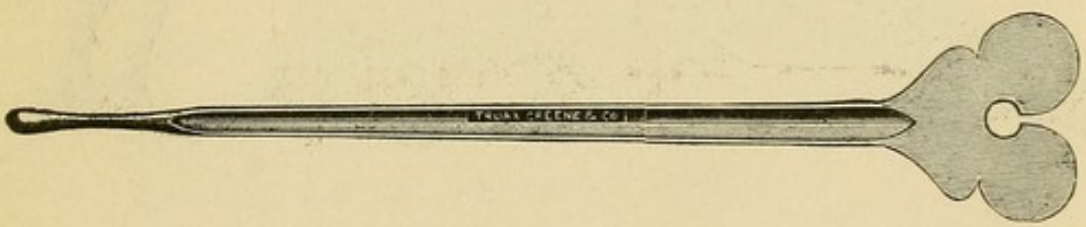


Halsted's Retractors.

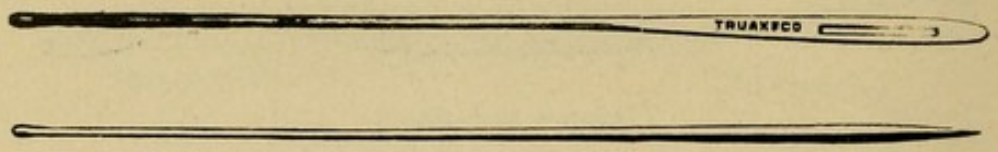
Adam's Enucleator.

Kocher's Director.

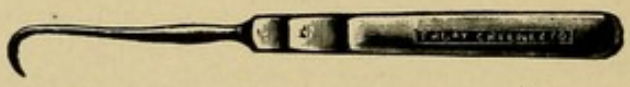
Ordinary Director with Tongue Plate.



Probe Point Director with Tongue Plate.



Minor Operating Probes.



Senn's Tenaculum.

Parker's Amputating Saw.

IMPORTANT TEST QUESTIONS.

Write in not less than a hundred words the qualities which a trained surgical nurse should possess.

How would you prepare an operating room in a private house?

How are hemorrhages classified?

Tell what you know of the means to be employed for the prevention and treatment of hemorrhage.

Give a brief explanation of the Metric Data.

How would you prepare and keep sterile normal salt solution?

In what instances are its uses indicated?

Name and give strength of the antiseptic solutions in general use.

Describe the mechanical and chemical disinfection of the field of operation for a laparotomy. For an operation upon the skull. Upon a mucous membrane.

Give directions for the disinfection of hands.

Describe the best method of rendering and keeping rubber gloves aseptic.

Define the terms sterilization and disinfection, and describe the processes for effecting each.

Which is the most reliable agent to effect sterilization? Why?

What are spores? Name diseases in which they have proved most refractory.

Mention the different methods for the sterilization of ligature and suturing material.

Describe the manner of preparing iodized catgut, and give formula of solution employed.

What is said of the use of antiseptics in the form of powder, and under what circumstances are they most frequently used in practice? Give the methods for preparing iodoform, salicy-

lated and adhesive gauze. How is salicylated cotton prepared and kept aseptic?

State briefly the preparation required and precautions to be observed for the administration of an anesthetic.

What are the most important details to be observed in emergency work?

Name the articles which the anesthetizer should have at hand.

Describe methods of administering chloroform and ether.

What indications manifest danger during narcosis? How are they to be treated?

Name the agents used for local anesthesia. Explain methods of administration.

Give in detail the method to be followed for the thorough disinfection and sterilization of operating room, instruments, dressings, etc., required for a surgical operation.

What course of treatment would you pursue as to diet, etc., in preparing a patient for a laparotomy?

Explain the ordinary duties which devolve upon the senior nurse in the operating room.

Name the instruments required for abdominal hysterectomy.

Give the different methods for closing an abdominal incision.

What are buried sutures? Specify the needles required in suturing internal vascular organs. Why?

Describe the Paquelin cautery, mentioning cases in which it is used, the precautions to be taken while handling it, and its after-care.

How is the rectal tampon made? Describe its use.

What instruments, ligatures, dressings, etc., would you prepare for the amputation of a leg?

Mention the instruments required for craniectomy.

Name the instruments required for tracheotomy.

In the after-treatment of the case, what care devolves upon the nurse regarding the cleansing of the tracheotomy tube?

What are the precautions to be taken in the preparation and use of the intrauterine douche tube?

Define an abscess. In the treatment of such why observe aseptic precautions?

Describe the preparation and use of Senn's injecting syringe.

Mention the various uses of plaster of Paris dressing.

What would you provide for the application of Senn's fixation splint?

What treatment should a patient receive immediately after a laparotomy?

How would you differentiate between symptoms of hemorrhage and shock?

What means would you employ to render aid while awaiting the arrival of a physician?

Mention two other most important wound complications.

Give general symptoms by which you would suspect their onset.

What treatment is usually employed in such cases?

Name the different clinical thermometers?

Give directions and explain reasons for rendering thermometers aseptic before and after using.

In how many ways may temperature be taken? What variation in the degree of temperature will result?

Describe the catheter. What are the precautions to be taken in its use? What directions are given for sterilizing and keeping in an aseptic condition?

What urinary tests should a nurse be able to make?

How would you proceed to make a test for albumin?

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