The operating room and the patient / by Russell S. Fowler.

Contributors

Fowler, Russell S. 1874-1959.
Augustus Long Health Sciences Library

Publication/Creation

Philadelphia and London : W. B. Saunders company, 1906.

Persistent URL

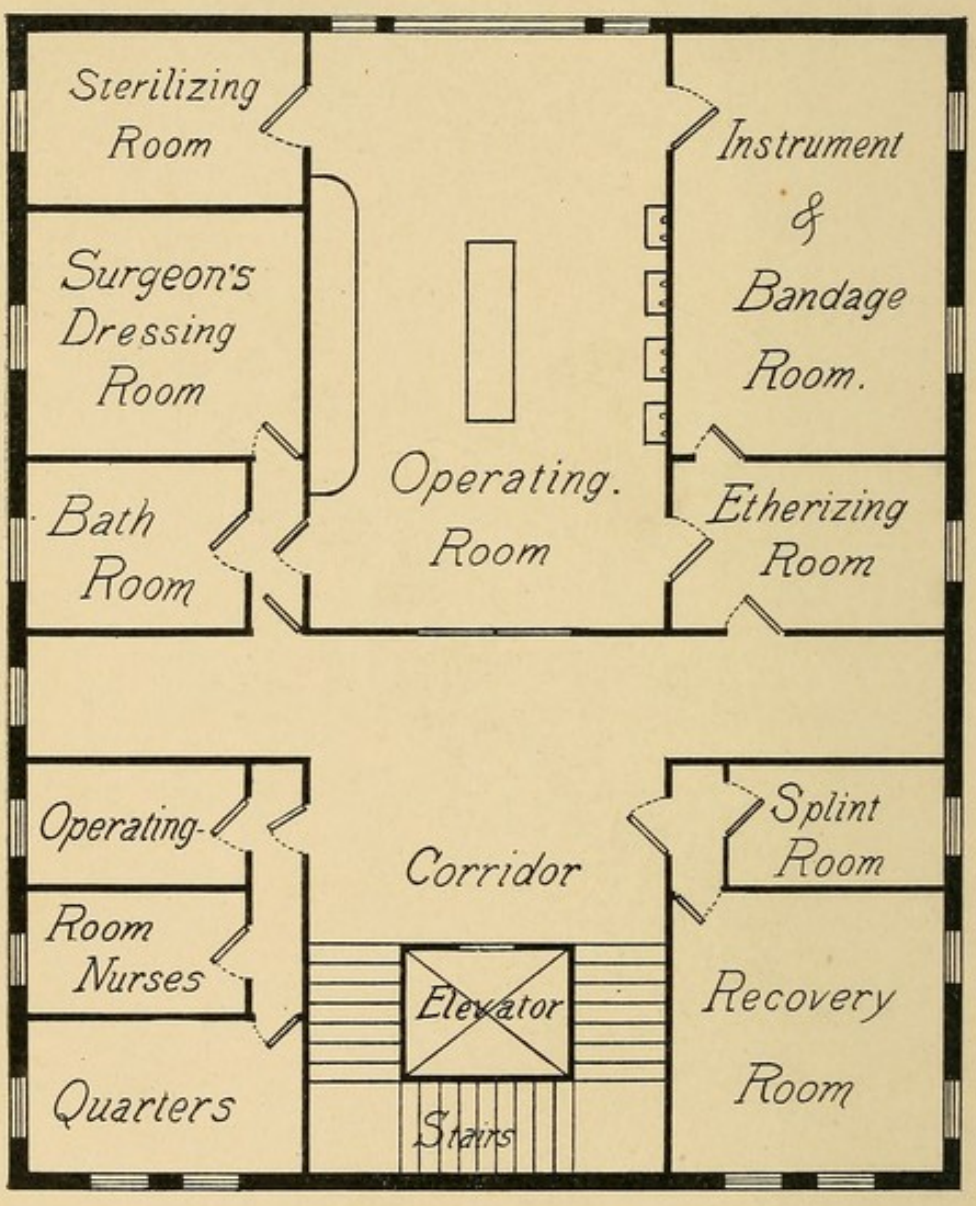
https://wellcomecollection.org/works/a47w5qan

License and attribution

Wellcome Collection
183 Euston Road
London NW1 2BE UK
T +44 (0)20 7611 8722
E library@wellcomecollection.org
https://wellcomecollection.org

Frank Hurley.

1906.



Relation of Operating and Adjoining Rooms.

THE OPERATING ROOM AND THE PATIENT

BY

RUSSELL S. FOWLER, M.D.

SURGEON TO THE GERMAN HOSPITAL, BROOKLYN, NEW YORK

Fully Illustrated

PHILADELPHIA AND LONDON

W. B. SAUNDERS COMPANY

1906

PRINTED IN PHILADELPHIA.

THIS SMALL VOLUME IS DEDICATED TO THE INTERNES AND NURSES WHOM I HAVE HELPED TO TRAIN, AND TO THOSE WHO ARE YET TO UNDERGO TRAINING, AS A FORERUNNER TO A MUCH LARGER VOLUME UPON POST-OPERATIVE TREATMENT.

PREFACE.

I wish to thank Miss Kurtz, Supervisor of Nurses at the German Hospital, for many kind suggestions in the chapters upon supplies; Mr. Francis A. Deck for his admirable illustrating; and last, but not least, the W. B. Saunders Company for the excellent manner in which they have brought out this little book.

January 1, 1906, *Brooklyn*, 299 *De Kalb Avenue.*

CONTENTS.

LIST OF ILLUSTRATIONS.

THE OPERATING ROOM

AND

THE PATIENT.

CHAPTER I.

THE OPERATING ROOM AND ITS PERSONNEL.

General considerations. Arrangement during operations. Preparation of table. Sinks. Scrub-up tray. Disinfection of operating room; table; nickel; brass; glass. Personnel. Costumes; nurses; anesthetist; orderly; operator and assistants; visitors. Operating room nurse. Senior operating room nurse. Junior operating room nurse. Anesthetic nurse. Preliminary training for nurses. Operating room orderly.

General Considerations.—The operating room should be on the top floor, should have a large floor space and lofty ceiling. The central skylight should be double, air-tight, and made of ribbed glass. The east side of the room should have large double windows. The floor, walls, and ceiling should be tiled. There should be no corners. The relation of the operating room to the adjoining rooms is shown in the illustration (frontispiece).

General Operating Room Rules.—There should be no confusion in the operating room. Each person should be thoroughly acquainted not only with his or her duties, but also with the duties of others employed in the operating room. There should be no unnecessary talking. Each

movement should be executed quickly and noiselessly and without coming in contact with other persons.

The operating room furniture consists of two or more operating tables, an instrument table, a sponge table,

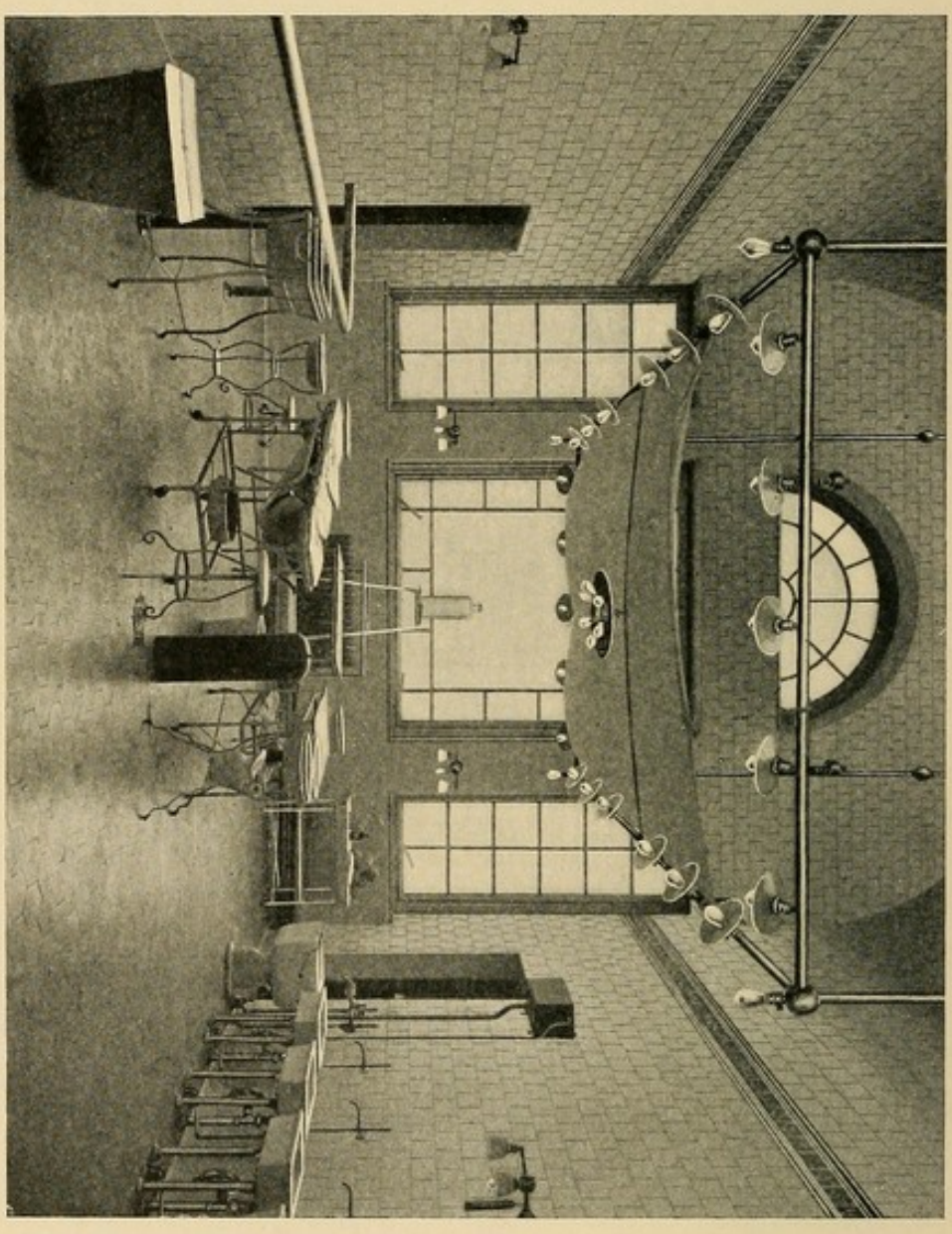


Fig. 1.—Operating room.

a ligature and dressing table, an anesthetic table, three stools, two irrigation stands, a stand for the large bichlorid bath, six basins and stands for solutions, two screens, a table for the scrubbing outfit, four sinks with hot and

cold water taps, a waste sink, pails and receptacles for solid gauze; gowns, etc.; a stand or inclosure for visitors.

During an operation the arrangement is somewhat as follows: The table is so placed as to afford the best possible view of the field of operation; the anesthetist seated at the head, behind him and to his right the table containing the anesthetic outfit and the oxygen apparatus; the operator to one side of the field of operation; his adjunct opposite; the house-surgeon to the right of the operator; the senior assistant to the left of the adjunct; the instrument table behind the adjunct-surgeon, the operating room nurse midway between the instrument table and the adjunct; the sponge table behind the senior assistant, the senior operating room nurse midway between the sponge table and the senior assistant; at the operator's right stands a basin for hand solution; also one at the adjunct's left; to either side of the table is a pail for soiled sponges; on one side of the room stand the sinks with soap, brushes, etc., in place on the scrub-up table; nearby in line are the stands containing the bichlorid bath, alcohol, permanganate, oxalic acid and ammonia or aqua calcis; the visitors' stand or inclosure is so placed as to be readily accessible from the operating room entrance; the large receptacles for soiled dressings, gowns, etc., are at the farther side of the operating room.

Preparation of Operating Table.—On the table is placed the Trendelenburg crutch, with small rubber pads attached (to protect the patient's shoulders), a long rubber hot-water pad (covered with a sheet), a small rubber pillow (covered with a towel). The lithotomy posts and stirrups should be near at hand; also the attachment for operations upon the hand and forearm.

Preparation of the Sinks.—Nail scissors, nail files, wire nail brushes, a jar containing hand brushes, a jar of green soap, a bottle of alcohol, a jar of chlorid of lime, a jar of carbonate of soda and a bottle of hand lotion should

be on a small table near the sinks. Bottles which are to be handled should have bichlorid towels pinned around them or should be covered with bottle bags with draw-strings to fasten around the neck of the bottle. This prevents slipping.

The scrub-up tray is placed on a small, movable table in a convenient part of the room. It contains a large flask of sterile water with aseptic cotton plug, a large flask of acid-bichlorid, sterile brushes in 10 per cent. bichromate of potash solution, liquid green soap, tincture of iodin, Woelfler's solution, alcohol, turpentine, ether, razor, safety pins, bandages, and scissors.

Disinfection of the Operating Room.—The walls of the operating room should be washed down at least once a month with soap and water. The furniture should be scrubbed with soap and water and wiped off with bichlorid (1:1000) or carbolic (1:20) after every operation, when practicable, and certainly after every series of operations. This must also be done after every septic case. The room should be dusted daily and should always be ready for use. Dusting or cleaning should not be done just before an operation. The air of the room should be moist. All windows must be kept closed and draughts avoided. In summer those windows which are to be kept open in rooms adjoining the operating room should be provided with screens. The temperature of the room should be between 75° and 85° F. All ventilators and heat registers are covered with nonabsorbent cotton filters. After each series of operations the floor is flushed and scrubbed with bichlorid solution, 1:1000. Once each month the operating room is disinfected by the formalin process. This method is also used after cases of streptococcic infections. Steaming of the operating room should be done daily in order to keep the air moist and prevent dust.

Enamelware, hand basins, pitchers, pus basins, dressing

pails and other enamelware are scrubbed with soap and water and rinsed with bichlorid, 1:1000. After septic cases they should be boiled for ten minutes. Tables are scrubbed with soap and water, then rinsed with bichlorid, 1:1000. Nickel work is cleansed daily with "*bon ami*" and polished with chamois-skin.

Brass work is cleansed daily with "*bon ami*" and polished with a dry, soft cloth.

Glass basins are cleansed by scrubbing with soap and water, rinsed, wiped off with bichlorid, and polished with gauze wet with alcohol.

Personnel of the Operating Room.—The operating room staff proper consists of an operating room nurse, a senior operating room nurse, and two junior operating room nurses. The position of operating room nurse is a permanent one. The senior and junior nurses serve in each position for at least one month, during which time they are excused from duty elsewhere in the hospital. There is an operating room orderly; also an anesthetic nurse who remains with the patient until anesthesia is established and later accompanies the patient to the bed, remaining until the patient is recovered from the anesthetic.

The operating staff consists of the operator, his adjunct, the house-surgeon, the senior assistant, and the anesthetist. The resident bacteriologist attends operations in which cultures are desired.

Operating Room Costumes.—Nurses employed in the operating room shall wear over their regular nurse's costume (sleeves and cuffs detached) a plain linen gown with sleeves reaching below the elbow. These gowns fasten in the back, are snug fitting, and of sufficient length to entirely cover the dress. A gauze mask is worn which covers the nose and mouth. A cap, linen or gauze, is so arranged as to entirely cover and confine the hair. The operating and sponge nurses wear rubber

gloves at the discretion of the operator. Gowns are changed after each case unless the operator otherwise

Fig. 2.—Nurse's costume.

Fig. 3.—Assistant's costume.

orders. Rubbers or rubber-soled shoes should be worn to prevent slipping.

The anesthetist is provided with a long-sleeved gown

having a breast pocket. He wears a mask and cap. The operating room orderly wears a long-sleeved gown and cap and mask. Operator's and assistant's gowns are long sleeved. Rubber gloves are used at the discretion of the operator.

Visitors are provided with freshly laundered, long sleeved, loosely fitting linen gowns. Each gown is rolled up in a compact package and is not unrolled until needed. They are put on by the visitors before entering the operating room. The number of visitors is limited to the capacity of the visitor's stand.

Operating Room Nurse.—The operating room nurse is responsible for the care of the operating room, the anesthetic room, the instrument room, and all the furniture and apparatus pertaining thereto. She is responsible for the preparation of all instruments, dressings, ligatures, sutures, and appliances necessary for each operation; also for the preparation of all dressings and bandages used in the hospital. She should keep a record of all dressings and appliances issued to the different wards of the hospital, with the date and amount of each issue, and make a monthly statement of the same. She issues to each ward the necessary dressing sets, inspects these instruments frequently, and instructs the ward nurse in the care of such instruments. She stands at the instrument table during operations and passes such instruments to the surgeon as he may require. She should endeavor in every way to anticipate his wants. She watches closely the nurses who assist her in the operating room and who are under her direction, and sees that they properly perform their duties. She must not leave her post at the instrument table except at the request of the operating surgeon. She personally prepares all ligature and suture material. She allows no instrument, apparatus, or dressing to leave the operating room without a written requisition. She

delivers such messages as are reported to her to the person for whom such message is intended.

She keeps the key to the operating room, instrument room, and anesthetic room. These rooms are kept locked when not in use. The operating room nurse also sees that all specimens are sent to the pathologic laboratory, properly labeled with the name of the patient and the hospital number. She also sees that all stains are removed from the gowns, sheets, etc., before these are sent to the laundry.

Senior Operating Room Nurse.—The senior operating room nurse should have four weeks' experience as junior operating room nurse before becoming senior. Under the direction of the operating room nurse she has charge of all the sterilizing and preparation of material, except the ligature and suture material. Assisted by her junior, she prepares all the supplies used in the operating room and also those sent to the wards. On operating days she lays out the requisite number of towels, protectors, caps, masks, rubber aprons, gowns, etc. (everything except the suture and ligature material), necessary for the operations to be performed that day.

During the operation, her post is at the sponge table, and she shall not leave her post except at the request of the operating room nurse. She places bichlorid towels or protectors around the edges of the hand basins. She hands the operator and his assistants their gowns. She passes all sponges, towels, and protectors, anticipating the needs of the operator as much as possible, and is responsible for the correct counting of all sponges.

After operations she cleans all instruments and returns them to their places. She also washes out blood-stained gauze, gowns, etc. She sees that the surgeon's dressing room is provided with sterilized gowns for visitors and that the surgeon's operating clothes are properly prepared. At operations in which but one sterile nurse is required the sponge table is taken care of by the operating

room nurse. The senior's term of service should be at least one month.

Junior Operating Room Nurse.—The junior operating room nurse should serve for at least four weeks before becoming senior. She is responsible for the dusting of the instrument and supply room, the cases and drawers of which should be cleaned at least once each week. The room itself is dusted each night before she goes off duty. She prepares the ward packages of towels for sterilization by the senior nurse. She cuts and folds all the compresses, and assists the senior nurse in making bandages, sponges, etc. She is responsible for the cleanliness of all the operating room and anesthetic room furniture. Before going off duty, she shall see that the operating room, instrument room, and anesthetic room are in order, that the sinks and basins are clean, that the soap, brushes, etc., are in their respective places.

On operating days she arranges the operating room furniture, prepares the basins, solutions, anesthetic room, and the anesthetic table. When the patient is wheeled into the operating room, the junior nurse assists in placing the patient on the table. She fastens the patient's arms above the head in operations upon the upper abdomen or thorax, across the chest, in other abdominal and pelvic operations. She assists in placing the patient in the kidney, lithotomy, or Sims' position as required. The blankets are smoothly arranged so as to completely expose the parts to be operated on, but no portion of the body is to be left unnecessarily uncovered. She removes the bandages and bichlorid towels from the site of operation, taking care not to bring her hand in contact with the patient's skin. She then assists the assistant house surgeon in preparing the field of operation, pouring for him liquid green soap and warm water, alcohol, ether, alcohol-bichlorid, acid-bichlorid, or iodin-bichlorid

as required. In abdominal cases she brings Woelfler's solution for the umbilicus.

She then fastens the gowns of the operator and his assistants; places hand basins on either side of the table, changes the hand solutions as they become discolored; sees that the anesthetist is supplied with anesthetic; picks up all sponges and towels which drop to the floor and places them in their proper receptacles; picks up fallen instruments, cleanses them, and, if so ordered, sterilizes them; collects the used hand brushes and sterilizes them; places freshly sterilized brushes in the brush jar for each case; keeps the instrument sterilizer three-quarters full of soda solution and boiling during the operation; prepares and gives hypodermatic injections as ordered; operates the thermocautery; collects, counts, and places in a pail near the sponge nurse all soiled sponges used in a laparotomy, and reports the number to the senior nurse and to the operating room nurse. She must be ready at all times to give the sponge count; sees that the saline solution is kept at the proper temperature; takes all messages coming to the operating room and reports them to the operating room nurse.

Between operations she washes the frame of the chloroform mask or ether cone, changes the covers, and replaces the soiled hair bag of the latter with a fresh one. She brings a dry, warm blanket for the patient and assists the ward nurse to prepare the patient to leave the operating room (dry shirt, stockings, etc.); flushes the operating room floor with bichlorid solution after each case; removes the protectors from the hand basins, flushes the basins with sterile water and refills them with bichlorid; cleans and prepares the operating table for the next case; collects soiled gowns, towels, sponges, etc., and places them in their respective receptacles.

On the completion of an operation or series of operations she rinses out the stains in the operating room clothing

and towels, and prepares them for the laundry. She cleanses the rubber aprons with soap and water and wipes them off with carbolic solution; cleans all the operating room furniture, anesthetic table, etc.; sees that the solutions are all in order, reporting any deficiency to the operating room nurse; refills all solutions; and cleanses all glassware, basins, blood-stained gauze, etc.

She must watch the operating room nurse, the senior nurse, and the anesthetist and anticipate their needs as much as possible. She must not leave the room unless ordered to do so by the operating room nurse. She sees that each visitor is provided with a gown.

The second junior nurse should be familiar with the duties of the first, so that when two operations are proceeding simultaneously she may help. At other times she is employed in preparing dressings and material.

The Anesthetic Nurse accompanies the patient from the ward to the anesthetic room and remains there until the patient is taken to the operating room. She marks on the anesthetic slip her name, the name of the patient, the variety of anesthetic, the time begun, and the time established; also the patient's pulse when the anesthetic is established. She pins this slip on the anesthetist's gown. She watches the pulse carefully, noting its quality and counting it frequently, and reporting its rate to the anesthetist. She assists in controlling any struggling of the patient. She gives hypodermatic injections when ordered to do so by the anesthetist. She must be familiar with the use of the oxygen tank. She sees, just previous to the patient's being taken to the operating room, that the patient's cap is on properly and that the blankets are smoothly arranged.

Course Preliminary to Entering Operating Room Training.—The supervisor of nurses should, so far as is practicable, arrange a list of nurses for operating room training.

These nurses shall, so far as possible, attend operations and by observation and study acquaint themselves with their future duties.

Operating Room Orderly.—The operating room orderly remains with the patient while in the anesthetic room, controls any struggle on the part of the patient, wheels the patient into the operating room, assists the anesthetist in placing the patient on the table, and sees that the pad of the anesthetic cart and the pillow remain on the cart. He removes the "lifter" (small stretcher) from under the patient and then removes the cart to the anesthetic room. Should the cover of the pad or pillow be soiled, he removes the cover, places it in the soiled clothes receptacle, wipes off the soiled rubber coverings with bichlorid, 1 : 1000, and puts on fresh linen covers. He brings the tray containing the anesthetic outfit from the anesthetic room and places it upon a table placed at the right and behind the anesthetist. Should the operation be one involving the male genitalia, the orderly should remain. He places screens around the operating table, brings to the assistant house surgeon, the soap and water, alcohol, ether, and bichlorid or acid-bichlorid solution as required, and performs such duties ordinarily performed by the junior operating room nurse as shall be assigned to him. In cases in which he is not needed in the operating room he remains in the anesthetic room and holds himself in readiness to receive orders from the operating room nurse. Such messages are delivered to him through the medium of the junior nurse.

CHAPTER II.

THE INSTRUMENT AND SUPPLY ROOM.

General Considerations.—The instrument and supply room should communicate directly with the operating room. It should be a large room fitted with numerous drawers and shelves capable of containing all the supplies needed for use in the operating room. The furniture consists of three enamel chairs; one, long, narrow enamel table for preparing supplies; bandage roller; an apparatus for preparing plaster-of-Paris bandages; and a dust-proof instrument case. Glass bowls, mortar and pestle, glass graduates, and mixing rods should be kept on a shelf above the supply table. A shelf should be reserved for books relating to aseptic technic, surgical bacteriology, operative surgery, and instruments.

Instruments should be kept in their proper places in the instrument case when not in use. Knives should be kept in racks to prevent dulling. Needles should be kept in needle trays. So far as practicable, instruments should be kept in sets representing the operations for which they are commonly used. Instruments in part made of soft rubber should be kept in a separate drawer. No rubber goods should be kept in the instrument cabinet. Sets of instruments the property of individual operators should be kept separate from the hospital instruments. Duplicate sets of instruments may be conveniently kept in linen holders.

Metal instruments (except edged instruments) are sterilized by boiling from ten to thirty minutes in a 1 per cent solution of carbonate of soda. This should be

done just before the instruments are to be used. They are taken from the sterilizer, drained, placed on a sterile sheet, arranged, and covered with sterile towels. Edged

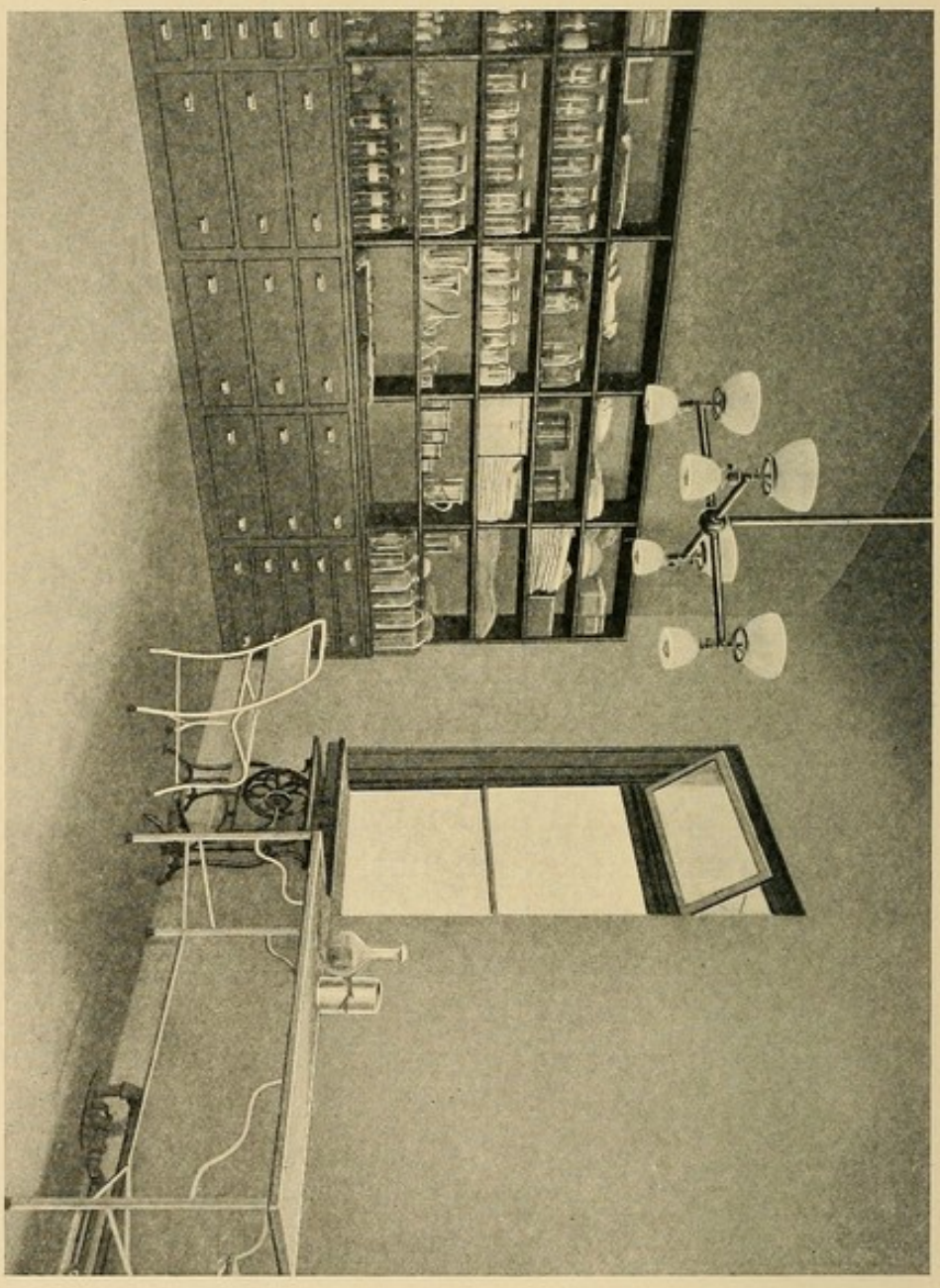


Fig. 4.—Instrument and supply room. First view.

instruments with locks, such as scissors and bone-cutting forceps, are boiled for five minutes. They are boiled separately from the other instruments and on a rack

which keeps them from contact with the bottom of the sterilizer and so in part prevents vibration. Knives are boiled for two minutes in special racks so constructed as to keep their edges uppermost. Needles are boiled for three minutes in an open metal box. During sterilization the sterilizer should be covered. There should always be sufficient soda solution in the sterilizer to cover the instruments.

Directly after use, instruments should be washed, piece by piece, in running cold water until all blood-stains are removed. This cleansing is facilitated by the use of a piece of gauze. Particular attention is paid to locks and crevices. Instruments are then boiled from ten to thirty minutes in soda solution. Following this, they are scrubbed with warm water and "*bon ami*" until bright; rinsed in warm water, thoroughly dried with gauze, polished with a soft chamois, and put in their places in dust-proof cabinets. Each week the cutting edge instruments that have been used during the week are sent to be set and sharpened. There should be a sufficient number of knives to allow one fresh knife to each operation during the week. The instrument nurse should be able to sharpen the knives. Instruments out of repair should be sent at once to the maker.

Brushes.—Brushes are sterilized by boiling for one-half hour in a 10 per cent. solution of bichromate of potash. They are transferred and kept in covered glass jars containing the same strength solution of bichromate of potash in 1 : 1000 bichlorid. After using they are boiled for ten minutes and replaced in the glass jars. The bichromate of potash-bichlorid solution is renewed at the end of each operating day. The use of this solution keeps the brushes in good condition and makes them last longer. Brushes should be of the common hand brush variety, of good quality, and not so stiff as to abrade the skin.

Soap.—Several varieties of soap should be kept in stock. The soap commonly used is the sapo viridis of the German pharmacopœia. Tincture of green soap is a convenient form. A good antiseptic soap may be made as follows:

R. Ether,
Alcohol,
Turpentine,
Glycerini, ... āā ℥iss.
Sapo viridis, ... ℥vj.
Hydrarg. bichlorid., ... q. s. ad 1 : 1000.
M.

Or:

R. Sapo viridis, ... ℥x.
Alcohol, ... ℥xx.
Glycerini, ... ℥vij.
Ol. bergamot., ... ℥ij.
M.

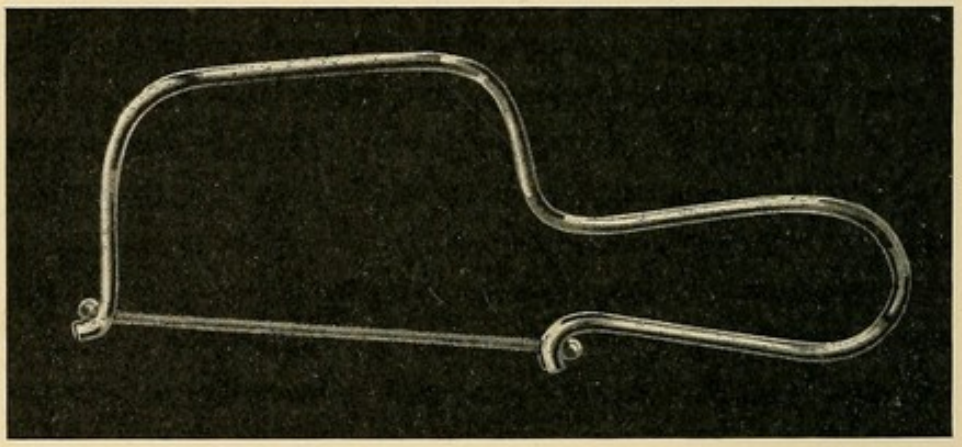


Fig. 5.—Nail cleaner.

Nail cleaners, nail files, and nail scissors should be kept in a special tray near the sinks. In addition to the nail cleaners usually employed, much satisfaction will be experienced in using the one devised by Dr. George R. Fowler. By its use injury to the matrix of the nail is avoided and thorough cleanliness is assured.

Chlorinated lime and **sodium carbonate** should be kept in separate stone jars. That containing the lime should be air-tight. A ready means of disinfecting the hands after septic operations consists in making a paste with a small quantity of each of these ingredients and water. This is rubbed well into the skin for a few minutes and then rinsed off with warm water. The combination gives off chlorin gas. It is quite irritating if left on the skin for any length of time or if used as a routine procedure.

Hand lotions are at times useful in allaying irritation of the skin from too vigorous scrubbing or from the chemical solutions. A simple lotion may be made as follows:

R. Acid. acetic. dilut.,.....
Alcohol.,.....
Glycerini,.....
Acid. boric. (sat. sol.),.....āā ℥j.
Aquæ rosæ,..... ℥iv.
M.

No hand lotion will make up for lack of care in the cleansing of the hands following operations.

Caps are made of bleached muslin in three styles: surgeons' caps, nurses' caps, and patients' caps. They should be made in several sizes and be large enough to come well over the occipital protuberance, covering all the hair. Patients' caps may be made of unbleached muslin. In form they resemble the ordinary bath cap, except that in place of an elastic they have a drawstring which fastens at the back of the neck.

Masks are made of oblongs of muslin ten inches by six inches. Each long side is turned in and a drawstring run through.

Rubber aprons are preferably made of double-faced, red rubber sheeting. Such sheeting is more durable than the single faced. A sheet one yard long and twenty

inches wide makes the average apron. Elastic rubber tubing is preferable to tape for holding the aprons in place. The aprons are cleaned after each use by scrubbing with soap and water, then wiping off with carbolic acid 1:40, and hung up to dry.

Gowns are of two varieties: operators' and nurses'. Gowns having closely fitting long sleeves are preferable to short-sleeved gowns, as the gowns are easily sterilized, while the skin is not. Gowns are washed and laundered in the usual manner, then each gown is rolled into a compact package inclosed in heavy sheeting material. They are sterilized by steam for one-half hour on the day of the operation.

Rubber gloves are sterilized by boiling for five minutes in saline solution. They are then immersed and filled with bichlorid, 1:3000, and put on. The gloves should have gauntlets which come well up on the forearm. They should be tested before each time of using by filling them with bichlorid solution to detect any needle holes or tears. They are worn during all operations by the nurses and assistants, but they should not be put on until after thorough mechanic disinfection of the hands. The objection to their use is that they macerate the skin and so bring hordes of bacteria to the surface. Should a needle hole or tear exist or be made during the course of the operation, these bacteria are likely to escape. If injury to the gloves occurs, the nurse should immediately retire from the operation, redisinfect her hands, and don fresh gloves. The use of a drying powder,—*i. e.*, alum,—as advocated by Dawbarn, prevents sweating to a certain extent. After using, gloves should be washed in soap and water, then boiled in saline solution for two minutes, rinsed in water, the outside dried, turned inside out, and hung up to dry. The surfaces may be kept from coming in contact and adhering by blowing into the glove occasionally or by packing the fingers with strips of gauze.

Gloves are also useful in vaginal and rectal examinations, in the examination of infected wounds, and as a safeguard to surgeons in septic cases.

Finger cots of thin rubber are useful in examinations and to protect small abrasions on the surgeon's fingers against infection. They may be put on the first and little finger of each hand in cases in which many ligatures are to be tied and will aid in preventing the cut which the tying of many ligatures frequently makes in the creases of these fingers.

They are prepared and cared for in the same manner as rubber gloves, except they stand but one minute's boiling. They are so cheap, however, that they may be thrown away after each use.

Protectors are made of heavy linen or of unbleached muslin in two sizes, one and one-half yards by one and three-fourths yards, and one and one-half yards by three-fourth yard. They serve to cover the patient except the part to be operated upon. They are sterilized by fractional steam sterilization in sets of two, one large and one small, rolled into a compact package done up in heavy sheeting material.

Laparotomy sheets are made of heavy linen or unbleached muslin. They should be long enough to cover the entire body and drape over the sides and foot of the table. Through the center of that part of the sheet which covers the abdomen a twelve-inch slit is made and the edges hemmed. Each sheet is sterilized in an individual package.

Perineal sheets are used to cover in the feet, legs, thighs, buttocks, and lower abdomen of patients in the lithotomy position. They are two yards in length by one in breadth. Each short side has a pocket arrangement which covers the patient's foot. Through the center of that portion which covers the perineum and vagina is a twelve-inch slit. Each sheet is sterilized in an individual package.

Anus protectors for use in vaginal operations are made in two patterns. One, a two-tailed bandage of several thicknesses of gauze, the tails lying upon the abdomen, the body of the protector over the anus. The tails should be long enough to lie well up on the abdominal surface to preclude slipping. The body of the protector is held in place by the speculum. The other pattern is a piece of toweling to the two upper corners of which are sewn double pieces of tape. These pieces of tape tied around the lithotomy posts serve to draw the towel tightly over the anus. An anus protector should be sterilized in the package with the perineal sheet. A third and convenient variety of anus protector consists of a towel held in place over the anus and buttocks by a broad strip of adhesive plaster, one-half of the towel being folded back over the adhesive plaster.

Towels should be made of dish toweling of good quality. They should be thirty inches in length by twenty inches in width, and hemmed. They are folded separately and sterilized by steam in packages of six.

Blankets for use in the operating room should be the ordinary single blanket cut in half. This size is most convenient for wrapping around the legs of patients or placing over the chest. They are laundered and sterilized after each use.

Screen Covers should be changed weekly or as often as soiled. The light-weight canvas kind which are provided with eyelets and lace to the frame are best.

Rubber sheeting should be kept in stock for making pads for the operating table and for rubber aprons. Several sheets one yard by thirty inches should be kept on hand to place under the patient to act as drainage pads during dressings.

Kelly pads, two in number, should be scrubbed with soap and water and wiped off with 1 : 40 carbolic solution after each use.

Covers for the rubber pads used on the operating table and anesthetic cart should be of stout muslin. These are fresh for each case. *Muslin bottle bags* should be kept in stock in various sizes and fresh ones used for each series of operations. *Muslin hand, foot, arm,* and *leg bags,* with drawstrings, are useful in operations in the neighborhood of these parts.

Sheets, gowns, towels, blankets, etc., are secured in convenient packages and sterilized at least one hour before operations. If these sterilized bundles have not been opened for forty-eight hours they are resterilized before using.

Powders for use in making up dressings and solution should be kept dry in wide-mouthed, screw-cap jars.

Iodoform.—This should be finely powdered by the mortar and pestle before using.

Zinc oxid for making zinc oxid gauze and for use as a dusting powder.

Saline powders for making up solution for intravenous infusion, made as follows:

R. Sodii chlorid., ... ℥iv gr. vj.
Sodii sulphat., ... gr. xj.
Sodii phosphat., ... gr. iii¾.
Sodii carbonat., ... gr. vss.
Calcii phosphat., ... gr. ix⅛.
Magnes. phosphat., ... gr. iv⅛.
M. Sig.—One powder to six quarts and nine ounces of sterile water.

Potassium permanganate crystals should be made up in one ounce packages.

Oxalic acid crystals should be made up in one and one-half ounce packages.

Thiersch powders contain 15 grains of salicylic acid and 90 grains of boric acid.

Boric acid for making Thiersch powder, gauze, and solutions and for use as a dusting powder.

Salicylic acid for making Thiersch powder.

Bichlorid of mercury made up in tablets of 7½ grains (one to one pint of fluid makes a 1:1000 solution) and for making stock solutions. Sufficient acid should be added to make the solution acid in reaction.

Carbonate of soda (℥iiss to the quart makes a 1 per cent. solution) to make up solution for sterilizing instruments.

Bicarbonate of soda, to make up a saturated solution (℥ii℥iiss to the quart) for mixing with equal parts of peroxid of hydrogen for use as an irrigation.

Sodium Chlorid made up in one drachm packages and sterilized by dry heat.

Magnesia sulphate made up in one ounce packages for use in intestinal obstruction cases.

Bichromate of potash in packages (℥iss gr. xlviii) for making the solution for the hand brushes (one package to the pint makes 10 per cent. solution).

Cocain hydrochlorate in one-half grain tablets for making up spray and hypodermatic solutions.

Solutions.—All water used in making solutions should be sterilized and all solutions should be carefully labeled.

Bichlorid of mercury.—The stock solution may be either 5 per cent. or 12½ per cent. bichlorid in alcohol. It should be kept in a blue bottle. Of the first, ℥j to the gallon makes a 1:3000; of the second, ℥iv to the gallon makes a 1:2000 solution; other strengths in proportion. A small quantity of anilin blue added to the stock solution is sufficient to color all the solutions and distinguishes them from other solutions. Sufficient hydrochloric acid should be added to cause an acid reaction in all bichlorid solutions.

Acid bichlorid is made in the proportion of water, 30 parts; alcohol (94 per cent.), 60 parts; hydrochloric acid, 6 parts; bichlorid, to make a strength of 1:1250 (Harrington's formula).

Carbolic acid solution should be made hot. Stock solution, 95 per cent.; ℥vj to 1 gallon makes a 1:20 solution; other strengths in proportion. Also used pure in the disinfection of suppurating cavities. When used in this manner a quantity of absolute alcohol should be at hand.

Boric acid, ℥vj to the gallon, makes a saturated solution. Add the crystals while the water is hot; then filter.

Thiersch solution (boro-salicylic solution): salicylic acid, 15 grains; boric acid, 90 grains to the pint. Add the powder after the water has cooled; then filter.

Normal saline solution.—Sterile sifted salt, ℥j to the pint. Dissolve in sterile water. Filter into flasks (sterilized by washing with bichlorid solution, then rinsing with sterile water), stopper with nonabsorbent cotton, sterilize for one hour for three succesive days at a temperature of 220° F., and cover the cotton stopper with a small square of rubber tissue held in place by a rubber band. When needed, place the flask in a deep basin filled with hot water until raised to the required temperature. A special saline powder may be used, but this is not essential. Stock salt solution may be kept in order to make normal salt solution quickly. The sodium chlorid used should be dried sufficiently to granulate. Add ℥iss (47 gm.) of the salt to ℥viii (237 cubic centimeters) of water. Boil in a closed vessel for fifteen minutes; ℥j of the solution to ℥viii of sterile water makes normal saline solution.

Bichlorid-permanganate Solution.—Potassium permanganate crystals, ℥j; bichlorid of mercury, gr. viiss; to 1 quart of hot, sterile water. The solution should be made shortly before using.

Permanganate of Potassium Solution.—Crystals, ℥j; hot, sterile water, 1 quart. Should be made shortly before using.

Oxalic Acid Solution.—Crystals, ℥iss; hot water, 1 quart. Should be made shortly before using.

Ammonia Solution.—Stronger ammonia, ℥j; cold water, 1 quart. Should be made shortly before using. For neutralizing the effects of the oxalic acid.

Lime-water, for neutralizing oxalic acid.

Iodoform emulsion, 10 per cent.

R. Iodoform (finely powdered),.....℥j.
Glycerini,.....℥ix.

Put glycerin in wide-mouthed bottle, cork, and sterilize by steam for fifteen minutes; add iodoform gradually, shaking the mixture every few minutes.

Chlorid of zinc solution, 10 per cent., for use as an escharotic in cancer of the cervix and in sloughing processes.

R. Chlorid of zinc,.....gr. 384.
Distilled water,.....℥viij.

Bichromate of potash solution, 10 per cent.

R. Bichromate of potash,.....℥iss gr. xxx.
Water, sterilized,.....1 pint.

This solution is used for sterilizing and preserving hand brushes.

Woelfler's solution is compound tincture of benzoin to which 10 per cent. iodoform powder has been added. It should be shaken before using. Sufficient bichlorid of mercury to make a strength of 1:1000 may be advantageously added. For use as a peritoneal varnish; to fill the umbilicus after cleansing; to coat the nipple in breast operations.

Tincture of iodin, for painting on the proposed line of incision to disinfect the skin. Bichlorid to make a 1:1000 solution may be added.

Benzin, for use in the thermocautery and for cleansing

eczematous condition of the skin, such as are found in the neighborhood of fecal fistulas. Great care must be exercised in handling benzin, as it is very inflammable. It is very useful in removing adhesive plaster straps.

Alcohol, 50 per cent. for general use in cleansing and adding to hand solutions; 80 per cent. for the hands; absolute for sterilization of catgut.

Sterile water should be kept in well-stoppered flasks. The hot and cold sterile water apparatus should give a generous supply.

Hydrogen peroxid kept in brown or blue glass bottles. The bottles should not be filled entirely, but an air space should be left above the solution.

Sodium bicarbonate (saturated solution), for neutralizing the hydrogen peroxid just previous to use.

Commercial ether, for cleansing purposes.

Glycerin, for use as a lubricant; for tampons; for preparing catgut.

Balsam of Peru, for gauze dressings.

Ichthyol, for adding to glycerin to make 10 per cent. tampons.

Vaseline in small, glass jars for use as a lubricant. Should be sterilized after each one.

Olive oil, for use as a lubricant.

Whale oil and iodoform mixture, for filling bone cavities.

Paraffin, of a melting point of 120° F., for preparing silk sutures; for preparing paper coverings for dressings; for injection purposes.

Cocain Solutions.—Solutions of cocain should be freshly prepared. A ½ per cent. solution is 2¼ grains to the ounce; 1 per cent. solution, 4½ grains to the ounce; 2 per cent. solution, 9 grains to the ounce; other strengths in proportion.

CHAPTER III.

THE INSTRUMENT AND SUPPLY ROOM. (Continued.)

GAUZES.

All gauze previous to use or to impregnation with antiseptics is sterilized by steam for a half-hour each day, at a temperature of 212° F., for three successive days. In the preparation of all gauzes, strict asepsis of the hands and all utensils is to be observed.

Iodoform Gauze No. 1.—Formula:

Iodoform powder	gr. 116.
Glycerin	℥j.
Alcohol	℥ij.

Mix thoroughly. This quantity of iodoform makes a 10 per cent. gauze. For more strongly impregnated gauze use iodoform in proportion. This quantity is sufficient to impregnate one yard of gauze. The gauze should first be sterilized by fractional steam sterilization for three successive days. The iodoform emulsion is evenly distributed through the gauze by repeatedly pressing the gauze into the liquid and wringing it out. The gauze is then folded or rolled in convenient shape and placed in sterile, glass, air-tight, light-proof receptacles. Finally, the gauze is sterilized by steam heat for one hour at a temperature not exceeding 212° F.

Iodoform Gauze No. 2.—Formula:

Iodoform powder	℥ss.
Glycerin	℥j.
Hydrarg. bichlorid, (1 : 2000)	Oj.

Mix thoroughly. The bichlorid solution is made with sterile water. Cut the gauze into strips five yards long

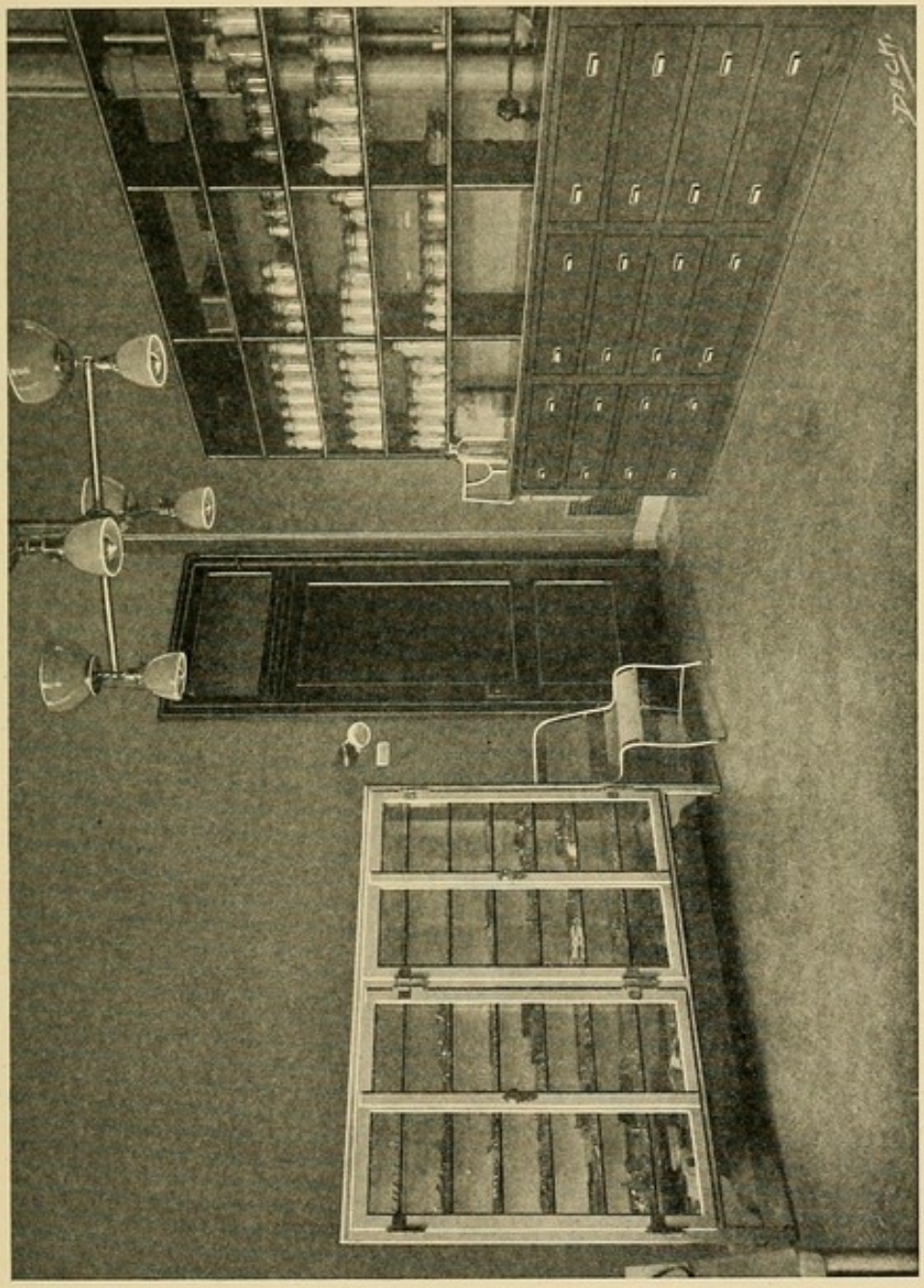


Fig. 6.—Instrument and supply room. Second view.

and four inches wide and fold or roll. Sterilize. Immerse in the above mixture, then sterilize by steam heat, 212° F.

Iodoform Gauze No. 3.—Formula:

Iodoform powder,	℥j.
Glycerin,	℥viij.
Alcohol,	Oj.
Sterile water,	℥viij.

Mix the iodoform and glycerin, then add the alcohol and sterile water. Proceed as above.

Iodoform Gauze No. 4.—Formula:

Iodoform powder,	℥iv.
Glycerin,	℥x.
Alcohol,	℥xxxv.
Ether,	Oj.

Mix the iodoform powder and glycerin. Let stand for twenty-four hours, then mix again and add alcohol and ether. Proceed as above. This formula is the best for impregnating gauze.

Zinc Oxid Gauze.—Formula:

Zinc oxid powder,	℥ss.
Glycerin,	℥j.
Sterilized water (warm),	Oj.

Mix thoroughly. Cut the gauze in strips five yards long and three and one-half inches wide; immerse in the solution, squeeze out, roll or fold, place in sterile glass jars,—sterilize for one-half hour by steam heat on three successive days, and seal.

Boric Acid Gauze.—Cut gauze in strips as above, boil for one-half hour in saturated solution of boric acid, then sterilize as for zinc oxid gauze.

Bichlorid of Mercury Gauze.—Formula:

Strength,	1 : 1000	1 : 500	1 : 400.
Absorbent gauze (dry),	13 av. oz.	13 av. oz.	13 av. oz.
Sol. bichlorid, (1 : 1000),	12½ oz.	25 oz.	31 oz.
Sterilized water,	q. s. ad 32 oz.	32 oz.	32 oz.

After the gauze has been thoroughly saturated, dry in a dust-proof place and preserve in light-proof jars.

Thiersch Gauze.—Prepare Thiersch solution, 1 : 50 (proportion: boric acid, gr. viij; salicylic acid, gr. j; use 292 grains of the powder to 1 quart of water). Saturate sterile gauze in this solution for twenty-four hours, place in sterile jars, and seal.

Balsam of Peru Gauze.—Formula:

Balsam of Peru,	℥iv.
Naphthalin,	℥iiiss.

The balsam is sterilized for twenty minutes at a temperature of 212° F. Cut gauze in strips five yards long and three and one-half inches wide, sterilize, immerse in the above mixture, wring out as dry as possible, place in sterile jars, and seal. Prepare the gauze before the mixture cools.

Carbolized Gauze.—Formula:

Resin,	℥xiiiss.
Carbolic crystals,	℥iiiss.
Alcohol,	Oiv.
Castor oil,	℥ii⅔.

Mix thoroughly. This quantity is sufficient to impregnate thirty yards of gauze. Place impregnated gauze in sterile jars and seal.

Gauze Drains.—Cut gauze strips one to three yards long and two to six inches wide. Cut by drawn thread to avoid frayed edges. Turn in the raw edges. Cervical and uterine drains are eighteen inches long and one inch wide, with the edges turned in. Gauze drains may be impregnated with antiseptics and sterilized accordingly.

Wicking Drains.—Material is string lamp-wicking which comes in lengths of several yards rolled up in balls. Cut in lengths of nine inches, place in bundles of four wicks each, fasten ends with silk, boil for one-half

hour in saline solution, place in jars, sterilize, and seal. The wicking may be impregnated with antiseptics. The wicking drain may be inclosed in fenestrated green

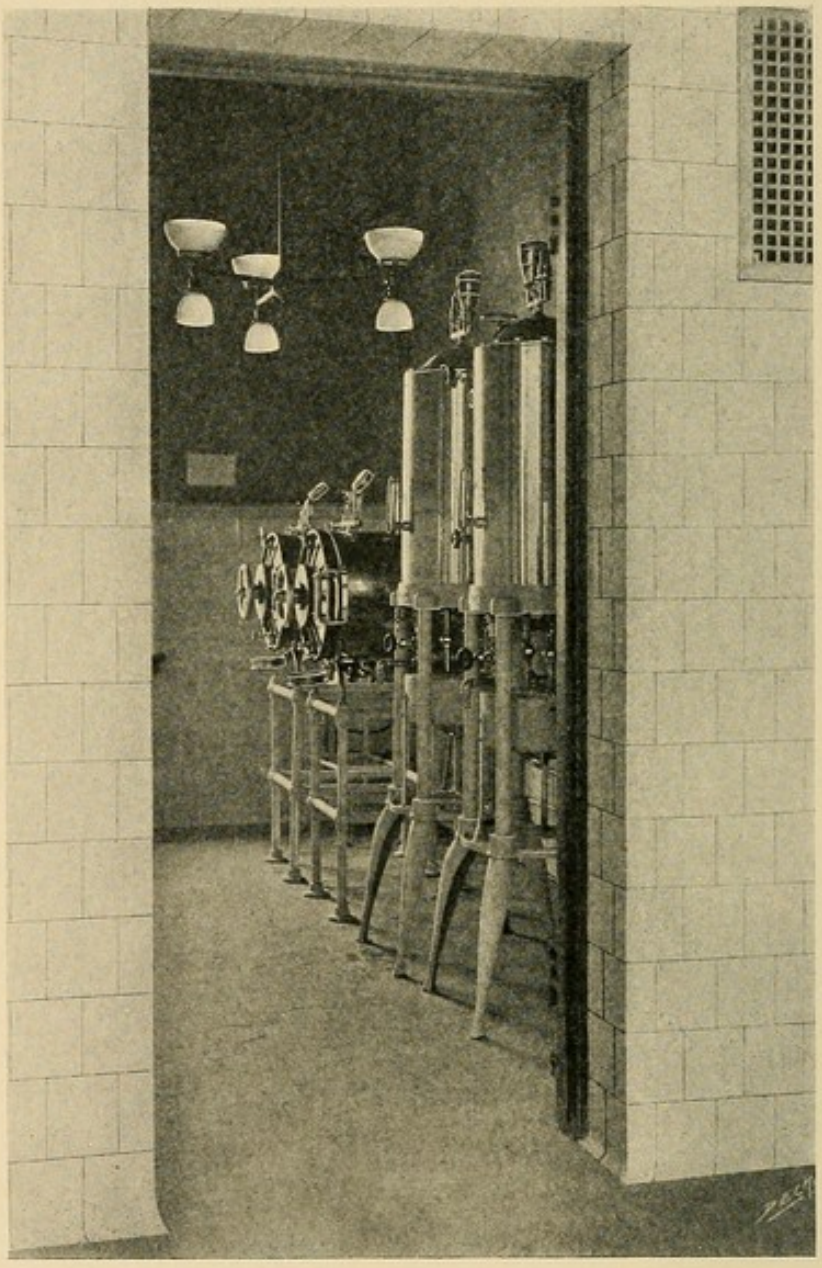


Fig. 7.—The sterilizing room.

silk protective stitched in place. These latter are known as "cigarette drains." They are sterilized for twenty minutes at a temperature of 212° F.

Rubber Tissue Drains.—The rubber tissue is cut in strips two by three to six inches, boiled in water for five minutes, preserved in 50 per cent. alcohol in normal saline solution, or after boiling it may be rolled between layers of gauze, placed in jars, and sterilized for twenty minutes at a temperature not higher than 212° F. Heat will destroy very light rubber tissue if prepared in this way.

Mikulicz Drain acts as a capillary drain and by compression arrests oozing. It is simply a square of gauze, plain or medicated, in which, after it is placed in the cavity to be filled, are packed, as in a bag, strips of gauze the ends of which, as well as the corners of the square bag, emerge from the wound.

Cotton, nonabsorbent, is prepared by cutting the original roll in half lengthwise, then unrolling each half and cutting crosswise into four sheets. Each sheet is rolled up, not very tightly, and covered with heavy sheeting material. Sterilize by steam at a temperature of 240° F. for one-half hour. This cotton is used for the outer protection of wounds and for padding splints.

Cotton, Absorbent.—Small pieces are used on wooden applicators for cleansing wounds or applying caustics. Absorbent cotton may be rolled up in small packages and sterilized for use in the operating room.

Lambs' Wool is cut into convenient sizes (two inches by four) for tampons. An eight-inch piece of cotton string is tied around the middle of the tampon to facilitate its withdrawal. The ends of the string should be knotted together.

SPONGES.

Sponges are made of gauze in three sizes: the hand sponge, eighteen inches square; the stick sponge, one-sixteenth of a yard square; and the laparotomy sponge, eight, ten, or twelve inches square.

Hand sponges are made of a single thickness of gauze. Two opposite sides are folded one over the other so as to lessen the width of the gauze two-thirds; the short sides of the resulting rectangle are folded toward each other and the end of one short side is inserted into the end of the other short side in the same manner that one tucks in the flap of an envelope. With a little practice sponges can be made more quickly in this manner than by sewing them. They are put up in packages of twenty-five.

Stick sponges may be made in three ways: either like the hand sponges or three corners of the small square may be folded to the center and then rolled into a ball which is held in shape by inclosing it with the fourth corner (like a pair of socks are held in shape when rolled up) or a small quantity of absorbent cotton may be inclosed in a three-inch square of gauze held in shape by stitching. They are put up in packages of fifty. Smaller stick sponges are made of gauze for use in small cavities.

Laparotomy sponges are made in three sizes: eight, ten, or twelve inches square. They are made of six thicknesses of gauze, the edges being turned in and hemmed so that there are no loose threads. To one corner of the sponge is sewn a tape twelve inches in length. Twelve laparotomy sponges of the same size, the tapes numbered from one to twelve, are made into a package.

Laparotomy sponges may also be made of crash. Crash wash-cloths are useful for this purpose. They should have the usual twelve-inch tape attached.

Particular care must be exercised in counting these sponges, both when they are made up into packages and when these packages are opened by the sponge nurse. Any inaccuracy in the count must be at once reported to the operating room nurse. The sponge nurse must be able to give the correct count whenever called upon.

COMPRESSES.

Compresses are of a single thickness of gauze one yard square. Two opposite sides are folded so as to overlap each other thus turning in the raw edges and decreasing the width of the gauze by two-thirds, the other opposite sides are then folded over each other toward the center. Compresses are done up in packages of two, for ward dressings; three, for laparotomy dressings; and twelve, for general operating room use.

Laparotomy Dressing.—This consists of one laparotomy pad, three one-yard compresses, and an abdominal binder. These are done up in one package.

Laparotomy pads are used to save gauze; they are made by inclosing a twelve inch square of nonabsorbent cotton in a gauze bag or by filling the bag loosely with shredded tissue paper.

Paper Dressing.—Bags of gauze, twelve by eight inches, are loosely filled with shredded tissue paper. This form of dressing is very absorbent, and is therefore very useful in dressing cases in which a large discharge is expected. They serve admirably for vulvar pads.

Cleansing of Gauze.—All gauze (except the stick sponges) which have not been used in septic cases should be soaked in several changes of cold water and stirred occasionally to remove the blood, then washed in running cold water until all stains are removed, rolled in packages, boiled for one-half hour in normal salt solution, wrung out, and placed in the steam sterilizer to dry. When dry, the gauze is made up into sponges and compresses and sterilized in the usual manner. Laparotomy sponges are cleansed in the same manner.

BANDAGES.

Dimensions.—*Muslin:* 7 yards long by $1\frac{3}{4}$, 2, $2\frac{1}{2}$, 3, and 4 inches wide. *Gauze:* 8 yards long by 3 and $3\frac{1}{2}$

inches wide. *Flannel:* 6 yards long by 1½, 2, 2½, 3, and 4 inches wide. *Crinolin:* 6 yards long by 2, 2½, 3½, and 4 inches wide. *Finger bandage:* 4 yards long by ½ and ¾ inch wide. *Double roller head bandage:* 10 yards long by 1½ and 2 inches wide. *Chest or abdominal roller:* 10 yards long by 4, 6, and 8 inches wide. *Plaster bandages* are made by incorporating plaster of Paris in the meshes of the crinolin bandage as it is rolled. They should be kept in tin boxes in a dry place. *Starch bandages:* usually there is sufficient starch already in the crinoline to make a fairly stiff supporting bandage. If not, powdered starch may be incorporated in the meshes of the bandage as it is rolled. They should be kept in tin boxes in a dry place.

Bandage Box.—Bandages may be made rapidly in quantities in the following manner: A wooden box one foot deep, three feet long, and wide enough to accommodate the bolt of material is required. This box is fitted with half a dozen wooden rollers to guide the material to be used and a metal roller with a crank attached on which to wind the material. The number of yards of material required is wound on the metal roller and the material is cut across. The roll is removed by withdrawing the metal roller. This long roll is then cut into the required widths by means of a "Christy" bread knife. To steady the roll while cutting, a small sized carpenter's mortise board is useful.

Retractor bandages are used to retract the soft parts in amputations. They are two tailed for amputation of the humerus or femur, and three tailed for amputation of the forearm or leg. They are made of several thicknesses of unbleached muslin twenty inches long by eight inches wide.

T-bandages are mostly used to hold perineal or vulvar dressings in place; they may be modified to secure dressings in other parts of the body. The single

T–bandage is made by sewing a strip of unbleached muslin three inches wide by eighteen inches long to the middle of another strip four inches wide by forty inches long. The edges should be hemmed. The double T–bandage is made by sewing two short strips to the middle of the long strip. Several sizes of each variety should be made up.

Triangular bandages are modified T–bandages. The vertical strip of the single T–bandage is made broad at the base and triangular in shape, the base being attached to the body of the bandage. This form of bandage is useful in securing dressings in the region of the groin, in the gluteal region, and in the anal region.

Slings.—The sling is one of the most frequently used of the compound bandages. A yard square of unbleached muslin is cut diagonally and suffices for two triangular slings. The apex of the triangle is applied beneath the elbow, the portion of the sling next the body is carried over the opposite shoulder, the other portion over the shoulder of the affected side, and the ends are fastened at the back of the neck, enough traction being used to insure that the body of the triangle affords equal support to the entire length of the forearm. The apex of the triangle is secured to the front of the sling.

Breast binder. Made of two thicknesses of unbleached muslin. It resembles an armless jacket; length, 1¼ yards; width, back, 16 inches; front, 11 inches; under arm, 9 inches.

Abdominal binder.—Made of two thicknesses of unbleached muslin or one thickness of Canton flannel. Made in several sizes, 18 inches wide by ¾, ⅞, 1, 1⅛, 1¼, 1½ yards long.

Adhesive plaster.—For strapping the ankle and other joints and leg ulcers adhesive plaster should be cut in long strips one-half to three-fourths of an inch in width. These strips should be neatly rolled on glass or metal

rods six or eight inches long for convenient handling. For general use the strips should be two, three, and four inches in width. Adhesive plaster may be used to retain an abdominal dressing in position. For this purpose, four strips are used, each strip ten to twelve inches in length and three inches wide. One end of each strip is folded on itself, adhesive surfaces together, for one inch. This is to facilitate removal. The other end of each strip is folded on itself, adhesive surfaces together, for a space of two inches. Through this double thickness a triangular cut is made with the scissors, and a half-inch tape is passed and knotted. Each tape should be long enough, eight to ten inches, to admit being tied in a bow knot to its fellow of the opposite side over the abdominal dressing. Two of these prepared adhesive plaster strips are placed on the skin well back on each flank. The skin should first be dried to insure thorough adhesion. By applying straps in this manner it is only necessary to untie the tapes when inspecting the dressing. This does away with the unpleasant necessity of frequent changes of adhesive plaster and is more economical in retaining dressing in most parts of the body. They are particularly useful in Syme's amputation and other foot amputations in which part of the tarsus is left. All adhesive plaster strips should be scrupulously freed from ravelings. It is particularly these threads which tend to irritate the skin.

Waxed or paraffin paper is used to wrap packages of dressings, sponges, etc. It is used as a substitute for oiled silk or gutta-percha tissue in making pneumonia jackets, protecting covering for wet dressings, etc. It is much cheaper than either of these materials. Paraffin is cheaper than wax. To prepare, spread the sheets of paper on a flat surface, melt the wax or paraffin, and pour it on the paper; iron evenly with a hot flat-iron. The prepared paper should not be exposed to high temperatures.

Rubber Goods.—The stock supply of rubber tubing and other rubber goods, such as catheters, stomach tubes, perineal tubes, Esmarch constrictors, and Martin elastic bandages, should be kept in a drawer by themselves and liberally sprinkled with powdered sulphur. Treated in this way, rubber can be kept in good condition for years. Rubber tubing should not be kinked nor should rubber sheeting be creased. *Rubber drainage tubes*, cut in desired lengths from the stock supply, are scrubbed with soap and water, rinsed, boiled in 1 per cent. carbonate of soda solution for one-half to one hour, rinsed, and preserved in alcohol, 50 per cent. or carbolic acid, 1 : 40, in normal saline solution in sterile, covered jars. Change the solutions at least once each week. *Rubber dam* is sterillized by boiling for one-half hour in soda solution, rinsed, and preserved in carbolic solution, 1 : 20. *Green silk protective* is cut in strips fourteen inches long by two inches wide, laid between strips of sterile gauze of slightly larger dimensions, rolled loosely, and sterilized in sealed jars at a temperature of 212° F. for twenty minutes.

Filiform bougies should never be boiled. They are washed with soap and water and placed in carbolic solution, 1 : 100, just before using. After using, they are washed with soap and water, rinsed, and carefully dried. They should be kept in a box or metal cylinder by themselves.

Tourniquets and rubber bandages are washed with soap and water, rinsed in 1 : 100 carbolic, and rolled up just before using. After using, they are washed with soap and water and thoroughly dried. They may be prepared by boiling in plain water for two minutes.

Rubber bolsters are used in tying cross-sutures in pairs. They are one inch in length (three inches for perineal bolsters), cut from rubber aspirating tubing. The cut edges should be rounded with scissors. They are prepared

and preserved in the same manner as rubber drainage tubes. In addition they should be boiled for five minutes just before using. They should be preserved after removal, cleaned and resterilized.

Glass goods comprise various sized drainage tubes, catheters, connections, irrigation nozzles, syringes, medicine droppers, and medicine glasses. They are sterilized by boiling in soda solution and kept in bichlorid, 1 : 1000, in covered glass receptacles. This process should be repeated at least once each week.

STERILIZATION OF SUTURE AND LIGATURE MATERIAL.

Plain Catgut.—The catgut is wound evenly on glass spools, one meter of catgut on each spool, and each spool placed in a glycerin-jelly jar. Each jar is then filled with absolute alcohol, the cap lightly screwed on, and the jars placed, cap down, in a two-quart glass jar and covered with absolute alcohol. This jar is then placed in a water-bath on a gas stove (unlighted). A platform of wire netting (such as is used in making wire splints) is placed at the bottom of the water-bath, and on this the large jar rests. The top of the jar is of rubber and should fit very snugly. Through the center of this top runs the lower tube of a Dowd condensing apparatus. The inlet water tube of the condenser is connected with a water tap and a small stream of water turned on. The outlet water tube is led into the sink. The end of the outlet alcohol tube is placed in a glass jar, the top of which is covered with gauze wrung out of bichlorid. This jar should be set at a distance from the flame of the gas stove. Unless a large jar is used for this purpose, it may be necessary to empty it two or three times during the hour. Enough alcohol to cover the jelly jars should be left in the jar. When the gas stove is turned out and the sterilization jar begins to cool, this alcohol is sucked back by the vacuum in the sterilizing jar. Care must be taken

that no fire is in the vicinity of the alcohol until the entire apparatus is set up and ready to start. The catgut is boiled in the alcohol three successive times for one hour at intervals of twenty-four hours (fractional sterilization). It is not removed from the sterilizer until the entire apparatus is cool. Nor is fresh alcohol added to the

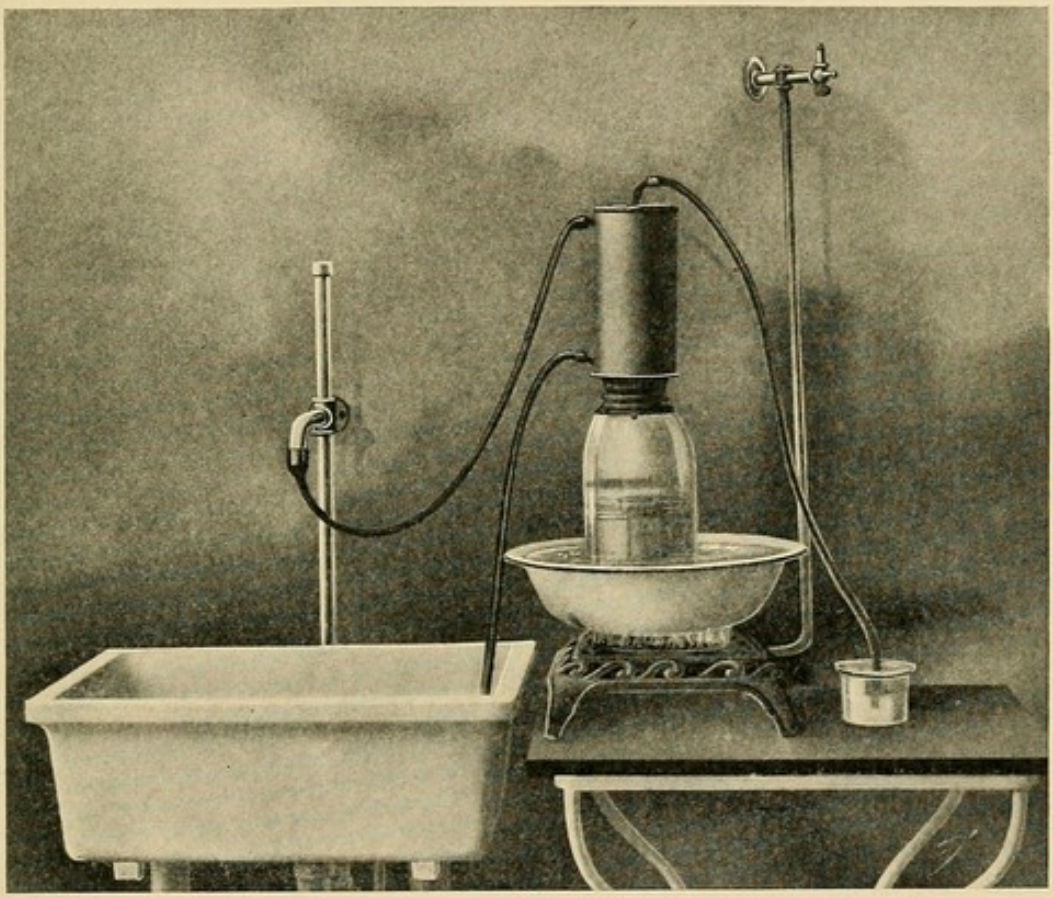


Fig. 8.—Dowd's condenser.

alcohol bath, except under the above conditions. Finally the small jars are removed from the large jar and their caps screwed down tightly.

Chromic Catgut No. 1.—Plain catgut is sterilized for one hour by the above method. It is then wound from the spool on glass plates thoroughly dried for twenty-four to forty-eight hours (if not thoroughly dried the

retained moisture weakens the gut when subsequently boiled in and immersed for twelve hours in a solution of chromic acid, 1 : 5000. Following this, it is allowed to dry thoroughly, wound again on spools, and prepared as plain catgut.

Chromic Catgut No. 2.—Plain catgut is immersed for twenty-four hours in ether or sterilized by boiling in alcohol for one hour. It is dried for two days and then placed for thirty hours in a jar containing the following solution:

Bichromate of potassium,	gr. iss.
Carbolic acid,	gr. x.
Glycerin,	℥j
Water,	Oj.

It is then thoroughly dried and prepared as plain catgut.

Formalin Catgut.—Immerse the catgut for twelve hours in absolute alcohol, Oj; formalin, (40 per cent.), ℥ij; then boil in this solution for one-half hour in the condenser. Replace the alcohol-formalin solution with absolute alcohol. Leave the catgut in this for twenty-four hours, then sterilize as for plain catgut. The addition of glycerin, ℥j, to the alcohol-formalin solution is useful in softening the catgut.

Antiseptic Catgut No. 1.—Immerse catgut for twenty-four hours in chloroform, 1 part; ether, 2 parts. Then place for twenty-four hours in a solution of equal parts of formalin, alcohol, glycerin, and carbolic acid. Finally preserve in alcohol-bichlorid, 1 : 500.

Antiseptic Catgut No. 2.—Proceed as above, but instead of placing catgut in alcohol-bichlorid, 1 : 500, place it for twenty-four hours in a solution of equal parts of water, alcohol, and glycerin. Then preserve in alcohol-bichlorid, 1 : 5000.

Antiseptic Catgut No. 3.—Immerse for twenty-four hours in ether; six hours in bichlorid, 1 : 1000; preserve

in absolute alcohol. Before using, boil for one hour in 95 per cent. alcohol.

Iodin Catgut.—Roll the catgut on glass spools, immerse for twelve hours in ether, then for eight days in 1 per cent. iodin and 1 per cent. iodid of potassium in 80 per cent. alcohol. Preserve in this solution. Kangaroo tendon may also be prepared in this way.

Braided Catgut.—Cut eight strands of catgut No. 1 of the required length, 20 inches; knot together at the end; sterilize in absolute alcohol for one hour; then braid. Finally sterilize the strands as plain catgut, placing two braided sutures in each small jar.

Kangaroo tendon is sterilized like plain catgut or it may be boiled for one-half hour in albolin, at a temperature of 245° F., then transferred to absolute alcohol and sealed.

Silk is boiled on small spools for five minutes in normal saline solution, and preserved in a solution of alcohol-bichlorid (1 : 5000); or boiled for five minutes in bichlorid, 1 : 500, and preserved in the same solution. This latter process weakens the silk. Silk will usually stand but three sterilizations, so but small quantities should be made up. *Linen thread* is prepared in the same way as silk.

Paraffin Silk.—Wind the silk loosely on a glass spool, and soak for one-half hour in soft, white paraffin at a temperature not higher than 240° F. Drain. Sterilize by steam heat, 212° F., fractional sterilization.

Silkworm Gut.—Boil for ten minutes in normal salt solution. Preserve in a solution of carbolic acid, 1 : 30; or boil a sufficient quantity for each series of operations with the instruments.

Horsehair.—Scrub with hot water and green soap. Rinse thoroughly in plain water, then in alcohol 50 per cent. Boil for ten minutes in 1 per cent. soda carbonate. Preserve in alcohol-bichlorid, 1 : 1000.

Silver Wire.—All small pieces of silver wire should be saved, as the manufacturers allow for the silver returned. Is prepared by boiling for one-half hour in normal salt solution.

PERCENTAGE TABLE.

To make four fluid ounces of solution.

$\frac{1}{10}$	of 1	per cent.	equals	1.92	grs.;	approximately,	$1\frac{4}{5}$	grs.
$\frac{1}{8}$	of 1	"	"	2.40	"	"	$2\frac{1}{4}$	"
$\frac{1}{6}$	of 1	"	"	3.20	"	"	3	"
$\frac{1}{4}$	of 1	"	"	4.80	"	"	$4\frac{1}{2}$	"
$\frac{1}{3}$	of 1	"	"	6.40	"	"	6	"
$\frac{1}{2}$	of 1	"	"	9.60	"	"	9	"
1		"	"	19.20	"	"	$18\frac{1}{4}$	"
2		"	"	38.40	"	"	$36\frac{1}{2}$	"
$2\frac{1}{2}$		"	"	48.00	"	"	$45\frac{1}{2}$	"
3		"	"	57.60	"	"	$54\frac{1}{2}$	"
4		"	"	76.80	"	℥j.		
5		"	"	96.00	"	℥iss. gr. 6.		
6		"	"	115.20	"	℥j gr. 55.		
7		"	"	134.40	"	℥ij gr. 13.		
8		"	"	153.60	"	℥ij gr. 33.		
10		"	"	192.00	"	℥iij gr. 2.		

Other strengths in proportion.

Thermocautery.—The thermocautery should be thoroughly tested each operating day. There should be an extra cautery in case of accident. Its principal use in the operating room will be for the destruction of mucous membrane in appendicectomy, in operations upon the liver and bile-passages, and in hemorrhoid operations. All three cautery tips—the point, the knife, and the button should be in thorough order. The benzin chamber of the cautery should be replenished and the cap screwed on, and the rubber tube and bulb attached. The tip is held in a gas flame until it becomes a dull red. The benzin vapor is forced through the cautery by squeezing the rubber bulb. Care is taken not to fill the rubber air reservoir too full or it may burst. The benzin

vapor must not be forced through until the cautery tip becomes red. If this is done prematurely, the vapor cools the tip and the heating process has to be repeated. Some cauteries are provided with an apparatus by which the preliminary heating is accomplished through an extra tube connecting the benzin chamber, a stopcock controlling the flow of benzin. From three to five minutes should be allowed to get the cautery in running order. Once heated, the rubber bulb should only be pressed sufficiently often to keep the tip dull red, dull red showing the proper amount of heat for cauterizing. If the tip becomes too hot, this is remedied by momentarily pressing the rubber tube, thus shutting off the air from the air reservoir. Just before the cautery is handed to the operator, a dry sterile towel should be thrown around the body of the instrument in such a manner as to allow the operator to grasp the instrument without touching it directly. In handing the cautery to the operator and in receiving it from him, the nurse should exercise great care not to come in contact with the operator. The heated thermocautery should be kept at a distance from the anesthetic. After use the tip should be thoroughly heated and allowed to cool slowly. When quite cold, the tip is gently cleansed with gauze. For appendical operations the point tip is most frequently employed; for hemorrhoid operations, the button tip; for liver operations all three may prove useful.

Sand Bags.—Sand bags (used for maintaining the patient in the required position and for supporting plaster-of-Paris casts while drying) are made in six convenient sizes: 25 by 8 inches; 18 by 10; 12 by 10; 10 by 9; 12 by 5; 20 by 15.

Splints.—These are kept in a small room adjoining the anesthetic room. All varieties of splints and splint material should be in stock. There should be a small bench and set of tools so that special splints can be made.

CHAPTER IV.

THE ANESTHETIC ROOM.

Anesthetist. Selection of the anesthetic. Ether anesthesia. Chloroform anesthesia. Ethyl bromid. Nitrous oxid. Junker's apparatus. Trendelenberg cannula. Anesthol. Spinal analgesia. Cocain anesthesia.

The furniture of the anesthetic room consists of the anesthetic cart, anesthetic table, oxygen apparatus, gas apparatus, and a stool for the anesthetist. On the anesthetic table is placed the anesthetic tray.

The anesthetic cart is provided with a long, rubber pad; a rubber pillow; small stretcher; and two medium-weight, woolen half-blankets. The rubber pad and pillow are covered with linen covers. The blankets are folded neatly at the foot of the table.

The oxygen apparatus should have the tube boiled after each use, and fresh sterile water placed in the bottle.

On the anesthetic tray are placed ether, ether drop-bottle, and ether inhaler; chloroform, chloroform drop-bottle, and chloroform mask; ethyl bromid, tongue forceps, aseptic tongue sutures, mouth-gag, sponge forceps, stick sponges, vaselin, hypodermatic syringe charged with a solution of sulphate of strychnin, gr. $\frac{1}{30}$, aseptic hypodermatic needles, an atomizer, unbleached muslin bandages, bandage scissors, safety pins, pus basin, towels; two small glasses, one containing sterile water, the other empty; a minim dropper, a glass graduate, and the restoratives. These consist of a 4-ounce bottle of whisky; tablets of strychnin sulphate, gr. $\frac{1}{30}$; digitalin, gr. $\frac{1}{100}$; caffein benzoate, gr. j; Magendie's solution of morphin, a box of amyl nitrite

pearls, and ergotol. The ergotol solution is made by adding 1 drachm of the solid extract of ergot to 1 ounce of a 1 : 3000 solution of formalin. The hypodermatic dose is 30 minims.

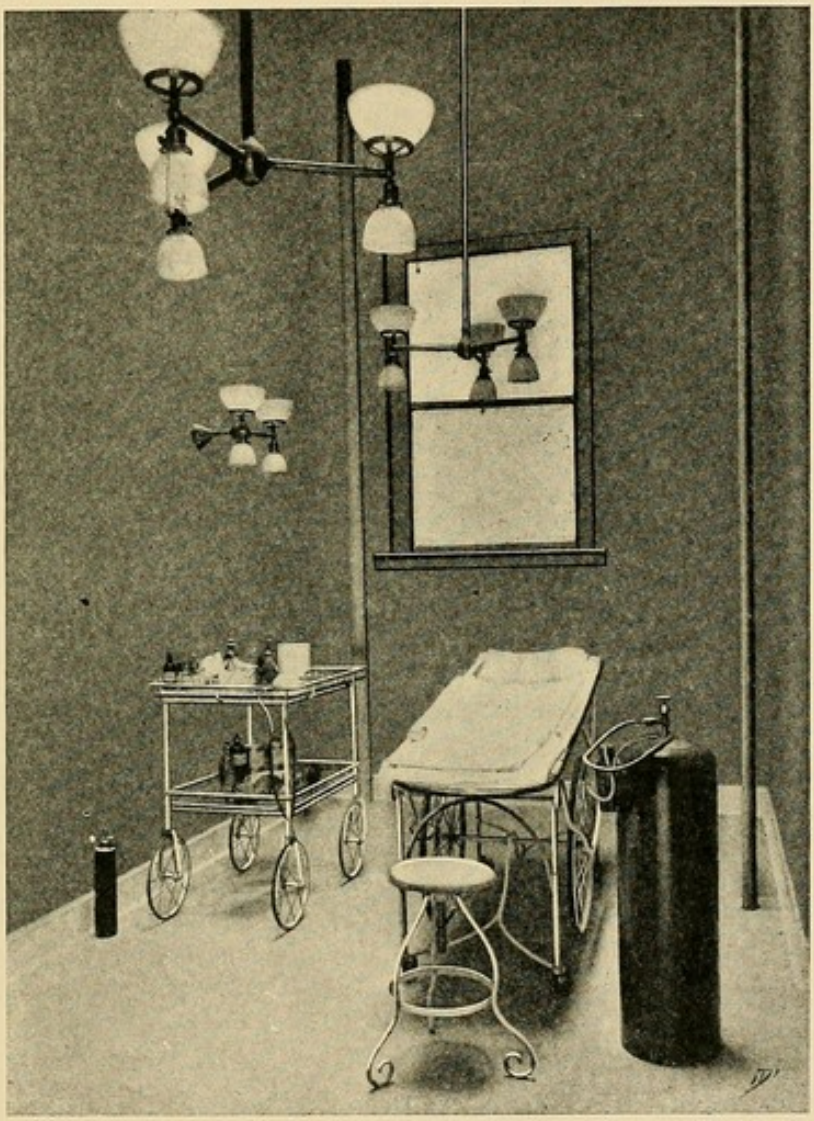


Fig. 9.—The anesthetic room.

There should be in reserve a second tray completely equipped.

The chloroform and ether should be poured into blue glass bottles and a reserve supply should be kept in their original packages.

The ether inhaler is prepared by pinning tightly around it a folded towel which has been somewhat stiffened by folding in it a few sheets of wrapping paper. The stiffened towel should project an inch or so below the face part of the inhaler and is intended to protect the patient's face against pressure from the hard edge of the inhaler. In adminstering ethyl bromid a rubber face piece should be used in place of the stiffened towel in

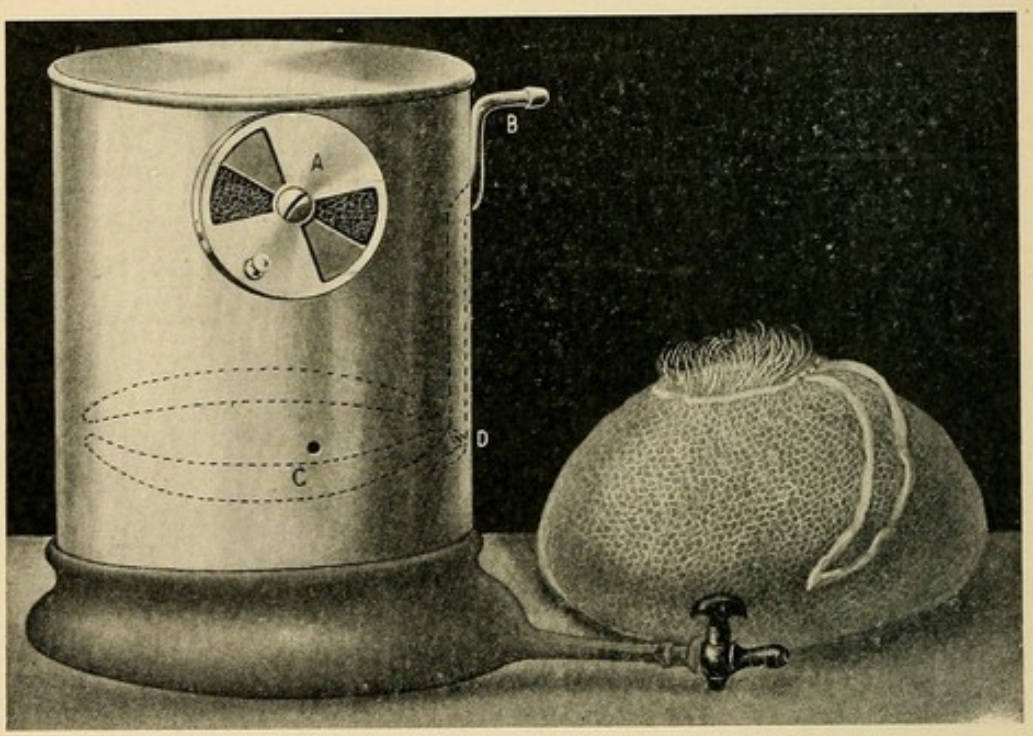


Fig. 10.—Author's modification of Dr. George R. Fowler's ether inhaler.

order to exclude all air. There should be kept in a convenient place fresh hair bags and clean chloroform mask covers. The ether inhaler is washed, dried, a fresh hair bag inserted, and a fresh cover put on for every case. The chloroform mask is washed and a fresh cover put on for every case. The tongue forceps, mouth-gags, and stick sponge holders are washed and sterilized after each case. The tongue suture is renewed as often as used.

On a reserve anesthetic tray in the instrument room should be kept, always ready for use, Junker's apparatus for chloroform anesthesia and Trendelenburg apparatus for chloroform anesthesia.

The **anesthetist** should don his gown and cap, but need not put on his mask until he enters the operating room. He should be familiar with the patient's history and with the condition of the heart, lungs, and kidneys. He takes charge of the case from the time it is brought to the anesthetic room until it is placed in charge of the nurse who watches it until consciousness is regained. He should endeavor to inspire the patient with confidence. He should see that all foreign bodies are removed from the mouth and that respiration is not impeded through constriction of the neck or chest by clothing or dressings. In catarrhal conditions of the nose and throat a preliminary spray of 2 per cent. cocain solution should be employed. Alcoholic patients should be given morphin sulphate, gr. $\frac{1}{4}$ to $\frac{1}{2}$, hypodermatically fifteen to thirty minutes before the anesthetic is begun. Morphin habitués should be given a dose of morphin proportionate to the amount to which they have been accustomed. The nose, lips, and skin in the neighborhood should be anointed with vaselin to avoid irritation from the anesthetic. The eyes should be protected by covering them with a folded towel. Should, in spite of this precaution, some of the anesthetic enter the eyes, they should be irrigated with boric acid solution as soon as practicable and a compress wet with boric acid solution kept on them. The patient's head should be turned to one side and should be lower than the body to facilitate the escape of secretions from the angle of the mouth and the nose. The position should not be forced, and should not interfere with respiration. A flat pillow may remain under the patient's head to protect the head from the table.

The anesthetist should call the operator's attention to any deviation from the normal course of anesthesia and see that stimulation is promptly administered. He is not to leave the patient for any reason unless some one is at hand to relieve him. He assists in placing the patient upon the operating table, and is then provided with a mask by the junior nurse. He will be notified by the operator when to discontinue the anesthetic. Ether vapor is inflammable; so care must be exercised in using the thermocautery not to bring it near this anesthetic. The anesthetic should be discontinued during dilatation of the sphincter ani preliminary to operations upon the rectum. Otherwise the deep inspirations which this procedure occasions would cause the patient to become too profoundly anesthetized. This would be particularly dangerous in chloroform anesthesia.

The selection of the anesthetic depends upon the condition of the patient and the character of the operation. The anesthetic which will be borne with least danger and yet will permit of all necessary manipulations in the operation is the one to be selected. Local anesthesia is indicated in operations occupying short periods of time and those in which the nerves supplying the parts can be readily anesthetized; also in operations of longer duration in which ether or chloroform is absolutely contra-indicated, the operation being upon a part of the body which is not controlled by spinal analgesia. Nitrous oxid may be indicated in some of these latter cases. If ether or chloroform is contra-indicated either by the character of the operation or by the weak condition of the patient, or by advanced lesions of the heart, lungs, or kidneys, we must employ local anesthesia or spinal analgesia.

Nitrous oxid is the safest of general anesthetics, but unfortunately its field is limited. It is useful in short operations and in tiding over the primary stages of ether

anesthesia. It may be employed in longer operations, but is not satisfactory where absolute relaxation of the patient is essential. In cases in which the heart muscle is much weakened or in which there is considerable difficulty in respiration, it is not safe to employ it alone, though it may be combined with oxygen. As a preliminary to ether anesthesia, it is thoroughly satisfactory. Given alone, in children, there is apt to be pronounced muscular twitchings; in pronounced anemia there is danger of respiratory or cardiac failure; in arteriosclerosis there is danger from the strain upon the circulatory apparatus. These dangers are considerably lessened if oxygen is combined with it.

Spinal analgesia should only be employed in those cases in which a general anesthetic is contra-indicated. Anesthesia can always be relied upon up to the level of the anterior superior iliac spines, and in many cases still higher.

Ether Anesthesia. The patient's confidence is strengthened by pouring a small amount of ether on the cone and holding the cone a few inches from the face, thus accustoming him to the smell. He is directed to take deep breaths and to expire freely. The cone is gradually approached to the face until it covers the mouth and nose. The anesthetist's left hand grasps the cone, and one finger of the same hand is hooked under the jaw to hold it forward; the jaw should be kept forward throughout the anesthesia. The nurse should keep a finger constantly upon the pulse. The patient now breathes through the cone. Ether is added drop by drop, slowly at first and then more rapidly. If added too rapidly at first the patient will gag and struggle. By this graduated drop method the patient passes into a state of primary unconsciousness. This state may be transitory and a state of unconscious struggling may ensue or the patient may pass directly into a state of profound anesthesia.

This primary state of unconsciousness varies. In alcoholics and drug habitués, it is of brief duration, while in patients profoundly septic, or in shock, this stage passes directly into profound anesthesia. Following the state of primary unconsciousness, there is usually some unconscious struggling. This is more marked in men than in women and is most severe in alcoholics and drug habitués. During this stage the ether should be dropped faster, the cone pressed firmly over the mouth and nose, the jaw held forward, and the patient's struggles restrained. In restraining the struggling no greater force should be used than is absolutely necessary. Misguided efforts in this direction only tend to increase the struggling. The unconscious movements of the patient should be guided, rather than forcibly restrained.

The stage of excitement gradually subsides. The convulsive movements become less and less. The later part of this stage is marked by muscular rigidity. Muscular relaxation gradually follows. The respirations, which during the stage of excitement have been irregular, spasmodic, and interrupted by attempts at speech, become deep, regular, and finally stertorous. The conjunctival reflex disappears. The pupil is midway between contraction and dilatation and responds to light. The anesthetic is now established. Should the anesthetic be continued the pupil will dilate, will not respond to light, and the respirations will become shallow, marking the danger stage of ether anesthesia. Should the anesthetic be discontinued, the pupil will also dilate, but will respond to light, the respiration will become normal, and the patient will regain the stage of excitement. Both these conditions should be avoided. The anesthetic having been thoroughly established, the condition should be maintained by dropping ether in the cone from time to time. Just enough ether should be added to keep the pupil midway between contraction and dilatation. The

pupil should respond at all times to light. To insure against the patient coming out of the anesthetic while being transferred from the anesthetic room to the operating table, the cone should be kept closely applied to the face.

With the patient properly placed on the table, the anesthetist must watch the respiration, pulse, and pupil. In the majority of cases the pupil will be the best guide to the degree of anesthesia, but occasionally cases will present themselves in which the pupillary reflex is lost early while muscular rigidity still persists. In such cases the respiration will be the best guide as to the depths of the narcosis. The anesthetic must be continued until muscular relaxation is complete, but oxygen should be combined with the ether. In other cases the rigidity will persist even after the pupils have ceased to respond to light and the respirations have become deep and stertorous. Oxygen should be combined with ether in these cases also. A hypodermatic injection of morphin sulphate, gr. $\frac{1}{4}$, often aids in overcoming the rigidity. These atypical cases are to be watched very carefully. In many cases the administration of oxygen with the ether will cause the case to pursue a normal course of anesthesia. From this, it would seem that the cause of the condition lies in an imperfect oxidation of the ether through insufficient air-supply. There are other cases, patients suffering from profound sepsis, deep shock, or severe hemorrhage, whose pupils remain dilated throughout, whose respirations are shallow, and whose relaxation is complete, but whose pulse gains force under the stimulating effects of the ether. Such cases require very little anesthetic.

Cyanosis may occur during any stage of anesthesia and results from insufficient air-supply. Occurring in the early stage it is due to spasm of the glottis or to accumulation of mucus in the pharynx. The former results from

too rapid administration of ether. The cone should be immediately removed, a mouth-gag inserted, and the tongue pulled forward, but not forcibly. This is done with tongue forceps which should be so constructed as not to crush or bruise the tongue. As soon as the patient has taken two or three deep inspirations the cone should be replaced and the administration of the anesthetic continued. In the case of an accumulation of mucus or vomited matter in the pharynx, the cone is removed, a mouth-gag inserted, the pharynx sponged out, and the anesthetic then continued. Later on, after anesthesia has been established, cyanosis may be caused by the administration of too much ether, or may be due to falling back of the tongue, to accumulation of mucus in the pharynx, or rarely to paralysis of the larynx. In the latter event attempts at respiration will cease. The anesthetic is immediately discontinued, the mouth-gag inserted, a suture passed through the tongue transversely to the septum one to two inches from the tip, and gentle rythmic traction made upon the tongue, and the pharynx sponged out. If the patient does not begin to breathe immediately, gentle rhythmic traction on the tongue is continued, the head of the table lowered, oxygen is administered; strychnin sulphate, gr. $\frac{1}{20}$, and atropin sulphate, gr. $\frac{1}{50}$, administered hypodermatically; the sphincter ani widely dilated, and artificial respiration begun and continued until breathing is reestablished or until thirty minutes after cardiac pulsations have ceased. The anesthetist should attend to the mouth-gag, tongue, jaw, and pharynx; a nurse should hold the oxygen tube in place; two assistants, one at each side should keep up the artificial respirations, a third assistant should dilate the sphincter; a second nurse should administer the hypodermatic stimulation; a third nurse should bring the faradic battery, connect the electrodes, moisten them, and place one on the lateral region of the neck and the other on the

epigastrium, the second electrode should be moved over the chest. It is only by quick, combined, and protracted efforts that these cases of respiratory paralysis can be saved. The premonitory signs are not marked. The patient is not often seemingly deeply anesthetized. The respirations stop suddenly, the patient gives a gasp or two and then is quiet, the heart action continues, and cyanosis becomes marked.

There may be a moderate degree of persistent cyanosis due to imperfect oxidation of the ether. This is remedied by combining oxygen with the ether. Such cases should be carefully watched.

The condition of the blood in the field of operation is a guide to the operator of the administration of the anesthetic. Should the blood become dark, he will call the anesthetist's attention to the fact. Should the patient be manifestly under the influence of the anesthetic, the ether should be withdrawn and oxygen administered until the blood regains its normal color. Should the patient be manifestly not under the anesthetic, more air or oxygen should be given with the anesthetic. An experienced operator will know intuitively, aside from the information given him by the anesthetist, when the patient is in danger.

Circulatory failure rarely occurs with ether. When it does occur, there is usually a premonitory acceleration and weakening of the pulse. This condition should be combated by the administration of as small an amount of ether as possible combined with oxygen; strychnin sulphate, gr. $\frac{1}{20}$, repeated, if necessary; whisky one syringeful after another at two minute intervals until the pulse responds; ergotol mxxx given when the pulse first begins to flag; all these alone or combined may be useful. Rarely acute cardiac dilatation will occur.

Chloroform Anesthesia.—Chloroform vapor is more irritating than ether vapor; so a liberal amount of vaselin

must be used on the lips, nose, and neighboring skin. It will be found advantageous as a routine measure to spray the nose and pharynx with 10 per cent. cocain solution. This seems to counteract in part the dangerous effects of chloroform narcosis. The Esmarch mask is held a few inches from the patient's face and chloroform dropped slowly upon it. The mask is slowly brought nearer the face, but not in contact with it, still slowly dropping the chloroform. An abundance of air should be allowed at all times. If the progress is slow the patient will go under the anesthetic without a struggle. If the process is hastened, there will be struggling, but the effect of chloroform in concentrated form is so powerful that when it is "pushed" the anesthetization becomes profound almost immediately. Such a procedure is dangerous. Anesthesia should be gradually produced. The skin becomes somewhat pale, the reflexes abolished, there is a slight accumulation of mucus in the pharynx, the pupil is midway between dilatation and contraction, the respirations moderate in depth and frequency. Altogether, the patient presents a much more pleasing picture than when ether is employed.

The stage of excitement is shorter with chloroform than with ether and is rarely marked. The pupillary reflex, general relaxation, respiration, and pulse must be carefully watched. Respiratory failure is not common as a primary complication. Alcoholics, however, may take chloroform quite as badly as they do ether and the same cyanotic conditions develop. They are to be treated in the same way. No matter how troublesome the patient, chloroform anesthesia must not be "pushed." When cardiac failure complicates chloroform anesthesia, respiratory failure quickly follows or is synchronous with it. The skin becomes blanched, the heart stops, perhaps gives a throb or two and then stops again. There is no warning. Respiration may continue for a few minutes

and then ceases. In the rare cases in which respiratory failure precedes circulatory failure some hope is held out for restoring the patients, but in true circulatory failure the hope for a successful issue is a very faint one. Nevertheless the same procedure should be gone through with as has been described under ether anesthesia. Opening the pericardium and massaging the heart has not met with success in our hands. Should the patient revive and it be deemed expedient to proceed with the operation, ether should be substituted for chloroform. It will be found advantageous in all cases to combine oxygen with the chloroform. To facilitate this, the oxygen tube is pinned to the inside of the chloroform mask.

Ethyl bromid is useful as a precedent anesthetic to ether especially in alcoholics. The amount necessary to produce anesthesia varies according to the weight of the patient. Patients weighing one hundred pounds or under require one to two drachms; patients weighing under one hundred and fifty pounds require two drachms; patients weighing over one hundred and fifty pounds require two to three drachms. It must be given without the admixture of air. It should not be employed in young children, the aged, or in patients suffering from sepsis or shock.

The mode of administration is as follows: The required amount is poured into a small graduate. The ether inhaler is placed close to the patient's face and the patient is told to breathe deeply through it. After two or three deep breaths have been taken, the ethyl bromid is poured into the cone through the slit in its side, and the slit immediately closed. With the next inspiration, the patient inhales all of the ethyl bromid and becomes immediately anesthetized. There is usually a general convulsive muscular contraction, following which there is general relaxation and abolishment of all but the pupillary reflex. The breathing is deep and stertorous, the pulse is accelerated, and the face becomes cyanosed. In

from thirty to forty-five seconds the slit in the cone is opened and ether anesthesia produced by the constant drop method. It will only be necessary to repeat the administration of ethyl bromid in those cases in which it is not possible to keep the cone in close contact with the face and exclude the air. By this method surgical anesthesia should be complete in seven minutes, generally in from three to five minutes. The anesthetic effect of the ethyl bromid is transitory and is only intended to abridge the primary stage of ether anesthesia. The smell of the drug persists in the breath for about twenty-four hours, and being of a garlic odor is disagreeable to some patients.

Nitrous Oxid and Oxygen.—The nitrous oxid apparatus devised by Bennett is the one most employed in this country. The average time for the production of anesthesia is about two minutes. The amount of oxygen varies with the reaction of the patient to the nitrous oxid. Nitrous oxid is administered pure at first until slight stertor is developed. Then oxygen is admitted in sufficient amount to prevent further stertor. The color should be natural, the pupils contracted, the conjunctiva insensitive and the muscles relaxed. Should stertor and cyanosis or muscular twitchings develop more oxygen must be admitted. Symptoms of excitement call for more oxygen. It may happen that even the admission of all the oxygen possible will not be sufficient to prevent stertor, cyanosis, etc. In such cases the face piece is to be removed from time to time. In this way satisfactory anesthesia can be maintained for fifteen to twenty minutes. Nausea may occur after prolonged nitrous oxid and oxygen anesthesia.

Nitrous oxid and ether is a very satisfactory method of anesthesia. The gas-bag is filled and the ether compartment is saturated. The patient first breathes air for two or three deep breaths, then the gas is turned on and inhaled and expired through the valves. When about

one-half of the gas in the bag has been used in this way the valves are turned so that the patient breathes in and out of the bag. Nitrous oxid anesthesia should now be complete. The ether is now turned on so that the patient breathes gas mixed with ether. No air should be given until ether anesthesia is complete. This takes about three minutes. Anesthesia may be continued by the addition of small quantities of ether as required and the admission of oxygen. It is our practice, however, to change to our own inhaler as soon as the anesthesia is established and continue the anesthetic with it. The

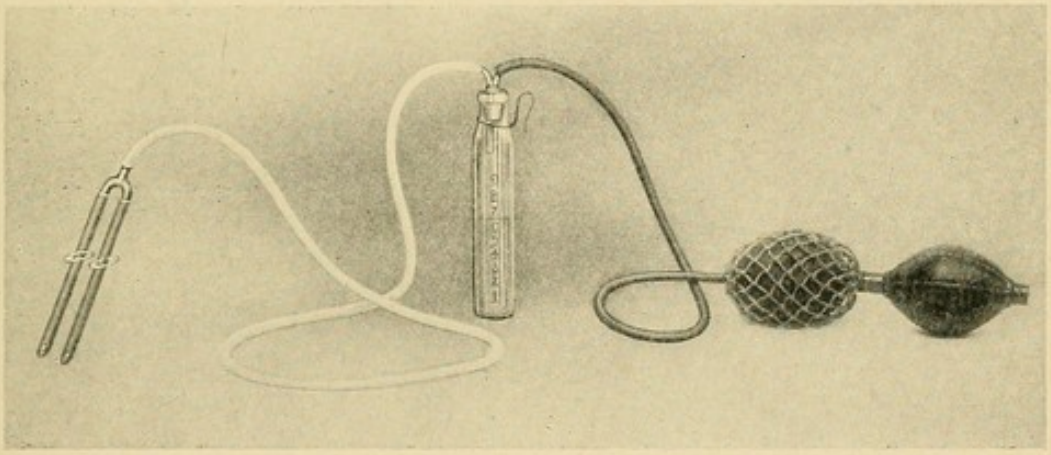


Fig. 11.—Junker's apparatus.

change should be made quickly and the inhaler should have been saturated with ether just previous to the change.

Junker's Apparatus.—This is very clearly shown in the illustration. The two catheters are inserted, one in each nostril, until the level of the pharynx is reached. A safety pin is then passed through each catheter to mark off the proper distance to which they are to be reinserted in case of removal. A narrow piece of adhesive plaster wound once around the tubes and fastened to each cheek serves to keep the tubes in place. In coupling up the

apparatus it is necessary that the leading-to tube, the tube by which air is forced through the chloroform, be properly attached; otherwise chloroform liquid instead of chloroform vapor will be forced through the catheter and will suffocate the patient. After testing the apparatus to insure its proper assembling it is customary lightly to pack the chloroform receptacle with lambs' wool to still further guard against spray instead of vapor being forced through the catheter. The apparatus is useful in opera-

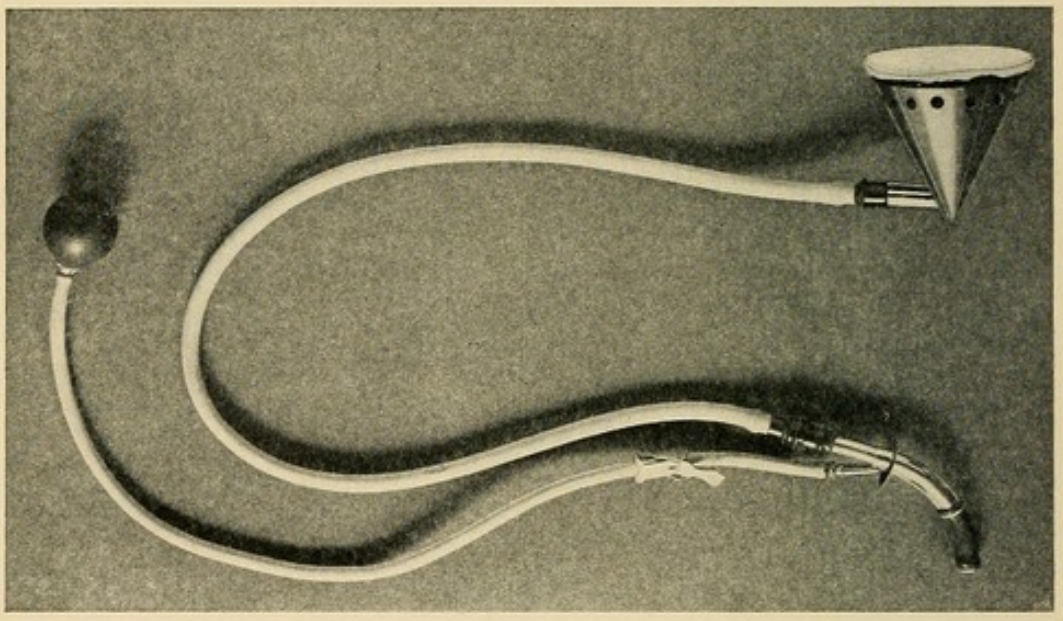


Fig. 12.—Trendelenburg cannula.

tions in which anesthesia by the ordinary methods would bring the anesthetist in the way of the operator.

The Trendelenburg cannula is useful in operations about the larynx and pharynx. The tube is introduced through a tracheotomy opening, and the little air-bag around the tube gently inflated. This prevents blood descending alongside the tube. Chloroform is given drop by drop on the gauze covered cannula in the usual way.

Anesthol was first used by Prof. Willy Meyer October 15, 1898. It is a chemic combination of ether (47.10

per cent.) chloroform (35.89 per cent.), and ethyl chlorid (17 per cent.), having a specific gravity of 1.045 and a boiling point of 104° F.

Anesthol is administered drop by drop. An Esmarch mask is used covered with several layers of gauze and a piece of oiled silk. An aperture the size of a silver dollar is cut in the oiled silk. There is no struggling. If the anesthetic is pushed too rapidly the patient will turn pale and respiration will become very shallow or apparently cease. The heart does not seem to be influenced. As soon as the second stage of general anesthesia is reached one or two drops every two or three seconds will suffice to keep the patient under. **The administration of the drops must be regularly continued.** Anesthol does not seem to affect the circulation. Occasionally the respirations will become very shallow during the administration. If this occurs the withdrawal of the anesthetic is sufficient to cause the patient to breathe more deeply. The appearance of the patient is one of light slumber.

With the relation between the boiling point of the anesthetic and the internal body temperature so close as they are in anesthol it holds true that a patient will come out of the anesthetic very quickly, and in many cases the reflexes will not be lost at any time during the anesthesia. To prevent this it is desirable to give a hypodermatic injection of morphin (gr. $\frac{1}{8}$ or $\frac{1}{4}$) one-half hour before anesthesia.

When under anesthol, the respirations are slow, quiet, and full without being stertorous. The color is natural and the pupils slightly contracted (morphin having been administered previously), the pulse slow, full, and regular. There is no excess of mucous secretions. Muscular relaxation is complete. The return to consciousness is prompt. There is vomiting in only a very few cases and, as a rule, this is not so distressing as after ether anesthesia.

Spinal Analgesia.—By this method immunity from pain may be relied upon in all operations up to the level of Poupart's ligament. In the vast majority of cases there will also be immunity from pain in operations up to the level of the umbilicus anteriorly and somewhat higher posteriorly. Beyond this, analgesia can not be relied upon. In rare cases, it may extend as high as the second rib. In cases in which this higher area of analgesia is obtained the Trendelenburg position may be, in part, responsible. Nor is analgesia at all satisfactory in intra-abdominal operations. This is particularly true in inflamed conditions of the peritoneum.

During and following the period of analgesia numerous unpleasant symptoms may occur. That these are not due to the cocain alone seems to be proven by the fact that the same symptoms are equally marked whether a large or small dose of cocain be employed as well as in cases in which antipyrin, tropacocain, or chloretone was used, and in one case, vertigo, pallor, cold sweat, sighing respiration; rapid, weak pulse; dry cough, nausea, and vomiting occurred before any cocain had been introduced and after but a few drops of cerebrospinal fluid had been withdrawn. In addition to these unpleasant symptoms there may occur: headache, chills, and involuntary defecation and urination. On the other hand, the course of analgesia may be quite free from all unpleasant symptoms, or at most a rise of temperature and headache may develop a few hours afterward.

In order to avoid respiratory or circulatory depression it is customary to give strychnin sulphate, gr. $\frac{1}{10}$, hypodermatically fifteen minutes before the spinal injection.

Vertigo is seldom noticed. Nausea occurs in about one-half of the cases five to ten minutes following the injection. Actual vomiting takes place in about one-third of the cases. It rarely lasts longer than two minutes. Dry retching will exceptionally occur, but is not persist-

ent. Some cases seem to be relieved of their nausea and vomiting is prevented by swallowing a cup of hot coffee when the first symptoms appear. Headache occurs in two-thirds of the cases, usually frontal in character and may be mild or severe. It comes on three or four hours after the injection. The severe form may become general and last for from twenty-four to forty-eight hours. Treatment is of slight avail. Nitroglycerin seems to be the most efficient drug in this connection. Rise of temperature is a fairly constant symptom. It occurs from three to eight hours following the injection. Usually the temperature does not rise higher than 101° to 102° F. and rapidly returns to normal. Involuntary micturition and defecation occur in a few cases. Sometimes the patients are aware of these occurrences and sometimes not. Pronounced chills are seldom observed. Pallor, cold sweat, and sighing respiration have only been noted in cases in which there was also present nausea, vomiting, and rapid, weak pulse. All of these unpleasant symptoms are lessened by the preliminary hypodermatic use of strychnin sulphate, gr. $\frac{1}{10}$.

RULES FOR MAKING THE INJECTION.*

1. The instrument employed may be a fine aspirating needle and an ordinary solid-piston hypodermatic syringe. A special needle inclosed by a cannula is a convenience under some circumstancs, and a glass barrel and asbestos-piston syringe add a nicety to the procedure. These should be sterilized by boiling.

2. Give the patient a hypodermatic injection of $\frac{1}{10}$ grain of sulphate of strychnin, a quarter of an hour before the injection, and have a glass of hot water or a cup of hot coffee ready to administer should nausea occur.

3. Place one or more tablets of hydrochlorate of cocain,

* G. R. Fowler, "Medical Review of Reviews," April 1901.

according to the character and site of the proposed operation, in a sterilized teaspoon or other convenient article, crush them, and pour on a few drops of chloroform to form a paste (Bainbridge's method of sterilization of cocain). When the chloroform has evaporated, add from 15 to 30 minims of boiled water, according to the amount of cocain employed. Half a grain is the usual quantity used.

4. A soap-and-water and alcohol cleansing of the skin of the back, with proper isolation by means of clean towels and surgically clean hands answer the requirements of asepsis.

5. The position of the patient may be either one of three postures: (*a*) The sitting position upon the edge of the operating table, leaning well forward. (*b*) The semiprone or Sims' position. (*c*) The left lateral decubitus, with both thighs flexed upon the abdomen, the shoulders and head thrown forward, and a cushion placed between the left loin and the table to prevent lateral deviation of the spine in the lumbar region.

6. The highest point of the crest of the ilium is to be identified, and upon a line straight across the back from this point will be found the fourth lumbar vertebra. The depression immediately above this or the one below, if this is more easily identified, may be utilized for the injection.

7. Select a point about half an inch to the right of the middle of the space chosen and here introduce the needle. A preliminary injection of a few drops of cocain solution, first in the skin itself and then into the depths, renders the patient less liable to start when the needle is introduced, and a slight dimple made with the point of a rather blunt scalpel is an additional precaution against infection.

8. Enter the needle at the point where the hypodermatic puncture has been made and direct its course in such a manner that its point reaches the spinal column in the

median line. A very little practice will enable the operator to estimate the angle necessary to hold the needle to effect this. Pass the needle slowly, and if the angle has been correctly estimated and the middle of the space between the spinal processes properly identified, the resistance to its passage will be but slight, until it reaches the interspinous ligament, when a decided and appreciable increase in resistance will be felt. Should it strike bone, withdraw partially or entirely and change its course. It will be more likely to strike the upper than the lower lamina. Once it has entered the spinal canal, unless its lumen has become blocked, the cerebro-spinal fluid appears flowing from the needle in clear or slightly blood-tinged drops.

9. Screw upon the needle the hypodermatic syringe previously charged with the cocain solution and inject slowly. Leave the needle *in situ* with the syringe attached for half a minute, so as to prevent leakage from the puncture, and then withdraw. Pencil a little collodion over the point of puncture and cover with a small piece of adhesive plaster.

10. Test for the analgesia once a minute, commencing in the soles of the feet, with a needle. Simple touch sensation is not abolished; the patient must complain of actual pain, otherwise analgesia is established. In the average case, numbness and formication in the feet occur in from one to three minutes, and analgesia in the lower extremities in from four to six minutes. In from seven to fifteen minutes the analgesia has reached to varying points between the umbilicus and the level of the fourth rib in the line of the nipple. In some of the cases in which the point was noted, it appeared to reach a higher level posteriorly than anteriorly. The analgesia lasts from thirty minutes to an hour and a half, according to the quantity of cocain employed, and recedes from above downward.

Cocain Anesthesia.—Hydrochlorate of cocain is employed in ½, 2, and 4 per cent. aqueous solution either alone or combined with minute quantities of morphin. Rarely is a 4 per cent. solution necessary. Schleich's solution may be made from tablets or may be prepared according to the following formulas:

No. 1. (Strong).

Cocain hydrochlorate,.....gr. j.
Morphin hydrochlorate,.....gr. ⅛.
Sodium chlorid,.....gr. j.
Sterile water,.....℥j.

No. 2. (Medium).

Cocain hydrochlorate,.....gr. ½.
Morphin,.....gr. ⅛.
Sodium chlorid,.....gr. j.
Sterile water,.....℥j.

No. 3. (Weak).

Cocain hydrochlorate,.....gr. $\frac{1}{20}$.
Morphin hydrochlorate,.....gr. $\frac{1}{15}$.
Sodium chlorid,.....gr. j.
Sterile water,.....℥j.

When possible the blood-supply of the part should be arrested in order to maintain the local effect of the cocain. This is accomplished in the case of the extremities by means of an Esmarch constrictor. In case of the fingers or toes by constricting the base of the member with a small rubber elastic catheter.

Following the usual aseptic preparations a hypodermatic syringe is filled with the required solution and the needles attached. The strength of solution required for skin incisions is usually 1 per cent.; for deeper dissections, ½ per cent. For anesthetizing nerve trunks a few drops of a 2 or 4 per cent. solution is used. In eye operations the lids are everted and a few drops of 4 per cent. solution allowed to flow over the conjunctiva.

In anesthetizing the skin by the infiltration method, the needle is introduced into the substance of the skin and a few drops of the solution injected,—enough to raise a

white wheal. The needle is then pushed farther along the proposed line of incision, still in the substance of the skin, and a second wheal raised which shall overlap the first. This process is repeated until the entire line of the proposed incision has been anesthetized, it being necessary to withdraw and reinsert the needle several times. The skin is tested for anesthesia with the point of the needle or with the knife, and, as soon as this is established, usually in less than two minutes, the skin incision is made. If deeper dissection is necessary, injections of ½ per cent. solution may be made into the surrounding tissue, or, as in hernia operations, the main nerve trunk supplying the parts may be anesthetized by injection of a 2 or 4 per cent. solution. As the period of anesthesia is variable, it is well to proceed with the operation as speedily as possible and so obviate the need for renewed anesthetic. The amount of cocain employed should be noted and not more than 1 grain be injected into tissues in which the blood-supply is not under control. Rarely will it be necessary to use this amount. In operations in which constriction is employed, the constriction should be intermittently removed at the close of the operation in order to avoid throwing a large amount of cocain rapidly into the general circulation.

General effects from the cocain will be noted. The patient talks quite freely. Should the heart-action be quickened and the pupils dilate, caffein and strychnin will be found useful. A cup of strong, hot coffee often makes these patients quite comfortable.

Cocain solutions should preferably be freshly prepared. This is easily done by Bainbridge's method. A known quantity of the crystals or a tablet is ground into a fine powder in a sterile spoon. To this is added a few drops of chloroform, and a paste made by thoroughly mixing the two. The chloroform soon evaporates. A sufficient quantity of sterile water is then added to make the strength of the solution required.

CHAPTER V.

THE PATIENT.

General preparation; mental condition; blood; heart and lungs; kidneys; skin; bowels; diet. Local preparation; general directions; head; face; neck; thorax; abdomen; extremities; body cavities; mouth; nose and pharynx; esophagus and stomach; small and large intestine; rectum; urethra and bladder; vagina. Preparation just previous to leaving for anesthetic room; clothing; bladder; stimulation. Position of the patient for various operations. Preparation of operative field in the operating room. Duties of House Surgeon; of Assistant House Surgeon; disinfection of the hands. Application of dressings.

The **general preparation** of the patient begins from the time he is admitted by the house surgeon. Patients should be received in such a manner as to maintain, and indeed increase, their confidence in a successful solution of their trouble. They should be placed at a distance from patients likely to complain, or whose condition would discourage them. Nervous patients should be insured a good rest during the night prior to the operation by the administration of a sedative, preferably a combination of the bromids. Emergency cases, of course, are prepared for immediate operation; other cases, with the exception of laparotomy cases, require twenty-four hours' preparation; laparotomy cases require forty-eight hours' preparation. Any concomitant disease should receive appropriate treatment.

An **examination of the blood** should be made in all cases of chronic septic conditions as well as in acute infections, hemorrhage cases, and cases presenting signs of anemia. The examination should consist of a red-cell count, a white-cell count, a differential white-cell count, and an

estimation of the percentage of hemoglobin. Should the latter be below 50 per cent., it should be increased, if possible, before the operation. A stained specimen should be prepared for the examination of the attending surgeon.

An **examination of the heart and lungs** is made by both the house surgeon and the anesthetist and their findings compared. Any deviation of the normal is reported to the operator in time to allow of possible change in the preparation for operation.

The Kidneys.—Immediately following the first bath the patient is asked to urinate. Before procuring a specimen from females the vagina is douched and the external genitalia completely cleansed. Catheterization in females should only be resorted to in case the examination of the first specimen is made difficult by epithelium and pus-cells from the vagina. The specimen should be sent to the pathologist for immediate examination. In addition, the total quantity passed in the first twenty-four hours of the patient's stay in the hospital is to be saved and a sample of the mixed urine sent for analysis. In the event of the discovery of any pathologic condition of the kidneys, bladder, or urethra, suitable treatment is at once inaugurated and subsequent urinalyses made sufficiently often to note the progress of the condition. The urinalysis reports form an important part of the history of the case.

The Skin.—A hot water and soap tub bath is given immediately following admission and before the patient is put to bed. The entire surface of the body is vigorously scrubbed with soap-suds and a soft brush. Particular attention is paid to the head, axillæ, genitals, anal region, hands, and feet; the finger-nails and toe-nails should be cut short, and the subungual spaces well scrubbed. The bath is repeated daily until the day of operation, when a sponge bath is substituted for it.

Patients too weak to be given tub baths receive sponge baths instead.

The Bowels.—Those cases which permit of it, forty-eight hours before the operation, should be given one-half ounce of magnesia sulphate in cool water. The dose may be made more palatable by substituting equal parts of orange-juice and lemon-juice for the water, and adding only enough of this to liquefy the magnesia, then adding a small quantity of cracked ice. This is repeated every six hours until the bowels move thoroughly. The evening before the operation, the lower bowel is washed out with a liberal soapsuds enema. This is repeated four to six hours before the operation. In cases allowing of but twenty-four hours' preparation, the same plan is followed, except the interval between the doses of magnesia is shortened to two hours. In emergency cases the magnesia is omitted, and a large soapsuds enema given immediately following the sponge bath.

The Diet.—The diet should be highly nutritious, rapidly assimilable, and such as to leave the minimum residue in the intestines. The patient should be encouraged to indulge in liberal quantities of fluid up to within six hours of the time set for operating. In these six hours nothing should be introduced into the stomach. The meal directly preceding the operation should be omitted as far as solid articles of food are concerned. There is no objection, however, to the ingestion of water, tea, or thin soup so long as six hours elapse between the time these are taken and the operation. In emergency cases which have recently partaken of a meal the stomach should be washed out. Debilitated patients should receive rectal alimentation every six hours in addition to being fed by stomach.

Local Preparation.—*General Directions.*—Twenty-four hours preceding the time set for operating the skin of the field of operation should be shaved and thoroughly

cleansed with hot water, green soap, and a gauze compress. The surface should then be carefully wiped off with alcohol and the entire area covered with towels wrung out of boro-salicylic solution. These in turn are covered with oiled muslin protective and secured by bandage or binder. Twelve hours later the surface is again cleansed with hot water and green soap and the loose epithelium removed by sponging with alcohol. The surface is then covered with towels wrung out of 1 : 5000 bichlorid and then by a layer of non-absorbent cotton, the whole being secured by bandage or binder. In emergency cases following the cleansing with green soap and hot water the bichlorid towels are applied, the cotton being omitted. While the local preparation of the parts should be thorough, it is well to remember that an overzealous and too vigorous preparation will tend to defeat the end aimed at by abrading the skin and thus opening up avenues of infection.

The Head.—The hair of the entire head, except in the case of small tumors or wounds, is first cut short with scissors and then shaved. In any event, the hair must be removed wide of the site of operation. The remaining hair is cleansed by shampooing with soap and hot water; thoroughly rinsed in cold water; then rubbed with alcohol and bichlorid, 1 : 5000; finally thoroughly dried, braided in the case of females, and covered with a cap or bandage. The eyebrows should not be shaved, but should be completely disinfected. In operations near or involving the mouth or nose, the beard and mustache should be removed. The ears should be cleansed and lightly packed with sterile cotton.

The Mouth.—Preceding all operations upon the mouth the condition of the teeth should be investigated and made as perfect as possible before the patient enters the hospital. The teeth should be cleansed with a brush after each meal, and in addition an astringent and

antiseptic mouth-wash and nasal douche should be employed every three hours. Ulcerative conditions such as are present in carcinoma of the tongue should be treated by lightly touching them with 5 per cent. zinc chlorid solution or 10 per cent. chromic acid solution. Weak solutions of permanganate of potassium make good washes in this condition.

The Neck.—In operations in this region the hair on the side to be operated upon is shaved to above the level of the ear. The rest of the hair is shampooed as for operations upon the head. The ears are cleansed and packed with sterile cotton. The axillæ should be carefully disinfected, as it is here that the bacillus pyocyaneus has its habitat. It is not, however, necessary to shave the axillæ. The shoulder and chest should be included in the preparation.

The Thorax.—Both axillæ should be disinfected; the one upon the side to be operated upon should be shaved. The arm upon this side should be included in the preparation, as well as the shoulder and upper part of the abdomen.

The Abdomen.—The disinfection should include all the skin from the line of the nipple to the middle third of the thigh and as far back as the postaxillary line; also the perineum, genitalia, and inside of the thighs.

The Genitals.—The preparation should include the lower abdomen and upper third of the thigh, as well as the external genitalia and perineum. In males the prepuce should be carefully cleaned and in females the clitoris. In operations involving the *vagina*, as well as in laparotomy cases, the mucous membrane is cleaned by douching twice or thrice daily with hot boro-salicylic solution. In septic conditions the boro-salicylic douche is preceded by a 1 : 2000 bichlorid douche.

The Rectum and Anus.—The preparation includes the perineum, buttocks, genitalia, and upper third of the

thigh. Copious soapsuds enemata should be given to cleanse the rectum, but sufficient time should elapse between the last enema and the time set for the operation (six hours) to allow the enema entirely to come away; otherwise it may be expelled during the course of the operation.

The Extremities.—In operations upon the arm the axilla and shoulder should be included in the preparation; in the case of the thigh the genitalia and hip should be included. In operations upon joints the entire extremity should be prepared. The preparation of the hands and feet is part of the general preparation of the patient. Areas such as the elbow, knee, and sole of the foot should receive more careful attention than areas where the skin is not so thick. In these areas the borosalicylic compresses should be renewed every four hours and the loosened epithelium removed by sponging with alcohol.

The Nose and Pharynx.—In addition to nasal douching and sponging minute doses of atropin and morphin will be found valuable in limiting excessive secretion.

The Esophagus and Stomach.—The stomach should be washed out shortly before the operation. The washing should continue until the fluid returns clear, when the remainder should be siphoned out, leaving the stomach empty.

The Small and Large Intestines.—The most we can hope to accomplish is a diminution in the number of bacteria which here normally find their habitat. This is accomplished by thorough purgation and the ingestion of food leaving the smallest residue.

The Urinary System.—By increasing the amount of fluids taken by the patient and by repeated doses of such drugs as urotropin and caffein citrate we can increase the functional activity of the kidneys and so flush out the urinary tract. In operations involving the bladder and

in which a septic condition of the urine exists, we can, when time permits, catheterize every six or eight hours

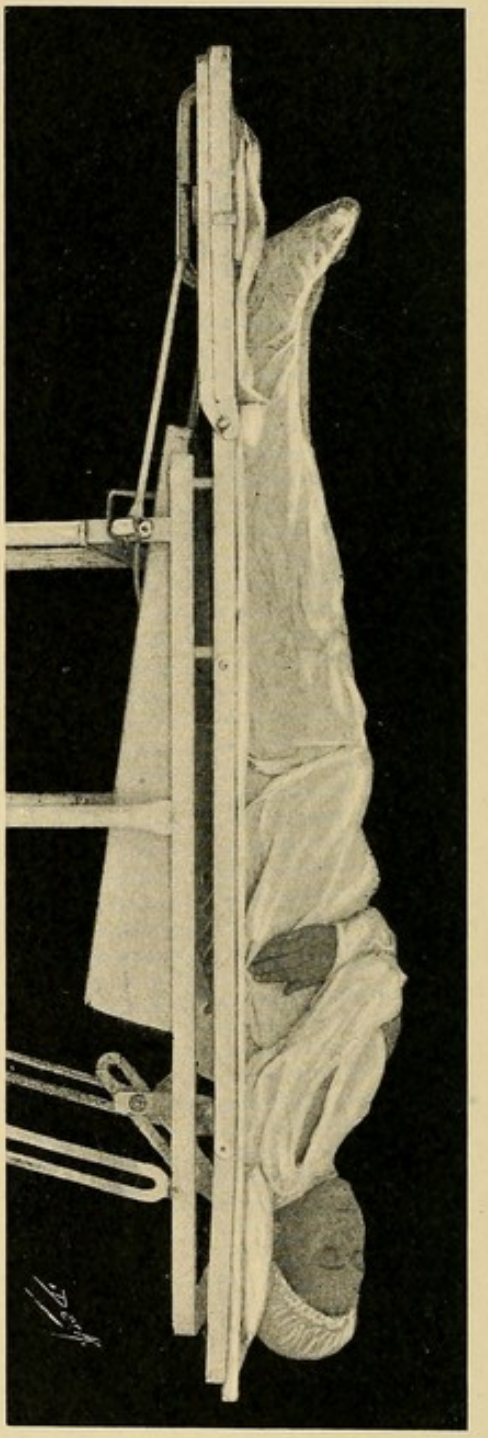


Fig. 13.—Dorsal position, operation suit.

and wash out the bladder with boro-salicylic solution, following this with boric acid solution. An ounce or two

of the latter may be left in the bladder. In operations involving the urethra, should septic conditions be present,

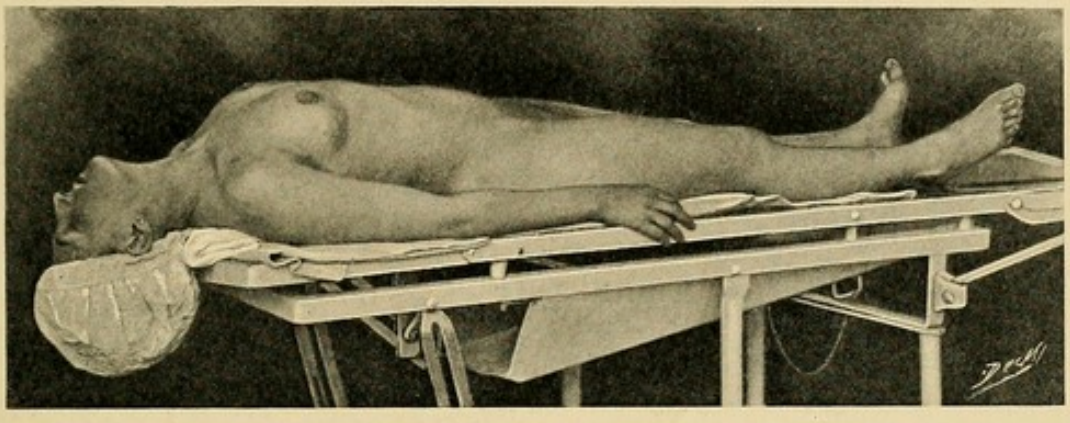


Fig. 14.—Dependent head position.

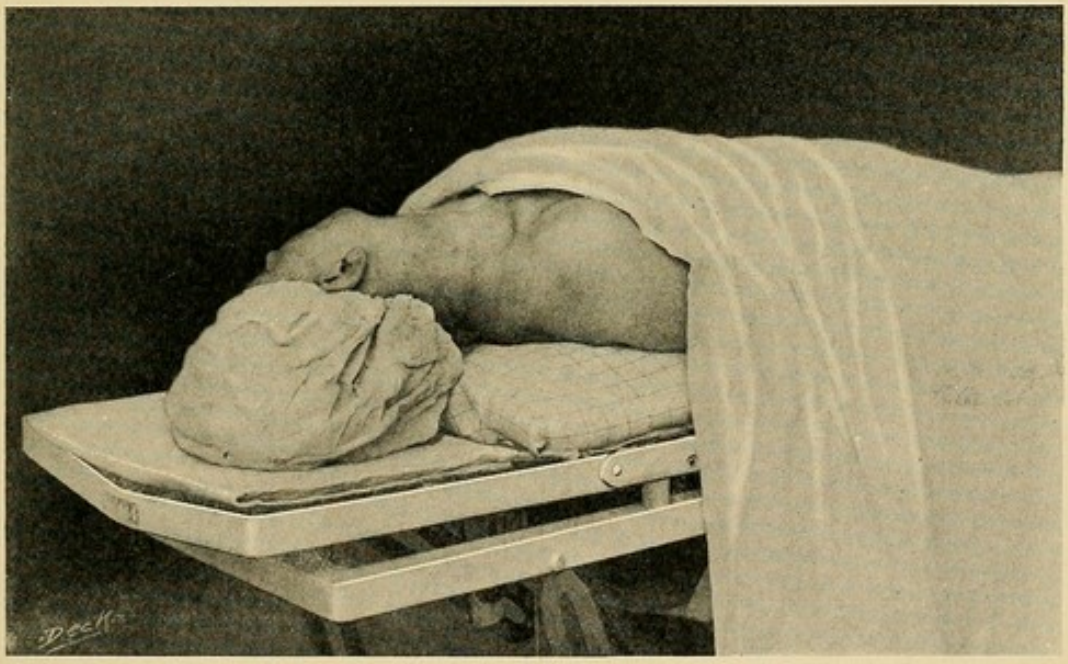


Fig. 15.—Extended neck position.

thorough irrigation through a small catheter with boro-salicylic solution should be practised.

Preparation Just Previous to Anesthetization.—A freshly laundered, light flannel night shirt open in the back, is put

on the patient; also a cap or bandage to confine and protect the hair, and long stockings. These latter should come well up on the thighs. The patient should be asked to urinate. If this is impossible or if the quantity passed is small in amount catheterization is employed if the patient be a female and the operation involves the pelvic viscera; otherwise catheterization may be omitted. In any case the fact should be recorded, and those cases which do not urinate voluntarily or which are not cathe-

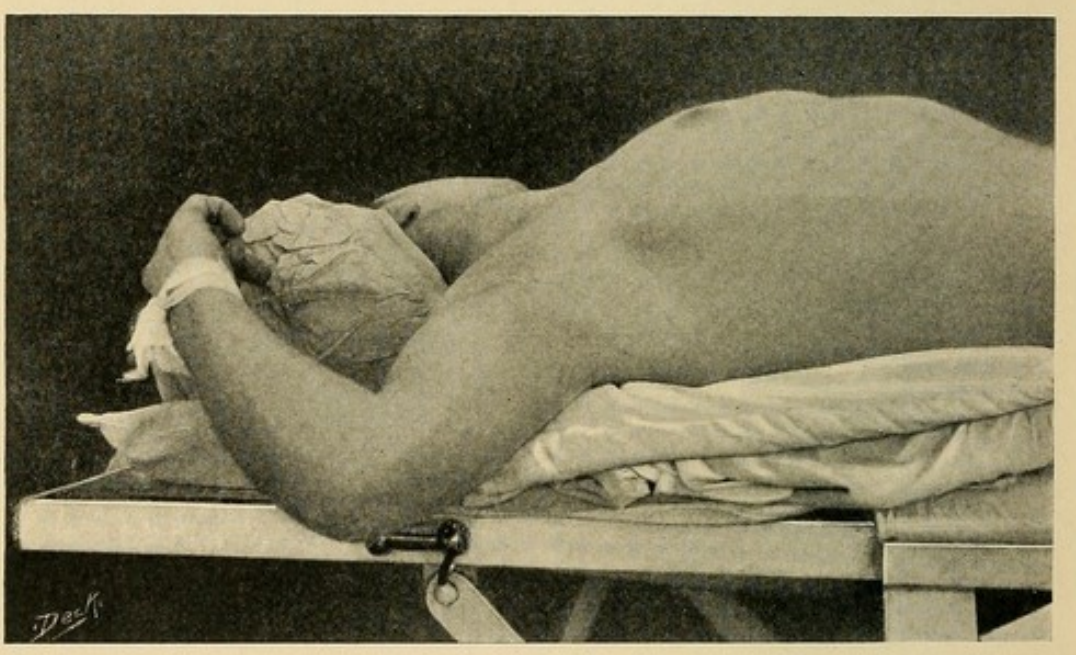


Fig. 16.—Position for breast amputation.

terized should be subsequently watched for distention of the bladder. As a rule, strychnin sulphate, gr. $\frac{1}{120}$ to $\frac{1}{20}$, is administered hypodermatically just previous to anesthetization.

The position of the patient on the operating table will vary according to the nature of the operation. It should be such as will render the part involved in the operation prominent and ready of access and yet such as to interfere as little as possible with respiration and circulation, and

there should be no pressure on important nerves. In short, the position should be as natural as possible. The musculospiral nerve is the nerve most frequently injured. This occurs through allowing the arm to rest against the edge of the table. It may be caused by an assistant leaning against the arm.

The *dependent head position* is used in operations upon the mouth and nose. Its object is to prevent the entrance

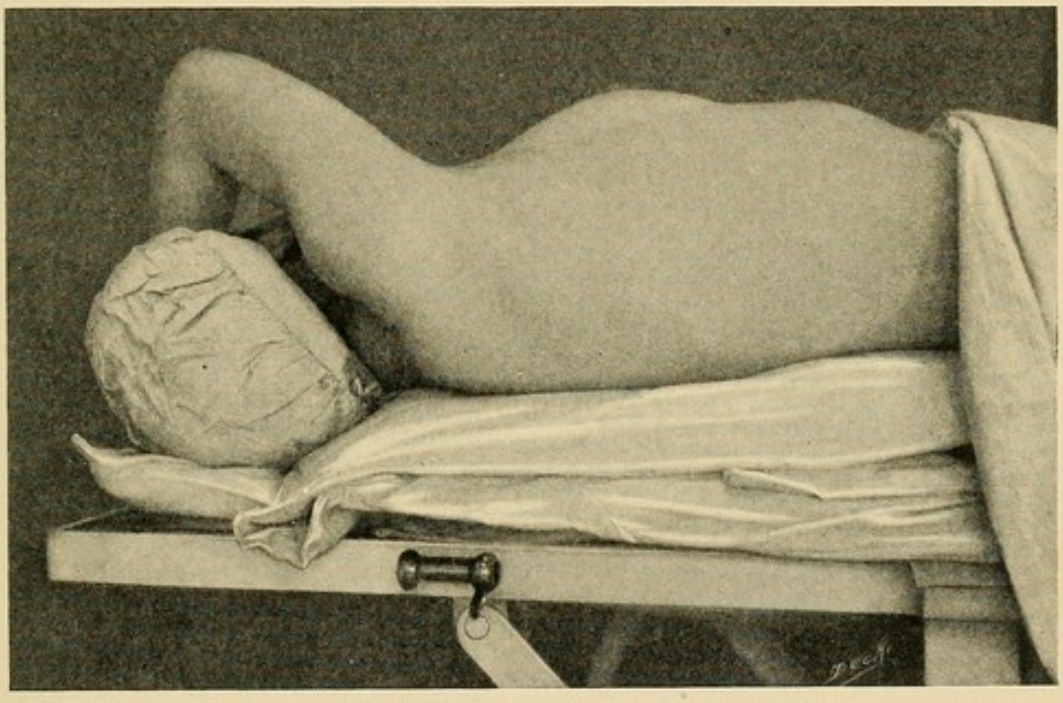


Fig. 17.—Thoracotomy position.

of blood into the larynx. The patient lies in the dorsal position, arms by the side, with the head hanging over the end of the table. The back of the neck is protected by placing under it a small, flat pad. The vertex of the head may be supported by the hand of an assistant.

The *extended neck position* is produced by placing the patient in the dorsal position, arms by the side, with a large, flat sand-bag beneath the shoulders. The sand-bag should be of such thickness as will allow the head to

rest on the table without excessive extension of the neck. This position is used in operations upon the anterior and lateral regions of the neck.

The *position for amputation of the breast* is the dorsal position with a flat sand-bag under the thorax on the affected side. The patient lies near the edge of the table on that side. The arm of the affected side is flexed at the elbow, abducted to a right angle at the shoulder, and held in that position by bandaging the wrist loosely to the table. The other hand lies close to the patient's side. The

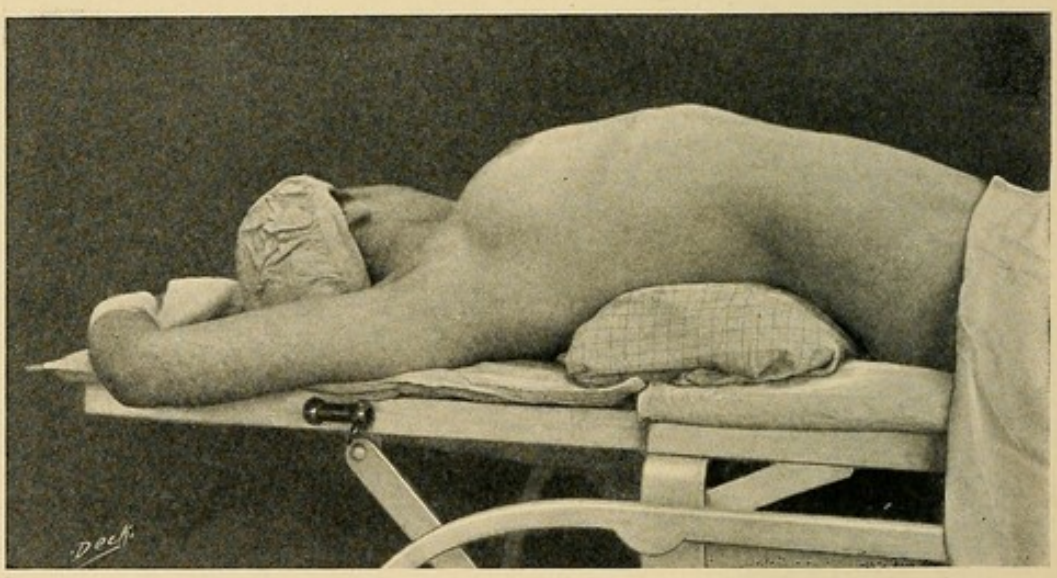


Fig. 18.—Position for operations upon the upper abdomen.

patient's face is turned away from the affected side so that the administration of the anesthetic will not interfere with the operator. Before the introduction of the sutures the arm is brought to the side.

The *position for thoracotomy* is similar to the above except that a larger sand-bag is used and the lateral chest wall more exposed by allowing the arm of the affected side to lie across the chest. The affected side should be well over the side of the table.

The *position for operations upon the upper abdomen* is the

dorsal position with a moderately large sand-bag under the dorsal spine. The arms should be placed above the head.

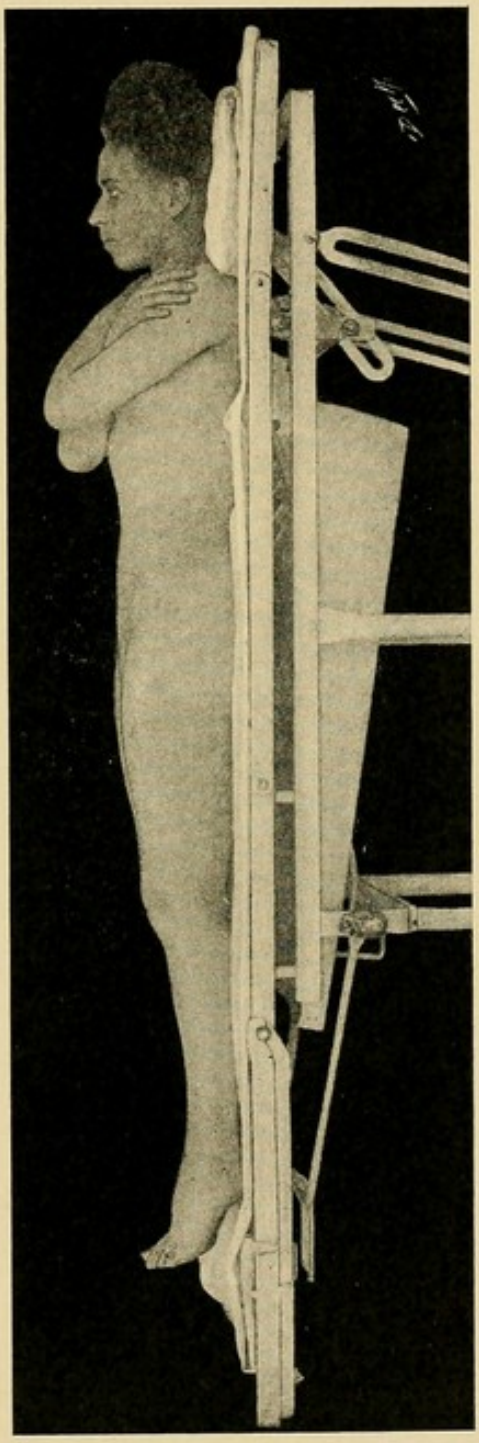


Fig. 19.—Dorsal position.

The *dorsal position* is with the patient flat on the back. The arms may be either folded across the chest, fastened

naturally above the head, or allowed to rest at the side. This position is the one usually employed.

The *Trendelenburg position* is secured by placing the patient in the dorsal position, with the shoulders resting against shoulder supports. The head of the table is then depressed as soon as required. For operations upon the small intestine or appendix, a moderate degree of Trendelenburg position is useful. In demonstrating intra-

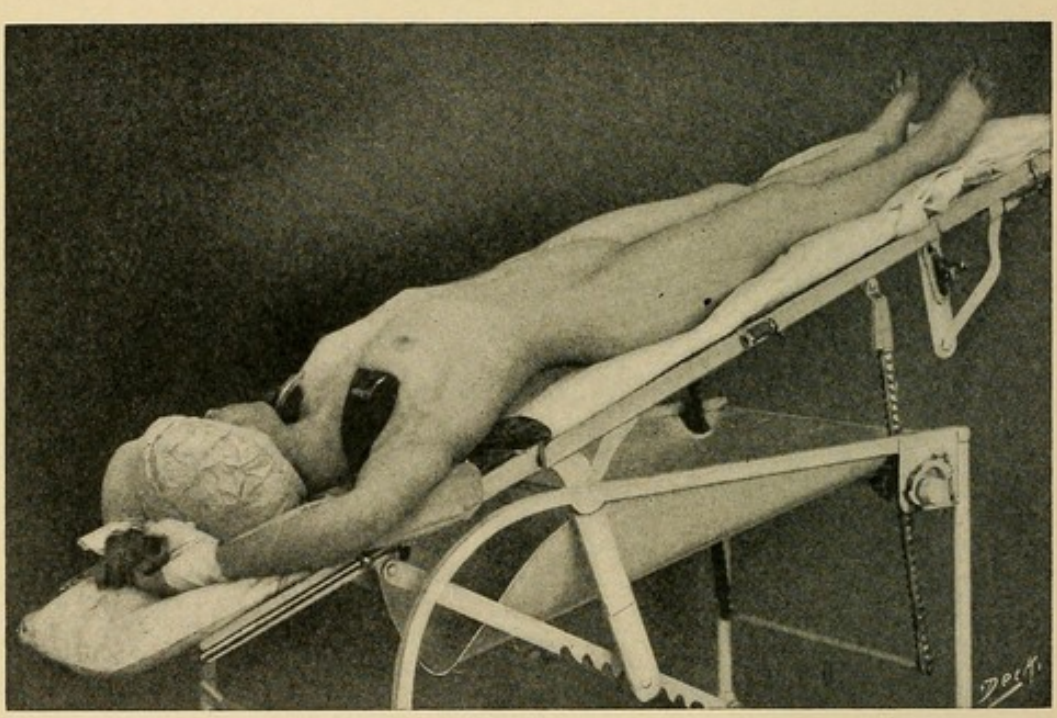


Fig. 20.—Trendelenburg position.

pelvic operations an exaggerated Trendelenburg position is necessary. The weight of the body should rest on the shoulder. To prevent pressure effects, rubber pads should be placed between the skin and the supports. The arms should be fastened loosely across the chest.

The *reversed Trendelenburg position* is useful in operations for varicocele and varicositis of the lower extremity and in limiting infection to the lower abdomen. The patient is secured to the table by bandages and ad-

hesive plaster strips so arranged as to distribute the weight.

The *lithotomy position* is obtained by placing the patient in the dorsal position and flexing the thighs on the abdomen with the legs flexed at a right angle. The patient should then be drawn down on the table until the buttocks project well over the edge. The position may

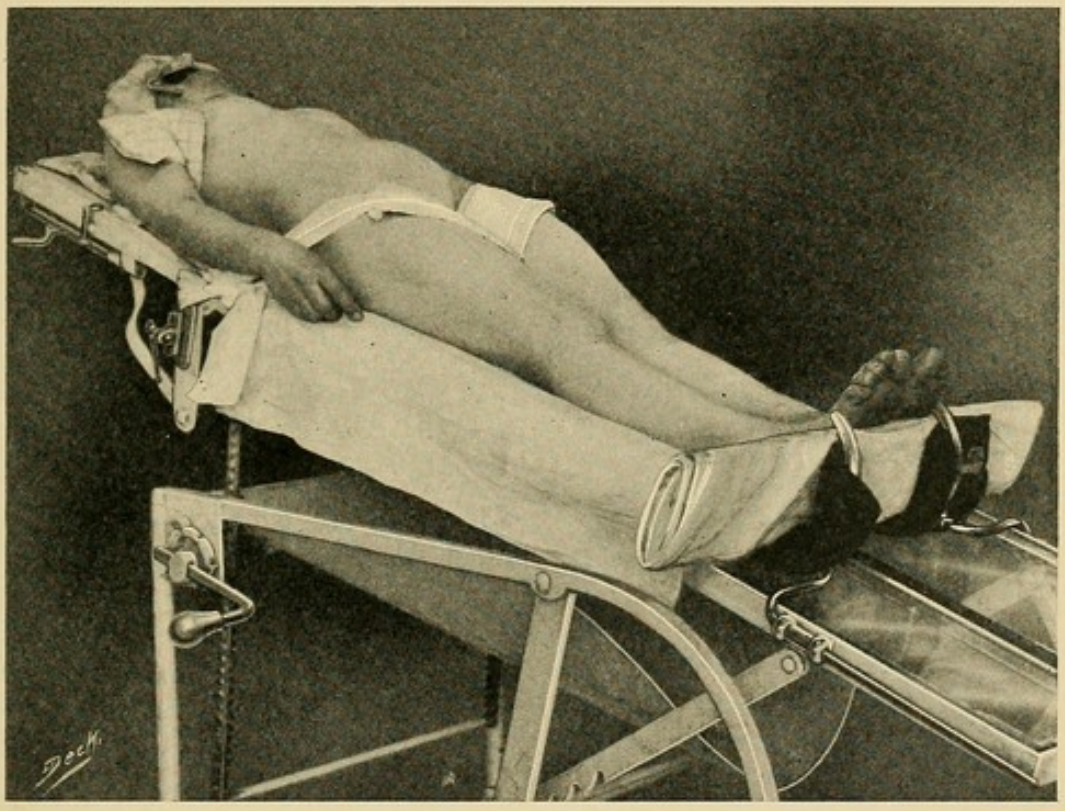


Fig. 21.—Reversed Trendelenburg position.

be maintained by a sling sheet. To do this, a large sheet is folded diagonally and placed with the apex hanging slightly over the foot of the table. The patient is then placed on the table in the lithotomy position, with the buttocks resting upon the apex of the sheet and the shoulder upon the upper folded portion. Each lateral corner of the sheet is then passed around the thigh from the outside and drawn taut. One end is then passed

back of the neck and secured by knotting to the other end. A more secure position is obtained by using the foot-holders and lithotomy posts. Care should be taken not to overflex the thighs nor to allow the inside of the legs to be pressed tightly against the posts.

Fig. 22.—Lithotomy position, with sling sheet.

The *exaggerated lithotomy position* is similar to the above except that the pelvis is elevated either by placing a large flat sand-bag beneath the buttocks or by combining with the Trendelenburg position. In the latter event, the shoulder supports should be so placed as to prevent the patient slipping away from the edge of the

table. This position is useful in clean vaginal sections to aid in keeping the intestines out of the pelvis, and in rectal operations.

The *Sims' position* is obtained by placing the patient upon the left side, the left side of the face, left shoulder, and breast resting upon a very flat pillow. The left arm lies straight on the table behind the patient; the right arm, bent at the elbow, lies naturally across the chest.

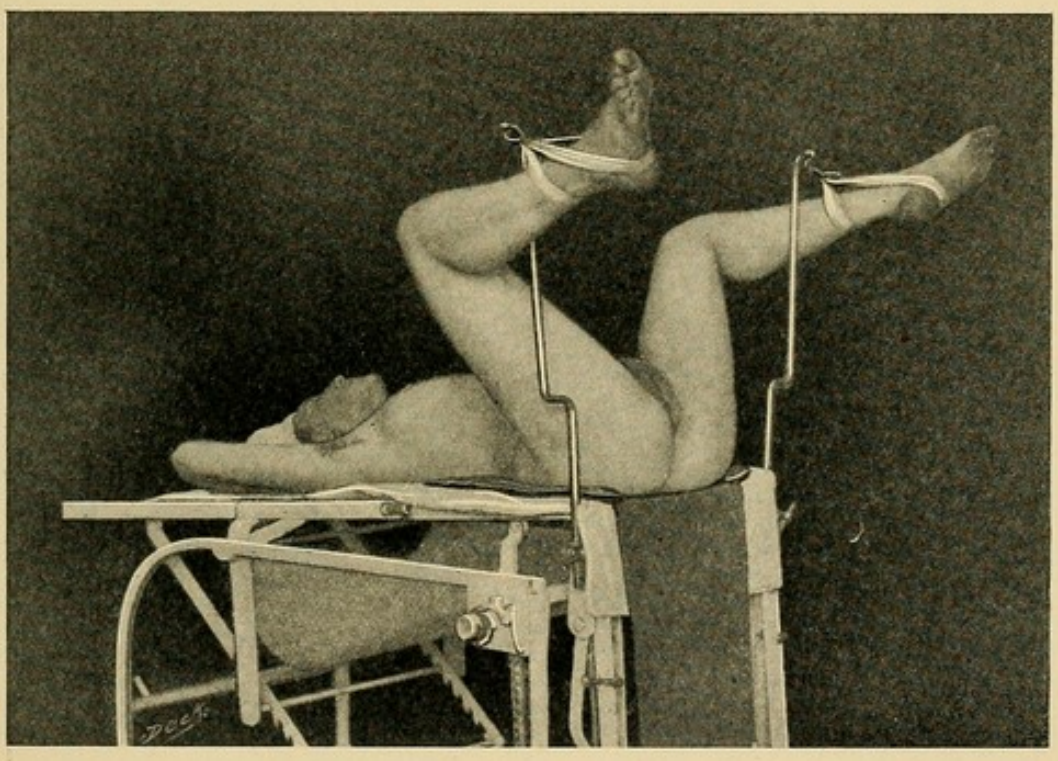


Fig. 23.—Lithotomy position.

The buttocks lie near the edge of the table; the knees are flexed and drawn up toward the abdomen, the right knee nearer the abdomen than the left.

The *kidney position* is secured by first placing the patient in Sims' position, either upon the right or left side, as required; then introducing an oblong sand pillow between the table and the flank so as to cause the kidney region on the affected side to become prominent. The

sand-bag should be sufficiently large to cause a flattening of the affected side by widening the space between the ribs and the iliac crest. The patient should lie more upon the side than in Sims' position. This is maintained by a second large sand-bag placed parallel to the abdomen or by securing the patient to the table by a broad, ad-

Fig. 24.—Exaggerated lithotomy position.

hesive plaster strip crossing the body at the level of the ensiform. The *ventral position* is flat on the belly with the head turned to one side. In operating upon both kidneys, as in removal of the capsule or double suspension operations, this position is exaggerated by placing a large sand-bag under the abdomen. The arms lie above the head.

The *knee-chest position* is useful in direct examinations of the rectum and the bladder. The patient kneels upon the table and with the thighs at right angles to the legs

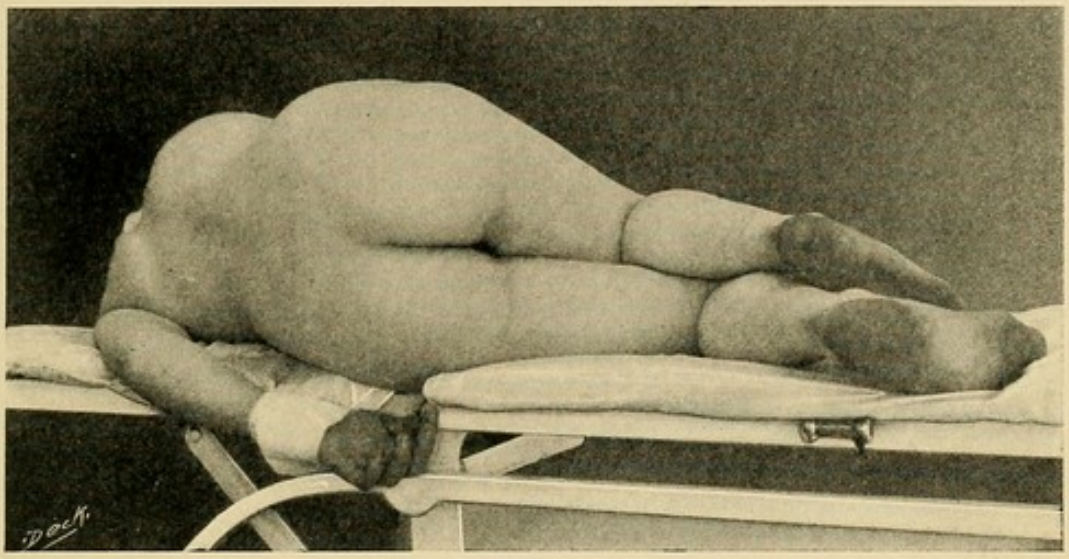


Fig. 25.—Sims' position.

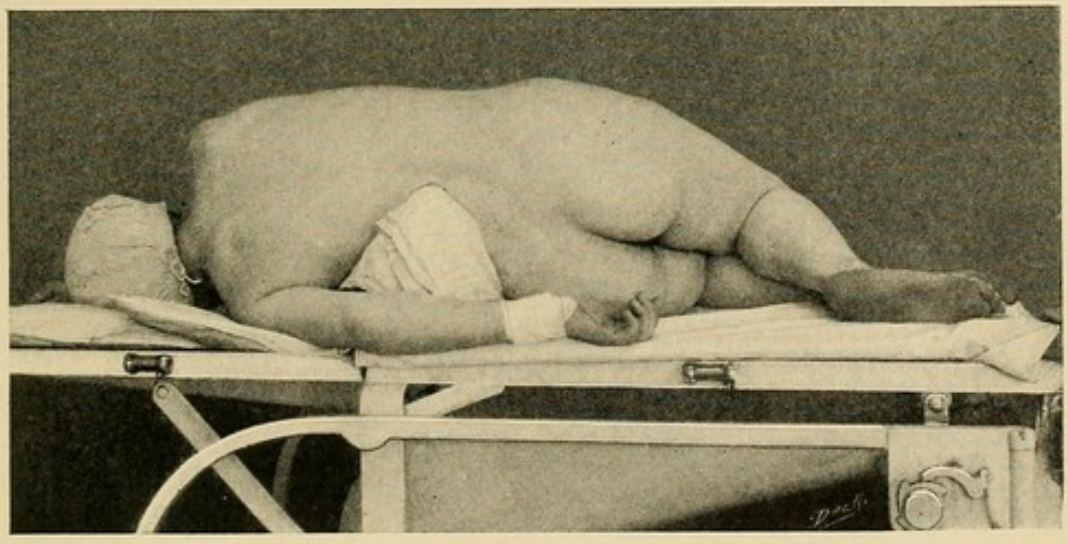


Fig. 26.—Single kidney position.

inclines the body until the chest rests upon a rather large pillow, the head being turned to one side; the arms, flexed at the elbow, help to support the body.

Final Preparation of the Field of Operation.—The assistant house surgeon should have thoroughly disin-

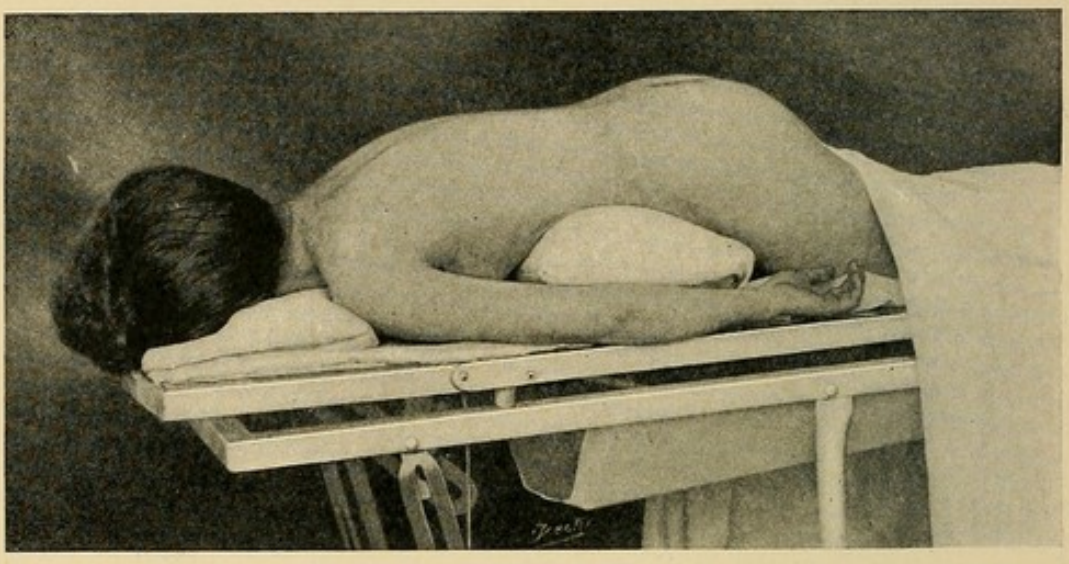


Fig. 27.—Ventral position.

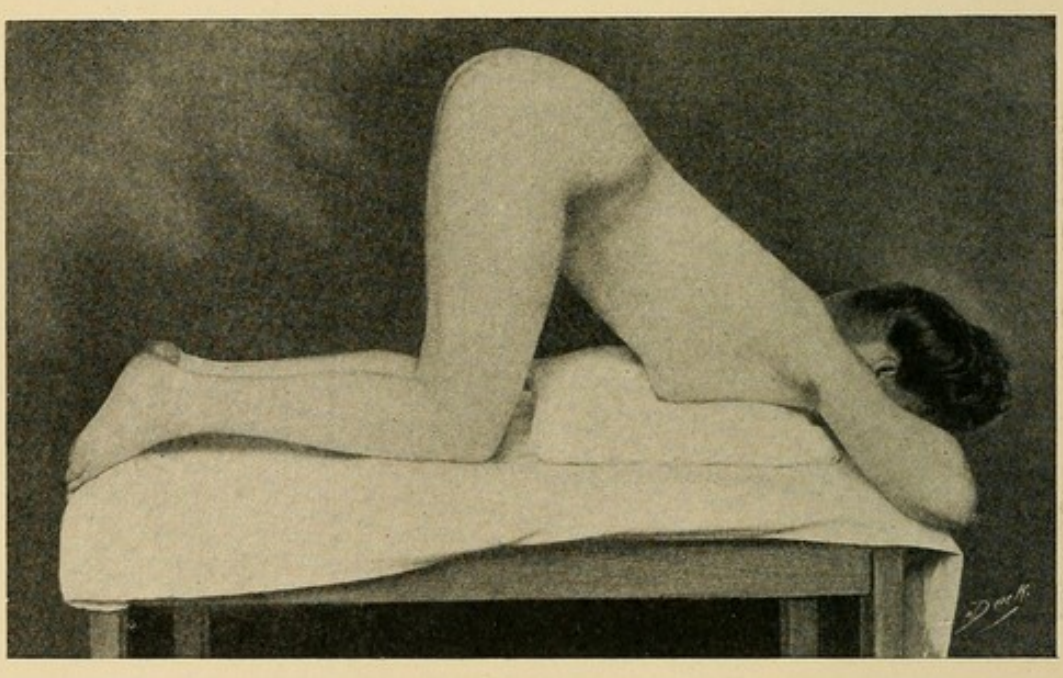


Fig. 28.—Knee-chest position.

fected his hands before anesthesia is established. He should have on cap, mask, and rubber apron, but should

not don his gown until he has finished preparing the patient and has again disinfected his hands. In handling

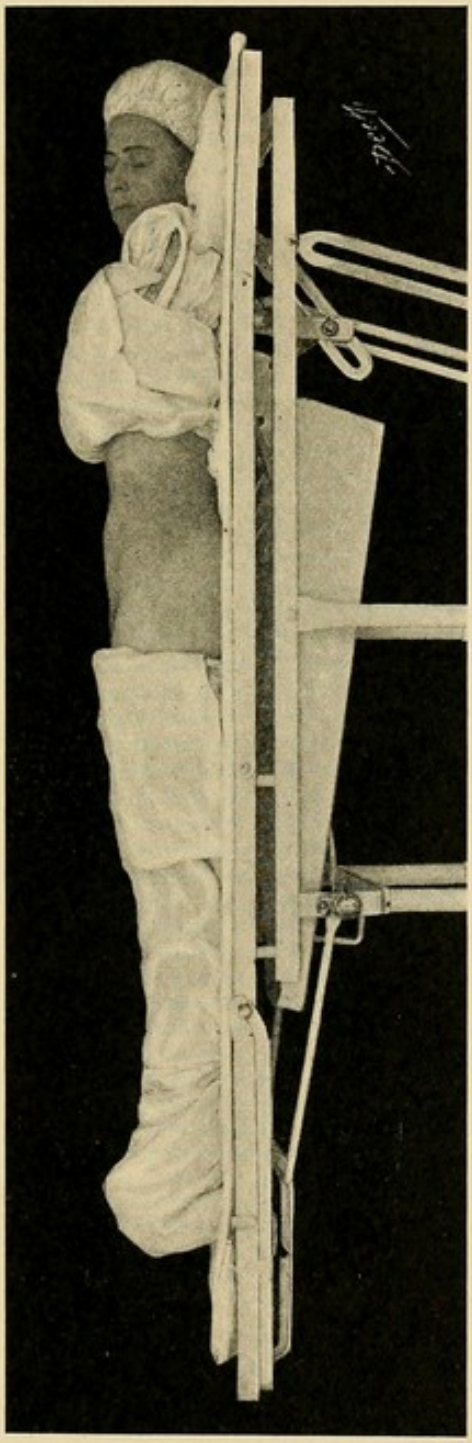


Fig. 29.—Dorsal position, arms fastened ready for final preparation.

the patient he should make use of bichlorid towels. The anesthetic being established, the patient is wheeled to

the operating table on which are rubber pads and a rubber sheet, and lifted from the cart to the table by means of the small stretcher, the anesthetist supporting the head and shoulders, while the body is supported by the orderly lifting on the cart side of the stretcher, and the assistant house surgeon lifting from across the table. The stretcher is then removed and the patient placed in the required position. The half blankets are arranged smoothly so as widely to expose the field of operation, the bichlorid towels and bandages removed, and the area to be disinfected surrounded with sterile towels. The parts are then carefully scrubbed for three minutes, in emergency cases five minutes, with green soap, hot water, and a sterile gauze compress. The soapsuds are washed away with sterile water. The skin is then gone over carefully with alcohol and ether, and finally flushed with bichlorid, 1 : 2000, a fresh compress being used for each solution. In place of this elaborate preparation, if the ward preparation has been thorough, it is only necessary to sponge the part with the acid-bichlorid solution for two minutes. The line of incision is painted with iodin on a stick sponge. Sufficient bichlorid should have been added to the iodin to make a 1 : 1000 solution. In emergency cases prepared on the table the same procedure should be carried out as in ward preparations except that the disinfection should be of longer duration. In ulcerative conditions of the skin, the area, after scrubbing, is painted with tincture of iodin. Sinuses are disinfected by curetting and packed with sterile gauze. The nipple in breast operations and the umbilicus in abdominal operations is coated with Woelfler's solution to which sufficient bichlorid has been added to make a strength of 1 : 1000. In abdominal operations in the female no more than the ward preparation of the vagina is necessary, unless a preliminary curettage is to be done. In septic endometritis cases a bichlorid douche is added to the repetition

of the usual disinfection. In operations upon the bladder, if septic conditions be present, the bladder should be

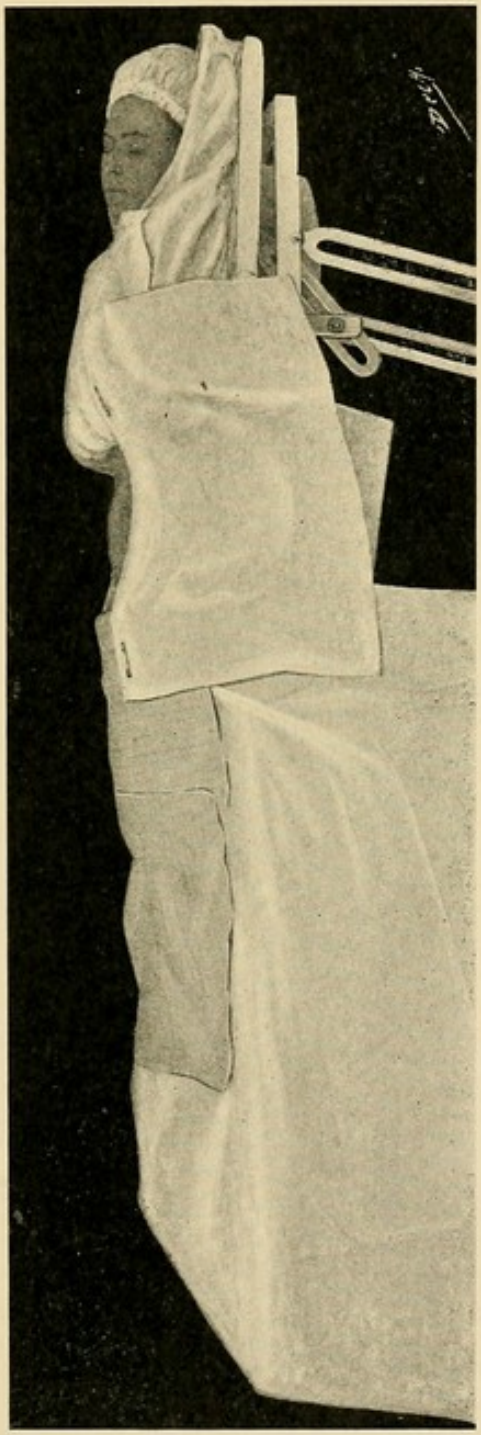


Fig. 30.—Dorsal position; ready for operation.

irrigated with borosalicylic solution. In operations upon the rectum and anus the sphincter should be mas-

saged and gradually dilated, a speculum inserted, and the rectum washed out with a boro-salicylic solution. During dilatation of the sphincter the anesthetic should be discontinued, otherwise a dangerous depth of narcosis might result. Having completed the local disinfection, the assistant house surgeon lifts the patient while the nurse removes the rubber drainage sheet. He then proceeds to redisinfect his hands, and dons a gown preparatory to assisting at the operation. The house surgeon assists the operating room nurse in arranging the protectors and towels. Every part of the patient except the immediate field of operation should be covered. No bichlorid towels should be used except in operating upon the extremities. The patient should be kept as dry as possible. The towels and protectors are held in place by sterile safety pins.

Hand Disinfection.—Skin disinfection has for its object the mechanic removal of germs from the surface of the skin, the chemic inhibition of germs which are brought from the depths of the skin to the surface by the sweat and sebaceous glands, and the mechanic lessening of the conditions which produce sweating. There is at present no method by which these aims can be certainly attained. A hand which is scrubbed clean mechanically and which gives no culture will, upon being moved about for a few minutes, give a culture. With the object of overcoming the conditions present so far as possible, the following procedure is advocated:

The hands and forearms are first vigorously scrubbed for five minutes with green soap and a soft brush in hot, running water. The hot water causes sweating, thus bringing to the surface at least some of the bacteria residing in the depth of the skin. The vigorous scrubbing facilitates this and removes the bacteria on the surface. A good lather should be raised which is rinsed off in hot water. The nails softened by the hot water are then

trimmed down to the quick, not close enough to be painful, but close enough to obliterate the subungual spaces. The only way to disinfect the subungual spaces is to destroy them. For those who object to trimming their nails so short, a wire nail cleaner is recommended. The hands and forearm are again scrubbed with green soap and a second brush in hot water for another five minutes. The brush must not be so stiff or used so vigorously as to abrade the skin; so doing would open up avenues of infection quite needlessly. The lather is rinsed off frequently. After a final rinsing, the hands are immersed for one minute in a 1 : 2000 bichlorid of mercury solution, then for one minute or until deeply stained in a hot bichlorid-permanganate solution. This latter serves three purposes: the permanganate penetrates the skin deeply, and so carries the bichlorid into the depth of the skin; owing to its astringency, it contracts the tissue and so tends to prevent sweating; in addition, it forms a film on the surface of the skin and so tends to prevent the entrance of infection as well as the egress of bacteria from the depth of the skin. Finally, during the operation at intervals of five minutes the hands should be rinsed in cold bichlorid solution 1 : 3000 or 1 : 4000 in 50 per cent alcohol. This serves to rinse off such bacteria as lodge on the surface or work out from the depths of the skin, and the low temperature of the solution and the alcohol present tend to minimize sweating. In case of skin-grafting saline solution is used for the hands in place of bichlorid solution.

The after-care of the hands is important. The hands are gently scrubbed in hot water to open up the pores, all soap rinsed off, and then immersed in a saturated hot solution of oxalic acid. This removes the permanganate. The hands are rinsed in warm water and then in cold ammonia solution, one ounce of ammonia to two quarts of water. This neutralizes the effect of the oxalic acid,

and when a little liquid green soap is added it results in thoroughly cleaning the hands, leaving them white and soft. If the hands feel dry, lanolin may be rubbed into the skin.

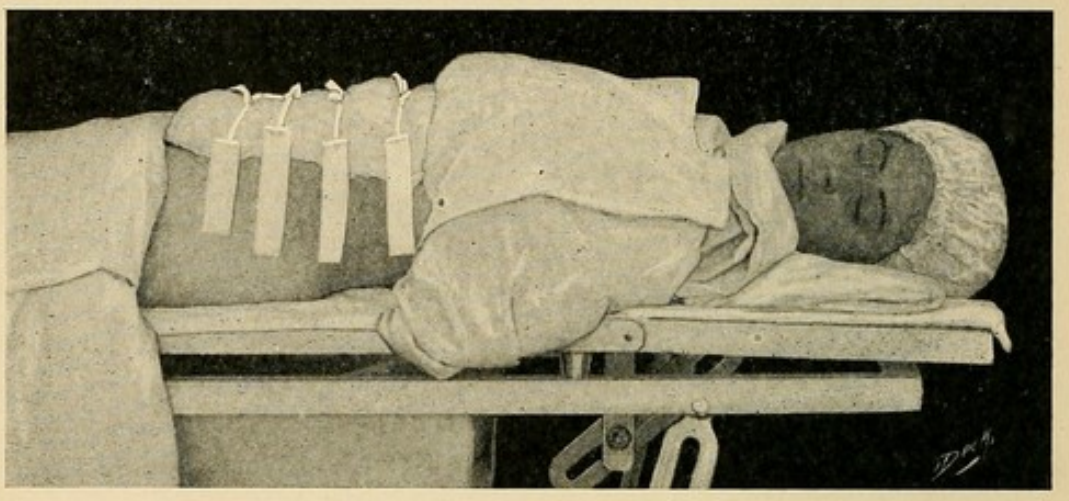


Fig. 31.—Dorsal position; abdominal dressing applied.

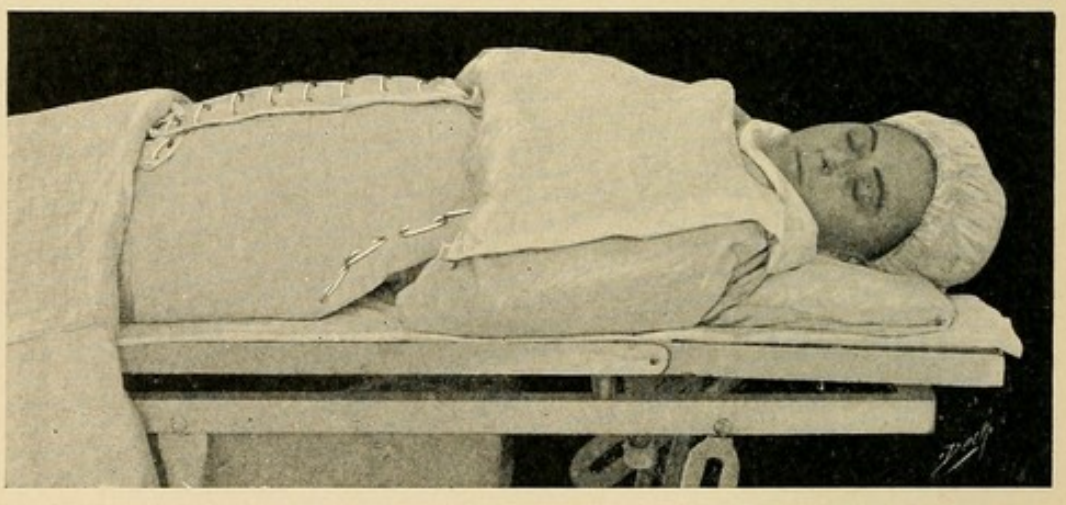


Fig. 32.—Dorsal position; abdominal binder applied.

Before disinfecting the hands and forearm a cap, mask, and rubber apron should be donned. After disinfection is completed a sterile gown is put on.

The **application of dressings** is usually done by the house surgeon under the direction of the adjunct. Prior to

applying the usual dressing, the skin in the neighborhood is cleaned with hydrogen peroxid, flushed with saline solution, and thoroughly dried. The wound dressing is then applied. The parts which will be covered with the outer dressing and bandage or binder are next dried and the dressing completed. In securing bandages with pins care should be taken not to wound the skin. In moving the patient about care should be taken to place no additional strain upon the sutures. The purpose of the dressing is to relieve strain and insure rest of the parts as well as to protect the wound against infection. Dead spaces should be obliterated. The back-rest or an inverted basin is used to facilitate the application of dressings to the trunk. All dressings should fit smoothly and be a source of comfort to the patient. Dressings on the cervical region should include the head, shoulder, and thorax. Thorax dressings should include the shoulder and upper abdomen. Adbominal dressings should go well over the flanks, thighs, and lower portion of the thorax. In applying the abdominal binder the binder should be rolled up halfway lengthwise; the patient should be rolled partly on the side and the rolled portion of the binder placed beneath; by rolling the patient partially in the other direction the rolled-up portion of the binder can be grasped and unrolled. The binder is pulled taut. It should extend well down on the thighs and well up on the lower part of the thorax, and should fit snugly. The ends are folded on themselves and pinned, the one over the other in the middle line. A vertical line of safety pins over each flank causes the binder to fit more closely to the body. Two perineal straps which follow the gluteal fold keep the binder in position. Vulva and perineal dressings are retained in position by T-bandages. In applying splints, such as the Volkmann, to the lower extremities the foot should be first attached in the desired position to the splint before bandaging the rest of the extremity.

CHAPTER VI.

GENERAL CONSIDERATIONS IN THE AFTER TREATMENT.

General considerations. Purpose. The bed. Position of patient. Pressure of bedclothes. Bed-rest. Frame for elevated head and trunk posture. Stay in bed. Recovery from anesthesia. Anesthetic vomiting. Persistent vomiting. General appearance of the patient. Parotitis. Pain. Thirst. Nutrition. Appetite. Diet. Digestion. Distention. Intestinal toxemia. Fecal impaction. General hygiene. Bath. Massage. Urine. Albuminuria. Diabetes. Urinalysis. Cystitis. Anuria. Retention of urine. Catheterism in the female. Vesical irritability. Danger of infection. Temperature. Intestinal fermentation. Autointoxication. Aseptic fever. Normal wound temperature. Pneumonia. Bronchitis. Nephritis. Superficial wound infection. Deep infection. Stitch abscesses. Fever due to other causes. Pulse. Respiration.

General Consideration.—A successful issue in many cases depends upon the care which is exercised in the after-treatment. The surgeon's responsibility does not end with the laying down of the scalpel, but continues until healing is complete. Many operative procedures would be absolutely negatived by failure to carry out the proper after-treatment. It would be of slight avail to cut urethral stricture if the passage of sounds were not rigidly enforced; nor would a good result be obtained following resections of bones and joints if no attention were paid to the position of the parts. The occurrence of pressure sores in patients who have long been confined to bed, has caused many surgeons to regret that they did not pay more attention to the details of their work.

The *purpose* of the after-treatment is to recognize complications early, be they simple or grave, and so intelligently to treat them as to give the patient not only the

best chance for recovery, but the best final functional result. Not only must the wound or injury itself be treated, but the entire organism must be brought to as nearly a normal condition as possible. Each case must be studied individually as regards previous habits of life and complicating diseases. The mental status of the patient must be understood. The general physical condition must receive attention. The working of every

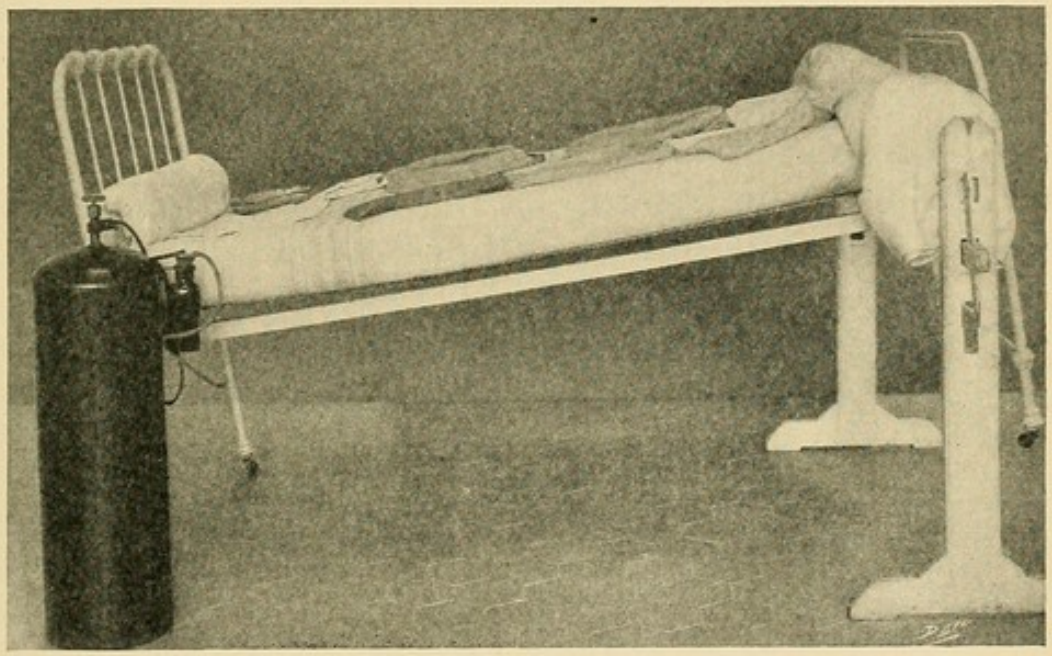


Fig. 33.—Bed ready to receive patient.

organ must be known in order to treat the case intelligently.

The *bed* should be easily separable for purposes of cleanliness. Enameled iron bedsteads with wire springs serve admirably. They have the advantage of being cheap, and are practically indestructible.

Preparation of the bed for reception of the patient: Either a thin hair mattress is placed on the wire spring or a heavy folded blanket is used for the purpose. The bedclothes consists of two sheets, an upper and an under

one, and a draw-sheet of thin rubber, two light blankets, a counterpane, and a small, flat pillow. Hot-water bottles are placed between the blankets half an hour before the return of the patient to bed is expected.

The *position* of the patient will depend upon the character of the operation. The position should be as comfortable as is compatible with proper rest of the operated part. Unnecessary movements are to be avoided. During the first few hours shock may necessitate the elevated pelvis posture. Subsequently the patient may be placed on one side, as in empyema or renal operation; or the elevated head and trunk position may be employed if diffuse peritonitis, excessive vomiting, or other indication for its use occur. In uncomplicated cases a small pillow beneath the head will be a source of comfort. Following herniotomy or other abdominal section a pillow under the knees will make the patient more comfortable by relieving the tension on the abdominal wall. Sand-bags will be necessary to maintain quiet of an injured member. Should extension of a limb be necessary, a board must be placed beneath the mattress to give the required stability. Pressure from the bedclothes is avoided by hoops or frames which keep the weight of the bedclothes from the body. Barrel-hoops form a good substitute for the manufactured frames. Rubber rings and pillows are useful in maintaining the patient in a comfortable position. The water-bed may be necessary in spinal cases or in much debilitated cases. In cases in which hemorrhage or oozing is feared, the parts affected may be elevated to lessen the flow of blood to them and hasten the flow from them; in other words, congestion of the parts is to be avoided. Old and debilitated patients should have the shoulders propped up and their position changed frequently in order to avoid hypostatic pneumonia.

The *bed-rest* will be found useful as convalescence pro-

ceeds. The *stay in bed* should be as short as is compatible with wound healing. As soon as possible, the patient should be taken into the open air and sunshine.

Recovery from Anesthesia.—The patient is to be watched until conscious. Under no circumstances is he to be left alone until he understands his surroundings. Movements tending to bring strain on the operated parts are to be restrained. Too vigorous restraint is to be avoided if possible, as it tends to cause the patient to struggle harder. In case of violent patients a sheet may be passed over the thighs and another over the shoulders and fastened to the sides of the bed. As a rule, the less the minor movements of the extremities are interfered with, the more tractable the patient will be.

Anesthetic Vomiting.—The chief danger is that some of the vomited matter may be aspirated into the bronchi and set up a foreign-body pneumonia. Vomiting may be prevented to a great extent if proper *precautionary measures* are employed. The patient's nose, mouth, and pharynx should be thoroughly cleansed by spraying with an astringent, mildly antiseptic solution an hour before anesthetization. Should catarrhal condition be present, they should receive special attention. Such patients should be sprayed every three or four hours for as long a time as the preparation of the case will admit. Spraying the throat and nose with a 2 per cent. solution of cocain directly before anesthetization will be found valuable in lessening the irritability of the mucus membrane to the anesthetic, and thus lessen the amount of secretion. The patient's head is turned to one side and slightly lowered during and after anesthesia to favor the flow of secretion from the lower angle of the mouth and nose. The stomach should be empty, but the patient should not have been too long deprived of food. In catarrhal conditions of the stomach, lavage should be employed. A sufficient amount of the anesthetic is to be administered

to overcome any efforts at vomiting during the course of the anesthetic. Inspiration of food or mucus is apt to cause foreign-body pneumonia. The struggles of an under-anesthetized patient cause subsequent muscular discomfort and lassitude. This should be particularly avoided in patients with weak heart. The secretions of the mouth and nose should be removed as fast as they collect. Stick sponges are provided for this purpose. The admixture of oxygen with the anesthetic tends to lessen the frequency and violence of the vomiting.

Treatment.—Oxygen may be administered for from fifteen to thirty minutes following the withdrawal of the anesthetic, with excellent results. The elevated head and trunk position tends to prevent vomiting. To allay persistent anesthetic vomiting cocain hydrochlorate, gr. $\frac{1}{12}$; bismuth subnitrate, gr. $\frac{1}{2}$; cerium oxalate, gr. $\frac{1}{2}$; may be given dry on the back of the tongue, every half-hour for four doses. Spraying the nose and throat with a 4 per cent. solution of cocain will prove useful in some cases. Frequently rinsing the mouth with cool water is useful. Ice only tends to keep up the vomiting. Should vomiting continue, lavage may be practised. If this is done early it will remove mucus and anesthetic-soaked secretions from the stomach, and thus tend to prevent retching from this source.

Character of the Vomit.—The vomited matter is watery and usually colorless. It consists of mucus and stomach secretions. At times, it may present a brilliant green appearance, due to admixture with bile. It rarely lasts longer than a few hours and need cause no anxiety, though the patient may feel very wretched.

Persistent Vomiting.—It sometimes happens that anesthetic vomiting is prolonged and vomiting persists for several days. This, when not traceable to other causes, must be attributed to a disturbed motility of the stomach itself, due to nerve disturbance. The character of the

vomitus does not differ from that of anesthetic vomiting. Thin, mucous secretions, partially bile stained, are vomited frequently. These patients continue to vomit in spite of ordinary treatment. Systematic lavage of the stomach must be practised. This may be repeated at intervals of four hours if vomiting persists. Following a thorough cleansing of the stomach one-fourth to one-half grain of morphin is to be administered hypodermatically. In this connection it is well to remark that some persons have an idiosyncrasy to morphin, and that in some cases the drug will itself cause persistent nausea and vomiting. In neurotic individuals the use of counterirritation over the epigastrium by means of a mustard plaster, or even the application of the thermocautery, may be useful. I have seen one case which vomited for several weeks after an ovariotomy, and in which no treatment was of avail, the vomiting finally stopping spontaneously. Nutrition in the cases of persistent vomiting is maintained by nutrient enemata. All medication by the mouth is withdrawn while the attacks of vomiting continue. When feeding by the mouth is attempted, half-ounce doses of warm fluids should be first resorted to at hour intervals, and, if these are retained, the amount may be gradually increased.

General Appearance of the Patient.—To an experienced eye the picture which the patient presents is of great value. In an *uncomplicated case* the facial expression will be contented and the patient will welcome the surgeon with a smile. There may be some minor complaints, but, on the whole, the picture will be a happy one. Such a case will occasion no anxiety. In *distention* the countenance may be somewhat troubled. In *hemorrhage* the face will be colorless, lips waxy, pupils dilated, respiration rapid and shallow, and the patient thirsty, anxious, and restless. In *peritonitis* the face will be drawn and anxious, the eyes somewhat sunken, pupils

dilated, skin covered with sweat, and the patient depressed; later restlessness, both mental and physical, develop, while in some cases a peculiar dusky suffusion of the face is noted. In *anuria* in the early stages there is a peculiar glittering of the eye and a suffusion of the face which only clinical experience can recognize. Later, the picture is classic. In *pneumonia*, the face is dusky and the respiration rapid and labored. Parotitis is self evident. It will repay the surgeon to make a careful study of patients' faces. Often the first clue to a serious complication may be thus furnished. On the other hand, the calm face and general contented appearance of the case will furnish grounds for a good prognosis even when serious complications are threatening.

Parotitis.—This is an extremely infrequent complication. I have seen it but three times in the after-course of several thousand laparotomies. In two cases typical symptoms of the disease presented during the second week following operation upon the adnexa. Neither case suppurated, though painful swelling persisted for several days. In one case the disease was bilateral; in the other unilateral. In the third case the lesion was unilateral, developing five days following an operation for extra-uterine pregnancy. These three cases recovered. The only treatment employed was painting the overlying skin with tincture of iodin, the application of heat to relieve the pain, and careful and frequent cleansing of the mouth. In reported cases which have resulted fatally and have been submitted to microscopic examination the cause seems to be a catarrh of Stenson's duct following infection from the mouth. In such cases the prognosis should be good. The lesion, however, may be but one of many resulting from a profound septic condition. Should suppuration ensue, incision and free drainage are indicated. There seems to be reason to suppose, as some authorities indicate, that this complication occurs

after abdominal operations more frequently than after operations elsewhere.

Pain is, as a rule, not much complained of. Neurotic patients may suffer excruciating agony following removal of a cystic ovary. Other patients will suffer but slightly after much more extensive operations. Morphin should not be given if its use can possibly be avoided, especially in laparotomy cases. Here, even small doses of morphin are apt to produce distention. Hypodermatic injections of hot water serve in many cases. Morphin or cocain habitués are to be watched carefully. Occasionally it will be necessary to give them small doses of that drug to which they have been accustomed. The pain from the wound usually subsides in twenty-four hours. Naturally if the patient is restless pain will result from pulling upon the stitches. Recurrence of the pain in the wound after several days' quiescence is to be regarded with suspicion as one of the symptoms of infection. Pain from distention is treated by repeated enemata. In diffuse abdominal pain the ice coil will prove beneficial. Pain persisting after the patient is up and about must be inquired into. Not infrequently a complete change of scene, tonics, and an out of door life will cause these vague indefinite pains to disappear.

Thirst.—This is present after every anesthetization, and, in spite of the vomiting which the imbibing of fluids cause, patients will beg for water to quench their thirst. However, since we have employed repeated saline enemata complaints of thirst have been infrequent. If much blood has been lost thirst will be a prominent symptom.

Treatment.—After every operation necessitating anesthesia the patient should receive an enema of from one pint to one quart of saline solution at a temperature of 110° F. Aside from its other advantages, this will result in a great diminution in the thirst. This enema

is usually repeated at intervals of four hours for four doses. Small quantities of cool or hot fluids, such as peptonized milk or broths, may be given as soon as anesthetic vomiting has ceased unless the operation has been one involving the stomach. If the latter, feeding will be for the most part by rectum for the first few days. The frequent rubbing of the mouth, gums, and lips with cool water will prove grateful. Ice should be prohibited, as it tends to increase thirst and may disorder the stomach and induce vomiting.

The **nutrition** of the patient must be borne in mind. For the first few hours all nourishment by the stomach is prohibited on account of the irritability of that organ caused by the anesthetic. As soon as anesthetic vomiting has ceased, however, liquid food may be given by mouth. Peptonized milk or light broths are best for the first twenty-four hours, the doses being so graded as gradually to accustom the weakened stomach to retain larger and larger doses at more extended intervals until at the end of twenty-four or at the latest forty-eight hours full fluid diet is reached. Following this, stronger soups and farinaceous foods are given for a few days, and finally meat and vegetables. Patients lying in bed do not require as large a quantity of food as those who are walking about. Overloading the stomach is to be avoided. The character of the food should be such as to be readily assimilable. Flatus-producing foods are to be avoided. Emaciated patients receive additional nourishment by rectum. Care must be exercised in the selection of a diet and individual tastes and idiosyncrasy consulted as much as possible. The appetite does not return, as a rule, for one or two days. The tongue is coated and the breath foul. The odor of the anesthetic clings to the patient. Particularly is this the case if bromid of ethyl has been used preliminarily. The odor is that of garlic, and is disagreeable to the average patient. The stomach

is distended and the eructation of gas is common. Nausea persists after actual vomiting has ceased. It is not necessary to force the feeding. The patient's inclinations are the best guide as to the amount of nourishment that is needed in the first few days. The diet should be a varied one as soon as the patient is able to digest properly. The time, material, and amount of each meal should be designated by the surgeon in charge. Youth and old age require the greatest care. In case of continued loss of appetite a search should be made for the cause, which may prove to be an unfavorable condition of the wound.

The **digestion** of the food should be ascertained. Constipation and flatulence are watched for and remedied as far as possible by diet. Apple sauce, prunes, grapes, orange and lemon juice, and Vichy water will be found of value in this regard. Lack of accustomed exercise will account for constipation in many cases. Massage will often be of benefit. Enemata, either of soapsuds and warm water or containing spirit of turpentine, ox-gall, lac asafœtida, or alum, according to the severity of the case, are indicated if a natural movement does not result in forty-eight hours. Distention is relieved by the passage of the rectal tube as required, and by the elevated head and trunk position. In elderly persons suffering from atony of the intestinal wall, treatment of flatulence must be vigorous and initiated early. Calomel and salines may be necessary to produce thorough evacuation. A simple dose of castor oil will often prove beneficial. During convalescence, massage, both general and local, is of value. Regulate the diet. Give a natural cathartic water, or one-half teaspoonful of the fluid extract of cascara (bitterless) may be taken at bedtime. This may be advantageously combined with the fluid extract of licorice. In any event, the bowels should move once daily while the patient is in bed, with the exception of the first day. If regular movements do not occur, intestinal

toxemia is apt to develop. This is shown by a furred condition of the tongue, foul breath, distention, abdominal discomfort, and a rise of temperature. Following enemata or a cathartic the bowels move freely and the unpleasant symptoms subside. In the care of the bowels in operations involving the integrity of the intestinal wall reliance must be placed upon enemata. No cathartic is to be given until the tenth day, except in the case of an impending peritonitis. *Fecal impaction* may result if proper attention is not paid to the movements. This will necessitate spooning the hardened fecal masses from the rectum and the administration of a course of calomel and castor oil.

Dilatation of the Stomach.—This postoperative complication is exceedingly rare. Several cases have been reported by Dr. P. Miller ("Deutsche Zeitschrift für Chirurgie," vol. lvi, Nos. 5 and 6, p. 486, 1900). The dilatation is caused by the wedging of the duodenum between the duodeno-jejunal juncture and superior mesenteric artery. In most cases this has followed laparotomy, but may occur after operations upon other portions of the body. Vomiting is persistent and profuse, becoming grayish brown and later black. It has no fecal odor. The abdomen is not distended and there is no pain. There is little gas or fecal matter passed. There is no rise in temperature, no marked increase in pulse rate, or no severe general malaise. Diagnosis is only possible after determining the dilation of the stomach. Autopsy shows the stomach and duodenum markedly dilated. The pelvis is filled by the collapsed, ribbon-like remainder of the small intestine. The diagnosis of this complication is difficult on account of its rare occurrence. A few of these cases are said to have been diagnosed during life and saved by prompt measures. The treatment consists in emptying and washing out the stomach. The patient is turned on the stomach and the lower extremities

elevated to empty the pelvis of the intestinal coils and thus relieve tension on the duodenum. One such case has come under our observation, but, in spite of early diagnosis, repeated washing out of the stomach, and change of position, death ensued. The autopsy verified the diagnosis.

The **general rules of hygiene** must be carried out. The room and surroundings are to be made as pleasant as possible. There must be plenty of fresh air. The bed-clothes must be clean and changed frequently. The patient's skin must be kept clean by sponge baths. Care is taken that the patient is not chilled. Vaginal douches are given as required. The teeth, hair, and nails should receive attention. It will be well if the attending physician gives these matters his personal attention and sees that his orders are carried out by the nurse. Not only is the patient kept comfortable, but wounds will heal more quickly, if hygienic conditions are good. General massage may be given. This will increase the action of the skin and tend to prevent pressure sores.

The **urine** must be watched carefully. In all cases the total quantity passed in the first, second, and third twenty-four hours is recorded. A sample of the mixed urine of each day, together with a slip bearing the patient's name, date, and the amount passed, is sent to the pathologist for chemic and microscopic examination. The same procedure is carried out on the tenth day. In cases in which kidney complications occur the urine is examined more frequently.

Albuminuria may develop as a result of the anesthetic. This will, as a rule, disappear by the tenth day, and is not significant of a kidney lesion. Should diabetes or renal disease develop, the urinalysis will give the first clue and treatment may be begun promptly. The urinalysis report should comprise the name of the patient, date, quantity passed in twenty-four hours, color, odor,

reaction, specific gravity, the presence and amount of albumin and sugar, the amount of urea, the presence of bile, the relative amount of chlorid and peptones, the deposits on standing, crystals, casts, and other microscopic findings. The report is signed and filed with the other records going to make up the history of the case.

Cystitis is apt to follow cases in which the catheter is employed, particularly in females. With care and cleanliness in the technic, catheter cystitis should rarely occur. Early catheterization is of value as showing whether the kidneys are properly functioning or not.

Anuria may occur after any anesthetization, but is more likely to occur after operation involving the urinary apparatus; next in frequency after laparotomies. It may be caused by the absorption of strong antiseptics, such as carbolic acid and bichlorid of mercury. This is one reason why strong antiseptics should not be employed.

Retention of Urine.—The bladder must not be allowed to become distended. If the patient has not urinated voluntarily in ten to twelve hours the catheter is used. It is not necessary to catheterize until this time, provided the bladder has been emptied prior to the operation, as the amount of urine passed in the first twelve hours is never sufficient unduly to distend the bladder. A suprapubic examination of the bladder is useful as showing whether the use of the catheter is imperative. Subsequent catheterization may be done every six or eight hours as indicated. It should be discontinued as soon as possible.

Placing the patient in a hot bath, applying hot compresses, turning the patient on the side, or, if feasible, allowing the patient to get out of bed may cause the urine to be passed voluntarily.

Catheterization in the Female.—The operator's or nurse's hands should be scrubbed and thoroughly disinfected. The mucous membrane and skin surrounding

the urethral orifice should be cleansed with sterile water, followed by a swabbing with boro-salicylic solution. The patient should lie on her back with the thighs well separated and the limbs flexed at the knees. The parts should be well exposed to a good light. It is preferable to use a glass catheter on the score of cleanliness. If such a one is not at hand a silver instrument may be used. It is rendered aseptic by boiling and is lubricated with olive oil or vaselin. The instrument is gently inserted within the urethral orifice and pushed without force along the urethra. As soon as the bladder is entered urine will flow through the catheter into a vessel held to receive it. Following catheterizing, there may persist a slight degree of vesical irritability. To quiet this, twenty drops of spirit of nitrous ether may be given every two or three hours until the irritability subsides. Salol in five-grain doses may also be given. The *danger of infection* of the bladder, ureters, or kidneys must be borne in mind at every catheterization.

The **temperature** is taken every four hours for the first three days; later night and morning in ordinary cases. In abdominal cases the temperature is taken every four hours for the first ten days; then night and morning until convalescence is well under way. In septicemic and complicated cases the temperature is taken every four hours until all danger is passed. In cases of septic abdominal complications, whether operative or under observation, the temperature is taken every hour. Directly after the operation the temperature may be *subnormal*. This may occur at times during the after-treatment. Of itself it need not occasion alarm. If the wound pursues an aseptic course the temperature will not vary to any marked degree. It may be normal or as high as 100° F., but will pursue an *even course*. A slight rise to 100° F. or 101° F. occurring in the first few days prior to the occurrence of a bowel movement is not a

source of anxiety. The cause is found in intestinal fermentation. This causes an *autointoxication.* Auto-intoxication may not be due to partial reabsorption of excrementitious matter in the intestinal canal alone, but may also be due to lessened activity of the skin, lungs, kidneys, and liver. Should the tongue be furred, breath bad, a bad taste in the mouth, headache, anorexia, or malaise be present, and the bowels be closed, together with a slight rise of temperature, moving the bowels promptly causes a return to the normal course. During the first twenty-four hours the temperature may rise to 100°, 101°, or even 102° F. in aseptic cases. This reactive fever is commonly known as *aseptic fever.* This rise in temperature is gradual; reaches its maximum in a few hours, in any event by the end of the first twenty-four hours; and is rarely accompanied by a chill. There is a corresponding increase in pulse-rate. The patient's face is flushed, the eyes are bright, and there is more than the usual amount of thirst. These symptoms subside in a few hours, or in any case by the end of the second twenty-four hours. They need occasion no alarm. Since we have employed saline enemata as a routine procedure we have not noted as high a "reactive fever" as formerly. Any sharp deviation from the normal course of wound temperature is to be regarded with suspicion. *Normal wound temperature* may not be normal temperature in the usual sense, but may be 99° to 100° F. Actual normal temperature, 98.4° F., may not be reached until the tenth day. A slight rise of temperature indicating a slight local disturbance is not incompatible with primary union. Every rise of temperature has a cause, and this cause must be sought out, and, if harmful, removed. A rise in temperature in the first twenty-four hours, while probably due to the absorption of nucleins and albumoses (aseptic fever), may be due to *pneumonia, bronchitis,* or *nephritis.* In the latter, however, there will be other symptoms which

will lead to a correct diagnosis. Tension of the pulse, headache, wandering delirium, and muscular twitching will establish the diagnosis of a renal lesion. Physical examination of the chest and careful urinalysis will aid in establishing the cause of the fever. Fever occurring after a lapse of two or three days indicates superficial *wound infection*, if the bowels have moved. If not, *intestinal fermentation* may be ruled out by moving the bowels. Fever occurring in the second week usually indicates *infection of the deeper tissues, stitch abscess. Fever due to causes* other than those mentioned may occur. Operative cases have no more immunity from the usual causes of fever—typhoid, malaria, diphtheria, etc.—than other persons. As a rule, a temperature which continues high, associated with rapid pulse from the time of operation, indicates severe general infection.

The **pulse** should be just as carefully watched as the temperature. Any variation from the normal frequency, rhythm, and tension is noted. It is studied in connection with the temperature. After severe operations or prolonged anesthetizations a rapid pulse is the rule. This may persist for forty-eight hours, but so long as it does not increase in rapidity and so long as the general condition of the patient is good there will be no cause for anxiety. The pulse should be full and compressible. In cases pursuing a normal wound course, the same relation will be maintained throughout between the pulse and the temperature. The *respiration* is also carefully watched and recorded. It is studied in its relation to the temperature and pulse. Its type, costal or abdominal; depth, deep or shallow; rhythm, regular or irregular; rate, rapid or slow; equality of expansion of each side of the chest, whether painful or not; and its other characters are noted. If any variation from the normal occurs, a prompt search for the cause is instituted. Physical examination to be thorough must in-

clude not only the anterior and lateral chest wall, but also the posterior region. It is here that pneumonic processes (hypostatic pneumonia) begin. After abdominal operations the respiration may be increased to twenty-four and remain so for several days.

CHAPTER VII.

INSTRUMENTS.

I. Articles Required for All Operations.

Ligature catgut, medium and fine.
Chromic catgut, medium and fine.
Silk, medium and fine.
Silkworm-gut.
Straight, sharp-pointed scissors.
Long, straight, spear-pointed needle.
Medium-sized, curved, cutting-edge needle.
Soft-rubber male catheter, No. 15 F.
Glass female catheter.
2 irrigators, nozzles, tubing, various sized glass connections.
Safety pins.
Basin for specimens.
1 probe.

II. Operations upon the Scalp (preparatory to trephining and for operations upon the soft parts).

2 protectors.
6 towels.
Junker apparatus.
1 three foot length of small-sized rubber tubing (for tourniquet).
2 scalpels.
2 pair anatomic forceps.
12 Kocher clamps.
2 blunt hook retractors.
18 medium-sized, half-curved, cutting-edge needles (threaded in pairs with silkworm gut).

1 pair curved-on-the-flat, blunt-pointed scissors.
4 gauze compresses.
1 twelve-inch square of nonabsorbent cotton.
2 three-inch gauze bandages.
30 hand sponges.
12 stick sponge holders.

III. Trephining and Craniectomy (in addition to List II).

1 cyrtometer.
1 periosteal elevator.
1 set trephines.
Saline irrigation (to keep operative field clear).
2 craniectomy forceps.
1 rongeur forceps.
1 set large chisels.
1 mallet.
1 aspirating syringe and needle.
Basin of saline solution, 100° F. (for temporarily removed bone).
1 telephonic brain probe.
1 small, narrow-bladed scalpel.
2 pairs mouse-tooth forceps.
2 small, full-curved, cutting-edge needles (threaded with fine chromic gut, for suturing dura).
1 needle holder.
Green silk protective (for drains).
2 three-inch plaster-of-Paris bandages, salt solution, and additional plaster.

IV. Excision of the Trigeminus (in addition to Lists II and III).

2 Crile clamps (for temporary occlusion of the carotids).
1 brain retractor with cold electric light.
50 small stick sponges.

V. Excision of the Upper Jaw.

2 protectors.
6 towels.

Junker's apparatus.
Tracheotomy set (List XIII).
Trendelenburg cannula.
2 tooth-forceps.
2 full-bellied scalpels.
2 pairs anatomic forceps.
1 periosteal elevator.
12 Kocher clamps.
1 pair curved-on-the-flat, blunt-pointed scissors.
1 set large chisels.
1 mallet.
1 lion-jaw forceps.
1 straight bone-cutting forceps.
1 angular bone-cutting forceps.
1 rongeur forceps.
3 blunt hook retractors.
2 Volkmann sharp spoons.
2 medium-sized, full-curved, cutting-edge needles (threaded with catgut loop sutures).
1 twelve-inch square of zinc oxid gauze.
12 one-inch zinc oxid packing strips.
12 medium-sized, half-curved, cutting-edge needles (threaded in pairs with silkworm-gut).
Thermocautery.
1 medium-sized, full-curved, cutting-edge needle (threaded with silk for tongue suture).
4 gauze compresses.
1 twelve-inch square of nonabsorbent cotton.
2 three-inch gauze bandages.
12 stick sponge holders.
50 stick sponges.
50 hand sponges.
Iodoform-collodion, glass, and brush.

VI. Resection of the Lower Jaw (in addition to List V).

1 chain saw and carrier.
2 Gigli saws.

VII. Opening the Mastoid.

2 protectors.
6 towels.
2 scalpels.
2 blunt hook retractors.
1 periosteal elevator.
6 Kocher clamps.
1 set mastoid chisels.
1 set mastoid gouges.
1 mallet.
1 small trephine.
2 Volkmann sharp spoons.
1 small sinus curette.
1 probe.
1 grooved director.
1 pair curved-on-the-flat, blunt-pointed scissors.
Boro-salicylic irrigation.
20 hand sponges.
30 small stick sponges.
1 one-inch zinc oxid packing strip.
4 medium-sized, half-curved, cutting-edge needles (threaded in pairs with silkworm-gut).
3 gauze compresses.
1 twelve-inch square of nonabsorbent cotton.
2 three-inch gauze bandages.

VIII. Harelip.

2 protectors.
6 towels.
1 tongue-forceps.
1 tongue-depressor.
1 mouth-gag.
2 medium-sized, half-curved, cutting-edge needles (threaded with silk, for traction sutures).
1 small, narrow-bladed scalpel.
1 straight, sharp-pointed bistoury.
2 pair mouse-tooth forceps.

1 pair curved-on-the-flat, sharp-pointed scissors.
6 medium-sized, half-curved, cutting-edge needles (threaded with silk).
6 small, half-curved, cutting-edge needles (threaded with silk).
1 needle holder.
1 pair small hook retractors.
6 pointed artery clamps.
12 hand sponges.
Iodoform-collodion, glass, and brush.
2 narrow strips of adhesive plaster (to relieve tension).

IX. Staphylorrhaphy and Uranoplasty.

2 protectors.
6 towels.
1 Whitehead gag.
1 mouth-gag.
2 cheek retractors.
1 tongue-depressor.
12 stick sponge holders.
50 stick sponges.
2 single tenacula.
1 narrow, flat-bellied scalpel (for section of levator palati).
1 small-bladed scalpel (for paring edges of cleft).
2 pair long-handled, mouse-tooth forceps.
1 pair long-handled, curved-on-the-flat, sharp-pointed scissors.
1 dull-edged periosteal elevator bent at a right angle.
1 sharp-edged periosteal elevator bent at a right angle.
3 small, half-curved, cutting-edge needles (threaded with silk loops, for guide suture).
12 paraffin silk sutures.
6 artery clamps (to attach to sutures).
1 long-handled needle holder.

1 right spiral curved, sharp-pointed aneurysm needle.
1 left spiral curved, sharp-pointed aneurysm needle.

X. Tonsillotomy.

1 large protector.
6 towels.
1 mouth-gag.
1 tongue depressor.
1 pair tenaculum forceps.
1 pair long-handled, curved-on-the-flat, blunt-pointed scissors.
1 curved, probe-pointed bistoury.
1 tonsillotome.
2 stick sponge holders.
12 stick sponges.
Ice water, tumbler, and pus basin.

XI. Adenoids.

1 large protector.
6 towels.
1 mouth-gag.
1 tongue depressor.
2 Gottstein curettes.
1 pair Lowenbury's forceps.
6 sponge holders.
20 stick sponges.
1 uvula retractor.
1 No. 28 F. sound.
Solution of adrenalin chlorid, 1-1000.

XII. Deviated Septum.

1 large protector.
6 towels.
1 mouth-gag.
1 tongue depressor.
6 sponge holders.
20 stick sponges.
Solution of adrenalin chlorid, 1-1000.
Small pieces of cotton on wooden applicators.

2 Douglas knives.
1 Mial saw.
1 Curtis saw.
1 Bosworth saw.
1 elevator.
1 pair Asch's scissors.
1 pair Asch's compressors.
1 Douglas perforator.
1 set Asch's splints.

XIII. Tracheotomy.

2 protectors.
6 towels.
1 full-bellied scalpel.
18 Kocher clamps.
2 hook retractors.
2 pairs anatomic forceps.
2 single tenacula.
1 flat-bellied scalpel.
1 pair curved-on-the-flat, blunt-pointed scissors.
1 pair curved-on-the-flat, sharp-pointed scissors.
1 cartilage-cutting forceps (for enlarging tracheal opening).
1 set tracheotomy tubes.
Tapes for tube.
3 medium-sized, half-curved, cutting-edge needles (threaded with silk).
3 medium-sized, half-curved, cutting-edge needles (threaded with silk).
Flexible applicator and absorbent cotton.
20 hand sponges.
1 needle holder.
20 small stick sponges.
6 stick sponge holders.

XIV. Cervical Adenectomy.

1 small flat sand-bag (placed under the shoulders to extend the neck).

2 protectors.
6 towels.
2 scalpels (dissecting handles).
24 Kocher clamps.
12 pointed artery clamps.
2 pairs anatomic forceps.
2 pairs curved-on-the-flat and blunt-pointed scissors.
2 small, smooth retractors.
2 blunt hook retractors.
2 Volkmann sharp spoons.
1 needle holder.
6 medium-sized, half-curved, cutting-edge needles (threaded in pairs with silkworm-gut).
2 long, straight, spear-pointed needles (threaded with silk for subcuticular sutures).
1 medium-sized, half-curved, cutting-edge needle (threaded with silk for subcuticular).
12 stick sponge holders.
50 stick sponges.
6 gauze compresses (shaken out).
2 one-inch zinc-oxid strips (in drainage cases).
2 four-inch fenestrated rubber tubes (in drainage cases).
2 twelve-inch squares of nonabsorbent cotton.
3 three-inch gauze bandages.
2 three-inch plaster-of-Paris bandages (in children).

XV. Goiter (in addition to List XIV).

4 aneurysm needles (threaded with medium-sized catgut).
Thermocautery.

XVI. Cut throat.

Combine Lists XIII and XIV.

XVII. Occlusion of the Carotids, Temporary or Permanent.

List XIV, minus sharp spoons and drainage.
2 aneurysm needles (threaded with two strands of medium-sized catgut).

2 Crile clamps (for temporary occlusion).
Paraffin injection syringe, paraffin, alcohol lamp, basin of hot water (in occlusion of terminals of external carotid).

XVIII. Amputation of the Breast (radical operation for carcinoma).

1 flat sand-bag.
2 large protectors.
1 arm and hand protector.
1 bandage (for scouring arm).
24 towels.
1 towel wringer.
Hot saline in pitcher (for hot towels).
3 full-bellied scalpels.
1 small scalpel.
50 artery clamps.
2 pairs anatomic forceps.
2 pairs curved-on-the-flat, blunt-pointed scissors.
1 pair blunt hook retractors.
1 pair small, smooth retractors.
1 aneurysm needle.
1 single tenaculum.
50 large, half-curved, cutting-edge needles (threaded in pairs with silkworm-gut).
1 long, straight, spear-pointed needle (threaded with silk for subcuticular suture).
1 skin-grafting set (List LXXX).
75 hand sponges.
12 gauze compresses (shaken out).
2 squares nonabsorbent cotton.
1 breast binder.
1 three-inch Canton-flannel bandage.
12 safety pins.

XIX. Empyema (resection of rib).

1 flat sand-bag.
2 protectors.

6 towels.
Exploring syringe.
Stethoscope (Bowles).
2 scalpels.
12 artery clamps.
2 blunt hook retractors.
1 periosteal elevator.
1 costotome.
1 angular, bone-cutting forceps.
1 rongeur forceps.
1 bone-grasping forceps.
2 Volkmann sharp spoons (in caries cases).
1 pair curved-on-the-flat, blunt-pointed scissors.
1 pointed artery clamp (for opening pleura).
1 blunt curette.
6 stick sponge holders.
20 stick sponges.
20 hand sponges.
1 eight-inch large caliber drainage tube and glass connection (for subaqueous drainage).
8 medium-sized, half-curved, cutting-edge needles (threaded in pairs with silkworm-gut).
1 medium-sized, half-curved, cutting-edge needle (threaded with silk to retain tube in place).
Boro-salicylic and saline irrigation (in case of fibrinous masses).
3 gauze compresses (slit to allow tube to emerge).
4 adhesive plaster taped straps.
1 chest binder.
12 safety pins.

ABDOMINAL OPERATIONS.

XX. Accessories (extra-abdominal).

1 laparotomy sheet or 2 protectors.
12 towels.
4 safety pins.

XXI. Laparotomy Incision (making).

2 single tenacula (to steady the skin).
1 skin knife, small bellied.
2 pairs anatomic forceps.
6 pairs artery clamps.
1 pair curved-on-the-flat, blunt-pointed scissors.
1 pair narrow retractors.

XXII. Laparotomy Incision (retraction).

1 self-retaining retractor, 3 sets of blades.
2 medium-sized retractors.
2 large retractors.
2 small retractors.

XXIII. Accessories (intra-abdominal).

12 crash laparotomy sponges.
12 gauze laparotomy sponges.
50 stick sponges.
12 stick sponge holders.
Woelfler's solution and medicine dropper.
1 ligature carrier.
1 basin of hot bichlorid.
1 basin of hot saline.
Towels, towel wringer, and pitcher of hot saline.

XXIV. Articles Required in Drainage Cases.

1 quart equal parts hydrogen peroxid and sterile water (can be used slightly warm).
1 Chamberlain douche nozzle.
Saline solution, 120° F.
2 curved, fenestrated, glass drainage tubes.
Plain wicking.
Cigarette drains.
Zinc oxid wicking.
Gauze strips, two and four inches wide.
Rubber dam (to slip over tubes and so protect wound dressing).
Rubber tubing (in gall-bladder cases and for lateral drain in appendicitis with abscess).

1 uterine dressing forceps.
1 narrow-bladed scalpel (for making accessory drainage opening).
1 straight, blunt-pointed bistoury (for making accessory drainage opening).
1 pair long-handled, sharp-pointed, curved scissors (for vaginal drainage).
1 pair long-handled, blunt-pointed, curved scissors (for vaginal drainage).
1 large glass syringe.
1 vulvar pad and T-bandage in cases drained *per vaginam*.

XXV. Laparotomy Incision (closing).

18 large, half-curved, cutting-edge needles (threaded in pairs with silkworm-gut).
12 artery clamps.
8 Halsted clamps for the peritoneum.
1 pair curved-on-the-flat, blunt-pointed scissors.
1 medium-sized, half-curved, round needle (threaded with loop suture of catgut, for purse-string suture of peritoneum).
2 medium-sized, half-curved, cutting-edge needles (threaded with loop suture of chromic gut, for aponeurosis suture and muscle sutures).
1 needle forceps.
1 long, straight, spear-pointed needle (for subcuticular suture) (threaded with linen thread or silk).
10 rubber bolsters.
1 one-inch zinc oxid strip (as a subcuticular drain in fat patients).

XXVI. Laparotomy Incision (dressing).

4 compresses of plain gauze.
1 packet of nonabsorbent cotton.
6 adhesive plaster taped straps.
1 binder.

18 safety pins.
2 perineal straps.

XXVII. Appendectomy: (*A*) in acute cases, in addition to Lists XX to XXVI, inclusive.
2 small, round retractors.
1 ligature carrier (armed with catgut for meso-appendix).
1 small round needle threaded with paraffin silk (for first purse-string).
2 small, half-curved, round needles (threaded with chromic gut for purse-strings or Lembert suture).
Thermocautery (knife or pointed tip).
Carbolic acid, glass, and sterilized wooden tooth picks (in case thermocautery fails to work).
Special forceps for grasping and inverting appendical stumps.

(*B*) Appendectomy in the interval, as above except List XXIV.

XXVIII. Oöphorectomy, Salpingo-oöphorectomy (in addition to Lists XX to XXVI, inclusive).
1 ovary forceps.
4 Keith clamps, light weight (for deeply situated bleeding points).
2 medium-sized, round needles (threaded with catgut loop sutures to cover in raw surfaces).
4 strands braided catgut (placed in pairs on ligature carrier).
Thermocautery, pointed tip (to destroy any remaining lining of tube at uterine end).

XXIX. Extrauterine Pregnancy (in addition List XXVIII)
Saline infusion (List LXXXII).
1 large Chamberlain douche nozzle.
1 one-gallon pitcher.
Saline solution, 110° F., 10 gallons.
4 gauze compresses (to absorb blood).

XXX. Hysterectomy (in addition to Lists XX to XXIII,

inclusive, that part of XXIV referring to vaginal drainage, and Lists XXV and XXVI).

1 eight-pronged tenacula forceps.
4 braided catgut ligatures.
4 Keith clamps (heavy).
4 Keith clamps (medium).
4 Keith clamps (light).
2 medium-sized, half-curved, round needles (threaded with catgut loop sutures to cover in raw surfaces).
Thermocautery, pointed tip (to disinfect cervical canal in supravaginal amputation of uterus).
Long catgut ligatures (medium size for deeply situated bleeding points).
1 aneurysm needle.

XXXI. Resection of Intestine (in addition to Lists XX to XXIII, inclusive, and Lists XXV and XXVI).

4 intestinal clamps (blades armed with rubber tubing).
4 tapes.
1 small, full-bellied scalpel.
1 pair straight, sharp-pointed scissors.
4 half-curved, round needles (threaded with silk for guy sutures).
4 straight, round (cambric) needles (threaded with fine paraffin silk).
1 ligature carrier.
10 strands of medium-sized catgut for mesentery.
2 medium-sized, full-curved, round needles (threaded with catgut for mesentery).
1 set Murphy buttons.
1 set Chlumský buttons.
1 set McGraw's elastic ligatures (used only in very emergent cases).
Towel wringer, towels, pitcher of hot saline.

XXXII. Ileocolostomy.

Same lists as for resection of intestine.

XXXIII. Inguinal Colostomy (in addition to Lists XX to XXIII, inclusive, and Lists XXV and XXVI).

First stage:

20 medium-sized, half-curved, round needles (threaded with silk).

Silver wire (for occlusion ligature).

Second stage:

2 pairs mouse-tooth forceps.
1 pair straight, sharp-pointed scissors.
1 straight, probe-pointed bistoury.
1 pus basin.
10 hand sponges.
2 paper wool pads.
1 abdominal binder.

XXXIV. Gastrotomy, for foreign body (in addition to Lists XX to XXIII, inclusive, and Lists XXV and XXVI).

2 medium-sized, half-curved, round needles (threaded with silk for guy sutures).
1 narrow-bladed scalpel.
1 pair straight, sharp-pointed scissors.
6 slender-pointed clamps.
1 smooth-bladed grasping forceps.
2 medium-sized, full-curved, round needles (threaded with loop sutures of fine chromic gut, for mucous membrane sutures).
2 straight, round (cambric) needles (threaded with paraffin silk, for Lembert sutures).

XXXV. Gastrostomy, permanent stomach fistula (in addition to Lists XX to XXIII, inclusive, and Lists XXV and XXVI).

15 medium-sized, half-curved, round needles (threaded with paraffin silk).
1 narrow-bladed scalpel.

1 pair straight, sharp-pointed scissors.
2 medium-sized, half curved, round needles (threaded with fine chromic gut loop sutures, for mucous membrane).
1 soft-rubber catheter, No. 24 F.
1 twelve-inch square of green silk protective (slit to allow tube to emerge).

XXXVI. Gastrectomy (in addition to Lists XX to XXIII, inclusive, and Lists XXV, XXVI, and XXXVII).

1 ligature carrier.
18 medium-sized catgut ligatures (for omentum).
2 medium-sized, half-curved, round needles (threaded with fine catgut loop sutures, for omentum).
1 long-bladed stomach clamp (jaws armed with rubber tubing).
6 medium-sized, half-curved, round needles (threaded with fine chromic catgut, for mucous membrane).
2 medium-sized, half-curved, round needles (threaded with paraffin silk, for Lembert sutures).

XXXVII. Gastroenterostomy, posterior (in addition to Lists XX to XXIII, inclusive, and Lists XXV and XXVI).

1 blunt-pointed anatomic forceps (for separating mesocolon).
12 medium-sized, full-curved, round needles (threaded with paraffin silk, for suturing mesocolon to stomach).
2 needle holders (the nurse arms one while the other is in use).
2 intestinal clamps (jaws armed with rubber tubing).
1 small-bladed scalpel (for making out visceral openings).
2 medium-sized, half-curved, round needles (threaded

with paraffin silk, eighteen-inch lengths, for continuous Lembert sutures).

2 pairs mouse-tooth forceps (for steadying intestines and stomach while incising).

1 pair straight, sharp-pointed scissors (for visceral incisions).

6 Kocher clamps.

1 medium-sized, half-curved, round needle (threaded with fine chromic gut loop sutures, for over-casting cut edge of intestine and stomach).

1 medium-sized Chlumský button (for lateral intestinal anastomosis).

2 straight, round (cambric) needles (for closing lateral anastomosis openings in intestine up to each half of button).

1 silver-wire ligature, medium weight, twelve-inch length (for occlusion suture).

2 slender-bladed clamps (for fastening wire).

XXXVIII. Cholecystostomy (in addition to Lists XX to XXIII, inclusive, and Lists XXV and XXVI).

1 large, smooth retractor (for liver).

2 medium-sized, full-curved, cutting-edge needles (threaded with silk for guy sutures).

1 aspirating syringe and needle.

1 narrow-bladed scalpel.

1 medium-sized scoop.

1 small curette.

1 pronged grasping forceps.

6 medium-sized, full-curved, cutting-edge needles (threaded with chromic gut, to secure drainage tube to gall-bladder).

1 eight-inch rubber tube, three-fourths-inch diameter.

1 medium-sized, half-curved, cutting-edge needle (threaded with chromic gut, used as a purse-string for securing inverted gall-bladder to tube).

1 one-inch zinc oxid gauze strip (to pack around tube).

1 twelve-inch square of rubber dam (to protect wound dressing).

XXXIX. Cholecystectomy (in addition to Lists XX to XXIII, inclusive, and Lists XXV and XXVI).

2 medium-sized, full-curved, cutting-edge needles (threaded with silk, for traction sutures).

1 small scalpel (dissecting handle).

1 medium-sized scoop.

Thermocautery, knife tip.

2 braided catgut ligatures.

1 one-inch zinc oxid drainage strip.

XL. Cholecystenterostomy (in addition to Lists XX to XXIII, inclusive, and Lists XXV and XXVI).

1 small scalpel.

2 pairs mouse-tooth forceps.

2 medium-sized, full-curved, round needles (threaded with silk for guy sutures).

2 intestinal clamps (jaws armed with rubber tubing).

1 pair straight, sharp-pointed scissors.

1 small Murphy button.

2 medium-sized, full-curved, round needles (threaded with silk, to close anastomosis openings up to each half of button).

4 medium-sized, half-curved, round needles (threaded with silk for supporting sutures).

1 one-inch zinc oxid gauze drainage strip.

XLI. Abdominal Cysts (in addition to Lists XX to XXIII, inclusive, and Lists XXV and XXVI).

1 large trocar, cannula, tube, and pitcher.

2 medium-sized, half-curved, round needles (threaded with catgut loop sutures, in case cyst-wall is to be attached to the incision).

Thermocautery.

24 Kocher clamps.
6 light-weight Keith clamps.
1 ligature carrier.
2 aneurysm needles (threaded with catgut).
2 braided catgut ligatures.
2 medium-sized, half-curved, round needles (threaded with catgut loop sutures, for covering in raw surfaces).
2 four-inch zinc oxid gauze strips.

XLII. Cæsarian Section (in addition to Lists XX to XXIII, inclusive, and Lists XXVI and LXXXII).

1 large, full-bellied scalpel.
1 three-foot length of rubber tubing.
12 Kocher clamps.
6 light-weight Keith clamps.
Saline solution, 120° F.
Braided silk for umbilical cord.
Chamberlain douche nozzle.
6 large, half-curved, round needles (threaded with catgut, for uterine sutures).
12 medium-sized, half-curved, round needles (threaded with chromic gut for uterine sutures).
1 vulvar pad and T-bandage.
1 breast binder.
Fluid extract of ergot.
For the baby: Tape, hot and cold baths; olive oil, toilet powder, and a warm blanket.

XLIII. Ventral and Umbilical Hernia (in addition to Lists XX to XXIII, inclusive, and Lists XXV and XXVI; in strangulated cases List XXXI).

8 medium-sized, half-curved, cutting-edge needles (threaded with kangaroo tendon or chromic gut).

XLIV. Inguinal Hernia (if strangulated include List XXXI).

2 large protectors.

1 one-inch gauze bandage for penis.
6 towels.
2 full-bellied scalpels (dissecting handles).
1 straight, probe-pointed bistoury.
2 pairs anatomic forceps.
18 artery clamps.
2 twelve-inch tapes (for retracting cord).
1 pair curved-on-the-flat, blunt-pointed scissors.
1 ligature carrier.
4 small retractors.
1 medium-sized, half-curved, round needle (threaded with medium-sized catgut for transfixing neck of sack).
2 needle holders (the nurse arms one while the other is in use).
12 medium-sized, half-curved, round needles (threaded with kangaroo tendon or chromic gut for canal and aponeurotic sutures).
1 spatula (for retracting posterior wall of canal).
1 medium-sized, half-curved, cutting-edge needle (threaded with fine catgut loop suture, for deep layer of superficial fascia).
1 long, straight, spear-pointed needle (threaded with silk, for subcuticular suture).
12 stick sponge holders.
30 hand sponges.
30 stick sponges.
1 small hand basin (inverted to support pelvis while applying dressing; the limb should also be supported to relieve strain on the sutures).
3 gauze compresses.
1 adhesive plaster strap (placed across thighs to support scrotum; to protect the scrotum a folded compress is placed on the edge of the strap).
1 twelve-inch square of nonabsorbent cotton.

2 four-inch muslin bandages (spica of groin).

XLV. Femoral Hernia, Fabricius operation (if strangulated, include List XXXI).

2 large protectors or 1 laparotomy sheet.
6 towels.
2 full-bellied scalpels.
1 straight, probe-pointed bistoury.
2 pairs anatomic forceps.
12 artery clamps.
1 medium-sized, half-curved, round needle (threaded with catgut, for transfixing neck of sac).
2 small retractors.
1 round retractor (for retracting femoral vessels).
6 medium-sized, full-curved, round needles (threaded with kangaroo tendon or chromic gut, for suturing Poupart's ligament to the pectineus muscle).
2 needle holders (the nurse arms one while the other is in use).
1 medium-sized, half-curved, cutting-edge needle (threaded with fine catgut loop suture, for loose cellular tissue).
1 long, straight, spear-pointed needle (threaded with silk for subcuticular suture).
12 stick sponge holders.
30 stick sponges.
30 hand sponges.
1 small hand basin (see Inguinal Hernia).
3 gauze compresses.
4 adhesive plaster taped straps.
2 four-inch muslin bandages (spica of groin).

XLVI. Vaginal Operations (accessories).

1 Kelly pad.
1 anus protector.
1 pail.
1 perineal sheet.

Dusting powder to apply to clitoris after separating adhesions.

XLVII. Curettage (in addition to List XLVI).

1 self-retaining speculum, three interchangeable blades (for dorsal position).
1 large Sims speculum.
1 self-retaining and expanding Sims speculum (when operating without assistants).
2 curved tenacula forceps.
1 cervix cleaner (applicator wound with gauze or cotton).
1 uterine sound.
1 small dilator.
1 large dilator.
1 polypus forceps.
1 medium-sized dull curet.
1 medium-sized sharp curet.
1 small, sharp curet (for curetting cornua).
6 stick sponge holders.
1 pair curved-on-the-flat, blunt-pointed scissors.
20 stick sponges.
1 uterine dressing forceps.
Normal saline solution, 120° F. (in simple cases).
Boro-salicylic solution, 120° F. (in suspicious cases).
Bichlorid solution, 120° F., 1–10,000 (in septic cases).
Cervix strip (in septic cases).
1 gauze strip four inches wide for vaginal pack (in septic cases or to correct displacements).
1 paper-wool vulvar pad.
1 T-bandage, single.
4 safety pins.

XLVIII. Trachelorrhaphy (in addition to Lists XLVI and XLVII).

2 lateral vaginal retractors.
1 pair hawksbill scissors scalpel.
1 pair tissue forceps.

1 pair long-handled, curved-on-the-flat, sharp-pointed scissors.
30 stick sponges.
1 pair anatomic forceps (to hold first knot of sutures).
10 straight or quarter-curved cervix needles (threaded with medium-sized chromic gut).
2 needle holders (the nurse arms one while the other is in use).
1 counterpressure hook.
10 artery clamps.
1 angle cleaner (similar to cervix cleaner, for removing clots before tying ligatures).

XLIX. Colporrhaphy, anterior and posterior (in addition to Lists XLVI and XLVII).

2 lateral vaginal retractors.
1 anterior vaginal retractor.
4 medium-sized, half-curved, round needles (threaded with silk, to serve as retractors).
1 scalpel.
1 pair tissue forceps.
1 pair curved-on-the-flat, sharp-pointed scissors.
6 artery clamps.
4 medium-sized, half-curved, cutting-edge needles (threaded with chromic gut).
1 pair anatomic forceps.
30 stick sponges.

L. Colpotomy, anterior and posterior (in addition to Lists XLVI and XLVII).

2 lateral vaginal retractors.
1 intraperitoneal blade of self-retaining speculum.
1 pair long-handled, curved-on-the-flat, blunt-pointed scissors.
1 needle holder.
2 medium-sized, half-curved, round needles (threaded with stout silk, to serve as guy sutures).
6 light-weight Keith clamps (for oöphorectomy).

6 braided catgut ligatures (for oöphorectomy).
2 medium-sized, half-curved, cutting-edge needles (threaded with catgut loop sutures, for securing drainage tube or suturing wound).
Gauze drainage strips, two inches wide (for cellulitis cases).
Fenestrated rubber drainage tubes (three-fourths inch caliber, for pus cases).
Small-sized "horse tracheotomy tube" (for prolonged drainage).
Harrison's rubber drainage tube.
30 stick sponges.

LI. Perineorrhaphy (in addition to Lists XLIV and XLVII).

1 pair curved-on-the-flat, sharp-pointed scissors.
1 pair curved-on-the-flat, blunt-pointed scissors.
1 full-bellied scalpel.
1 pair tissue forceps.
1 needle holder.
8 medium-sized, half-curved, cutting-edge needles (threaded in pairs with silkworm-gut).
2 medium-sized, half-curved, cutting-edge needles (threaded with chromic gut loop sutures).
1 medium-sized, half-curved, cutting-edge needle (threaded with chromic gut, for skin and mucous membrane suture).
6 artery clamps.
2 four-inch rubber bolsters.
30 stick sponges.

LII. Urethral Caruncle (in addition to Lists XLVI and XLVII).

2 lateral retractors.
Thermocautery or electric cautery (fine tip).
1 slender-bladed knife.
2 pairs mouse-tooth forceps.
6 slender-pointed clamps.

12 small, half-curved, round needles (threaded with fine silk).
1 needle holder.
1 pair slender, sharp-pointed, curved scissors.
1 rubber catheter, No. 20 F.
12 artery clamps (to use on sponge sticks).
30 small stick sponges.

LIII. Vaginal Hysterectomy (in addition to Lists XLVI and XLVII).

2 lateral vaginal retractors.
1 anterior vaginal retractor.
1 intraperitoneal blade of self-retaining speculum.
1 long-handled scalpel.
4 medium-sized, full-curved, round needles (threaded with stout silk, for traction sutures).
1 pair long-handled, curved-on-the-flat, sharp-pointed scissors.
1 pair long-handled, curved-on-the-flat, blunt-pointed scissors.
4 light-weight Keith clamps.
4 medium-weight Keith clamps.
4 heavy Keith clamps.
4 curved Péan clamps.
2 six-pronged tenacula forceps.
8 Kocher clamps.
12 stick sponge holders.
8 braided catgut ligatures.
4 medium-sized, half-curved, round needles (threaded with catgut loop sutures, for covering in raw surfaces and suturing incision).
2 zinc oxid gauze strips eight inches wide.

LIV. Fistula, vesicovaginal, rectovaginal (in addition to Lists XLVI, XLVII and XLIX).

2 paring knives.
4 small half-curved round needles threaded with silk.

LV. Circumcision.

1 laparotomy sheet or 2 large protectors.
6 towels.
1 strong, flat-ended, silver probe (to break up adhesions).
3 artery clamps.
1 circumcision clamp (in adults).
1 pair curved-on-the-flat, sharp-pointed scissors.
2 pairs mouse-tooth forceps.
1 pair anatomic forceps.
6 small, half-curved, cutting-edge needles (threaded with fine catgut).
3 six-inch squares of lint with slit in center just large enough to allow of glans being forced through (to hold back foreskin).
½ ounce of melted zinc oxid ointment (not hot enough to burn; to pour between layers of lint; this hardens and keeps the dressing from slipping).
1 square of oiled silk protective slit in center (to protect dressing).
1 three-inch gauze bandage (double spica of groin).
12 hand sponges.

LVI. Varicocele.

1 laparotomy sheet or 2 protectors.
6 towels.
1 one-inch gauze bandage (wet with bichlorid, for penis).
2 scalpels.
2 pairs anatomic forceps.
6 artery clamps.
2 aneurysm needles (threaded with medium-size catgut for ligating veins).
1 pair curved-on-the-flat, blunt-pointed scissors.
1 pair blunt hook retractors.
2 pieces of tape.

1 medium-sized, half-curved, cutting-edge needle (threaded with fine catgut loop suture, for sewing vein-stumps together).
1 medium-sized, curved, cutting-edge needle (threaded with medium sized chromic gut, for suturing skin incision).
1 medium-sized, curved, cutting-edge needle (threaded with fine catgut, in case tunica is opened).
12 hand sponges.
1 strip of adhesive plaster eighteen inches by four inches, placed across thighs to support scrotum).
1 gauze compress, folded (to protect scrotum from edge of adhesive plaster support).
3 gauze compresses.
1 small hand basin (pelvic support).
1 twelve-inch square of nonabsorbent cotton.
2 three-inch gauze bandages (single spica of groin).

LVII. Hydrocele, open operation.

1 laparotomy sheet or 2 protectors.
6 towels.
1 curved, sharp-pointed bistoury.
1 scalpel.
12 artery clamps.
1 pair curved-on-the-flat, blunt-pointed scissors.
2 pairs mouse-tooth forceps.
1 pair small, blunt hook retractors.
12 hand sponges.
1 zinc oxid gauze drainage strip, two inches wide.
6 medium-sized, half-curved, cutting-edge needles (threaded with silk or chromic gut).
1 adhesive plaster strip for scrotum (see Varicocele).
1 gauze compress, folded (see Varicocele).
3 gauze compresses.
1 twelve-inch square of nonabsorbent cotton.
1 four-inch gauze bandage.

LVIII. Hypospadias (methods of Anger and Duplay).

1 laparotomy sheet or 2 large protectors.
2 small, flat-bellied scalpels.
6 towels.
2 pairs small, mouse-tooth forceps.
1 pair slender, anatomic forceps.
6 slender-pointed artery clamps.
1 pair small, curved-on-the-flat, sharp-pointed scissors.
12 small, half-curved, round needles (threaded in pairs with fine silk).
6 small, half-curved, round needles (threaded with fine silk).
6 small, half-curved, round needles (threaded with fine catgut).
1 soft-rubber catheter, No. 14 F.
1 gauze compress, shaken out (held in place with safety pin).

LIX. Internal Urethrotomy.

1 laparotomy sheet or 2 large protectors.
6 towels.
4 ounces of olive oil in a glass.
1 glass piston syringe.
3 dozen filiform bougies.
1 set tunneled sounds.
1 urethrotome.
1 complete set of sounds.
1 soft-rubber catheter, No. 20 F.
Boro-salicylic irrigation and glass connection to fit catheter (to flush out urethra).
4 well-padded pieces of bass-wood four inches by one-half inch, to splint penis in case of severe hemorrhage.
1 one-inch gauze bandage and safety pin to secure splint.

LX. Perineal Section, for stricture and drainage, in addition to List LIX.

1 perineal sheet.
3 towels.
Trocar and cannula.
1 set lithotomy staffs.
1 full-bellied scalpel.
1 long, grooved director.
1 straight, probe-pointed bistoury.
1 perineal director.
1 gorget.
2 blunt hook retractors (when dissection of urethra is necessary).
6 artery clamps.
1 large examining cystoscope.
1 slender forceps (to aid in passing perineal tube).
1 soft-rubber peritoneal tube, No. 36 F.
1 large, curved, cutting-edge needle (threaded with stout silk to secure tube).
3 medium-sized, full-curved, cutting-edge needles (threaded with silk).
20 hand sponges.
30 stick sponges.
12 stick sponge holders.
Saline irrigation and glass connection to fit perineal tube.
1 umbrella tampon (in case of severe bleeding). This is made by passing the perineal tube through the center of an eight-inch square double thickness of gauze. The gauze near the aperture in it is sewn fast to the tube at a point which, when the tube is in position, lies just within the bladder. The tube is inserted and the interior of the umbrella tightly packed with small strips of gauze the ends of which emerge alongside of the tube.
3 gauze compresses (with apertures cut to allow passage of tube).

1 T-bandage, double.
1 glass connection (to attach perineal tube to rubber tube leading to urine bottle).

LXI. In Impassable Stricture Cases: Perineal Section Without a Guide (in addition to List LX).

2 pairs mouse-tooth forceps.
6 small, half-curved, round needles (threaded with silk, to aid in retraction and to identify remains of urethra).
1 needle holder.
1 pair curved-on-the-flat, sharp-pointed scissors.
1 long, silver probe.
2 single tenaculæ.

LXII. In Stone Cases (in addition to List LX).

1 Thompson searcher.
1 set of stone-crushing and stone-grasping forceps.

LXIII. Prostatectomy, perineal (in addition to List LX).

1 urethral divulsor.
1 rubber retractor and piston syringe (Parker Syms).
2 prostatic retractors.
2 three-prong, blunt-pointed volvellum forceps.

LXIV. Suprapubic Cystotomy.

1 laparotomy sheet or 2 large protectors.
6 towels.
2 scalpels.
2 blunt hook retractors.
1 pair curved-on-the-flat, sharp-pointed scissors.
2 narrow-bladed retractors.
4 small, full-curved, round needles (threaded with silk for guy sutures).
1 needle holder.
1 electric light bladder retractor.
1 electrocautery set, for removing portions of tumors.
1 set of stone instruments (List LXII).
4 small, full-curved, round needles (threaded with chromic gut, for suturing bladder).

1 soft-rubber suprapubic drainage tube, No. 40 F., with glass connection to fit. (This is attached by a rubber tube to a Dawbarn apparatus at the bedside.)
1 three-inch zinc oxid gauze packing strip.
2 narrow strips of adhesive plaster (to retain tube in position).
2 gauze compresses.
1 twelve-inch square of nonabsorbent cotton.
1 abdominal binder (split to allow passage of tube).
2 perineal straps.
18 safety pins.

LXV. Kidney Incision (for exposing kidney).

1 oblong sand pillow eighteen inches long, twelve inches wide, and eight inches thick, covered with sterile towel.
2 large protectors.
2 full-bellied scalpels.
2 pairs anatomic forceps.
6 artery clamps.
2 pairs curved-on-the-flat, blunt-pointed scissors.
2 medium-sized retractors, one with six-inch blade and one with four-inch blade (for deep retracting).
50 hand sponges.
30 stick sponges.
12 stick sponge holders.

LXVI. Kidney Incision (closing).

12 full-curved, cutting-edge needles (threaded in pairs with silkworm-gut).
1 long, straight, spear-pointed needle (threaded with silk for subcuticular suture).
1 gauze strip four inches wide by three yards long (if kidney support is needed).
3 gauze compresses.
3 folded towels (to serve as anterior support for kidney).

4 taped adhesive-plaster straps.
1 twelve-inch square of nonabsorbent cotton.
1 abdominal binder.

LXVII. Kidney Exploration (in addition to Lists LXVI and LXVII).

2 long, blunt-pointed, steel pins (hat pins with ends blunted).
1 exploring syringe and needle.
Thermocautery knife (pointed tip).
1 flat-bellied knife with dissecting handle (for splitting or removing capsule).
1 large, flat-bellied, broad-bladed knife for splitting kidney.
1 special forcep for compressing pedicle (jaws armed with rubber tubing).
1 needle holder.
6 long, straight, round needles (threaded in pairs with paraffined silk eighteen-inch lengths, for through-and-through sutures).
6 medium-sized, full-curved, round needles (threaded with paraffin silk for hemostatic sutures).
1 urethral probe (hollow).
2 long, silver probes.

LXVIII. Nephrotomy (in addition to Lists LXV, LXVI, and LXVII).

3 Keith clamps.
2 large, dull curettes.
Saline irrigation.
Peroxid and sodium bicarbonate solution.
1 pair dressing forceps.
2 fenestrated rubber drainage tubes.
3 zinc oxid gauze packing strips.

LXIX. Kidney Suspension (in addition to Lists LXV and LXVI).

6 artery clamps (for traction on the fatty capsule).
4 medium-sized, half-curved, round needles (threaded

with silk, eighteen-inch lengths, for suspension sutures in pairs).

4 medium-sized, full-curved, round needles (threaded with kangaroo tendon. For suspension by band from quadratus lumborum).

LXX. Nephrectomy (in addition to Lists LXV and LXVI).

2 long, curved, Péan clamps.
3 Keith clamps.
2 braided catgut ligatures.
1 ligature carrier.
1 pair long, curved-on-the-flat, blunt-pointed scissors.

OPERATIONS UPON THE RECTUM AND ANUS.

LXXI. Fistula in Ano.

1 perineal sheet.
6 towels.
2 silver probes.
1 wire rectal speculum.
1 long, grooved director.
1 scalpel.
1 curved, sharp pointed bistoury.
1 curved, blunt-pointed bistoury.
2 mouse-tooth forceps.
1 pair curved-on-the-flat, blunt-pointed scissors.
1 medium-sized sharp curette.
2 blunt hook retractors.
Hydrogen peroxid.
1 large glass syringe.
12 artery clamps.
1 medium-sized, half-curved, cutting-edge needle (threaded with catgut for circumsuture in case of troublesome hemorrhage).
1 large umbrella tampon (see List LX).
6 stick sponge holders.
30 stick sponges.

1 2-grain opium suppository.
1 1-grain iodoform suppository.
Vaselin for anointing suppositories.
1 three-inch strip of balsam-of-Peru gauze.
1 paper-wool pad.
1 T-bandage.

LXXII. Hemorrhoids (combined ligature and cautery operation).

1 perineal sheet.
6 towels.
1 rectal speculum.
6 large hemorrhoid clamps (ring clamps).
6 small hemorrhoid clamps (ring clamps).
1 pair curved-on-the-flat, blunt-pointed scissors.
6 large, half-curved, cutting-edge needles (threaded with eighteen-inch lengths of catgut for transfixing hemorrhoids).
6 artery clamps.
1 Thermocautery (button or knife tip).
6 medium-sized, half-curved, cutting-edge needles (threaded with catgut for use as a purse-string in covering in raw surfaces).
1 2-grain opium suppository.
1 1-grain iodoform suppository.
Vaselin for anointing suppositories.
1 Kelsey hemorrhoid clamp (in simple cautery operations).
30 stick sponges.
6 stick sponge holders.
1 large umbrella tampon.
1 paper-wool pad.
1 T-bandage, double.

LXXIII. Prolapsus Recti, suspension of rectum.

2 large protectors.
6 towels.
2 scalpels.

2 pairs anatomic forceps.
12 Kocher clamps.
1 pair curved-on-the-flat, blunt-pointed scissors.
3 blunt hook retractors.
1 pair tissue forceps.
1 needle holder.
1 large, curved, cutting-edge needle (threaded with chromic gut or kangaroo tendon for circumsuture of rectum).
6 medium-sized, half-curved, cutting-edge needles (threaded with chromic gut or kangaroo tendon, for suspension sutures of rectum).
12 medium-sized, half-curved, cutting needles (threaded with silkworm-gut).
3 gauze compresses.
1 T-bandage.

LXXIV. Extirpation of Rectum by the Abdomino-perineal Route (in addition to Lists XX to XXIII, inclusive, and Lists XXV and XXVI).

1 ligature carrier.
2 heavy silk ligatures (for sigmoid).
1 pair straight, sharp-pointed scissors.
10 eigtheen-inch lengths of catgut (for mesorectum).
2 aneurysm needles, right and left (threaded with catgut, for ligating internal iliac arteries).
1 six-inch iodoform gauze strip (to wrap around ends of sigmoid).
12 medium-sized, half-curved, round needles (threaded with silk, for artificial anus).
1 perineal sheet.
2 heavy Keith clamps.
12 light Keith clamps.
1 six-inch zinc oxid gauze strip.
2 paper-wool pads.
Collodion, brush, and glass.
6 gauze compresses.

1 T-bandage.

LXXV. Resection of Joints.

1 large sheet.
2 small protectors.
6 towels.
Hand or foot bags.
1 rubber bandage.
1 Esmarch constrictor.
2 scalpels.
1 resection knife.
2 pairs anatomic forceps.
24 artery clamps.
1 pair curved-on-the-flat, blunt-pointed scissors.
1 periosteal elevator.
3 blunt hook retractors.
2 sharp hook retractors.
2 Gigli saws.
1 chain saw and carrier.
1 butcher saw.
1 metacarpal saw.
1 bone-cutting forceps.
1 rongeur forceps.
2 sharp Volkmann spoons.
1 lion-jaw forceps.
2 medium-sized, half-curved, cutting-edge needles (threaded with loop sutures of catgut).
10 medium-sized, half-curved, cutting-edge needles (threaded with silkworm-gut).
6 stick sponge holders.
50 stick sponges.
30 hand sponges.
1 three-inch zinc oxid gauze strip.
6 gauze compresses.
3 packets of nonabsorbent cotton.
3 muslin bandages.
Splints (Richardson's in shoulder cases, right-angled

in elbow cases, bass-wood in wrist cases, Volkmann in knee and ankle cases).

Plaster-of-Paris bandages, salt solution, and additional plaster.

LXXVI. Amputation.

1 large sheet.
2 small protectors.
Foot or hand bags.
6 towels.
1 rubber bandage.
1 Esmarch constrictor.
Wyeth's pins, corks, and three-foot length of rubber tubing in hip and shoulder cases).
2 scalpels.
2 pairs anatomic forceps.
24 Kocher clamps.
2 blunt-nosed clamps (for artery and vein).
1 large amputating knife.
1 Catlin knife (for leg and forearm).
1 pair curved-on-the-flat, blunt-pointed scissors.
1 periosteal elevator.
2 Gigli saws.
1 chain saw.
1 butcher saw.
1 mallet and chisel.
1 bone-cutting forceps.
1 rongeur forceps.
1 bone-grasping forceps.
3 blunt hook retractors.
1 bandage retractor (two-tailed for arm and thigh, three-tailed for forearm and leg).
2 medium-sized, half-curved, cutting-edge needles (threaded with catgut loop sutures).
10 medium-sized, half-curved, cutting-edge needles (threaded with silkworm-gut).
30 hand sponges.

1 four-inch zinc oxid gauze strip.
6 gauze compresses.
1 six-yard gauze roll.
2 adhesive plasters, taped straps.
1 four-inch gauze bandage.
Bass-wood splints.
2 three-inch muslin bandages.

LXXVII. Suturing of the Patella.

2 large protectors.
1 foot and leg bag.
6 towels.
2 scalpels.
2 pairs anatomic forceps.
12 Kocher clamps.
1 pair curved-on-the-flat, blunt-pointed scissors.
2 blunt hook retractors.
2 sharp hook retractors.
1 sharp Volkmann spoon.
1 bone drill (silkworm-gut for carrier).
4 medium-sized, full-curved, cutting-edge needles (threaded with kangaroo tendon or chromic gut, for lateral sutures).
4 medium-sized, half-curved, cutting-edge needles (threaded with kangaroo tendon or chromic gut, for capsule sutures).
2 strands of kangaroo tendon, chromic gut, or silver wire (for through-and-through suture).
1 long, straight, spear-pointed needle (threaded with silk for subcuticular).
1 Volkmann splint.
2 gauze compresses.
1 six-yard gauze roll.
3 packets of nonabsorbent cotton.
2 three-inch muslin bandages (for foot and leg).
1 four-inch muslin bandage (for thigh).

LXXVIII. Varicose Veins (method of Trendelenburg).

2 large protectors.
6 towels.
2 scalpels.
2 pairs anatomic forceps.
6 Kocher clamps.
2 blunt hook retractors.
1 aneurysm needle (threaded with two strands of catgut).
1 pair curved-on-the-flat, blunt-pointed scissors.
1 long, straight, spear-pointed needle (threaded with silk, for subcuticular suture).
6 hand sponges.
2 gauze compresses.
2 adhesive plaster taped straps.
2 two-inch muslin bandages (for foot and leg).
2 three-inch muslin bandages (for thigh and pelvis).

LXXIX. Abscess.

2 large protectors.
6 towels.
1 exploring syringe and large needle.
1 scalpel.
1 narrow-bladed artery clamp.
6 Kocher clamps.
1 grooved director.
2 pairs anatomic forceps.
2 blunt hook retractors.
1 pair curved-on-the-flat, blunt-pointed scissors.
2 sharp Volkmann spoons.
6 medium-sized, half-curved, cutting-edge needles (threaded with silkworm-gut).
Peroxid of hydrogen.
1 large glass syringe.
Boro-salicylic irrigation.
6 stick sponge holders.
30 stick sponges.

30 hand sponges.
Carbolic acid (in tubercular cases).
Alcohol (in tubercular cases).
Peroxided zinc gauze strips (oxid of zinc gauze strips wrung out of peroxid of hydrogen).
2 fenestrated rubber drainage tubes.
6 compresses.
3 three-inch gauze bandages.

In Bone Cases (in addition to above).

1 periosteal elevator.
1 sequestrum forceps.
1 rongeur forceps.
3 bone gouges.
3 chisels.
1 mallet.
Mixture of whale oil and iodoform (for filling bone cavities).

LXXX. Skin-grafting.

2 large protectors.
6 towels.
1 skin-grafting razor.
1 pair sharp hook retractors (to steady skin).
2 pairs anatomic forceps.
2 flat-ended, silver probes.
Basin of saline, 105° F.
Green silk protective (cut in one-inch strips).
6 hand sponges.
4 compresses (wet with saline).
2 three-inch gauze bandages.

For Surface to be Grafted (in addition to above).

1 pair curved-on-the-flat, blunt-pointed scissors.
1 pair straight, sharp-pointed scissors.
1 sharp-pointed Volkmann spoon.

LXXXI. Plaster-of-Paris Outfit (application of cast).

Vaselin.
Nonabsorbent or French cotton rolls.

Canton flannel bandages.
Plaster bandages.
Additional plaster.
Salt solution in basin (deep enough to allow immersion of bandages).
Sand-bags.
Vinegar (for removing plaster from the hands).
Adhesive plaster and sharp plaster knife (if cast is to be fenestrated or cut down at once to facilitate rapid removal).
Soft-iron strips and bass-wood splints (for strengthening casts).

Removal of Cast.

Small circular saw.
Heavy plaster shears.
Heavy plaster knife.
Vinegar or strong bichlorid solution (to soften plaster).

LXXXII. Intravenous Infusion.

6 towels.
1 muslin bandage (for constriction).
1 scalpel.
2 pairs anatomic forceps.
1 aneurysm needle (threaded with silk).
2 Kocher clamps.
1 pair curved-on-the-flat, blunt-pointed scissors.
1 pair slender, curved-on-the-flat, sharp-pointed scissors.
Infusion cannula and connecting tubing with cut off.
Glass infusion jars and thermometer.
Stand for infusion apparatus.
Saline solution, 120° F., 1200 c.c.
1 medium-sized, half-curved, cutting-edge needle (threaded with silk).
2 hand sponges.
1 gauze compress.
1 three-inch gauze bandage.

INDEX.

Ashton's Practice of Gynecology

The Practice of Gynecology. By W. Easterly Ashton, M. D., LL.D., Professor of Gynecology in the Medico-Chirurgical College, Philadelphia. Handsome octavo volume of 1079 pages, containing 1046 original line drawings. Cloth, $6.50 net; Half Morocco, $7.50 net.

JUST ISSUED—NEW (2d) EDITION

Two large editions of Dr. Ashton's practical work have been required in six months. The author takes up each procedure necessary to gynecologic work step by step, the student being led from one step to another, just as in studying any non-medical subject, the minutest detail being explained in language that cannot fail to be understood even at first reading. Nothing is left to be taken for granted, the author not only telling his readers in every instance what should be done, but also precisely how to do it. A distinctly original feature of the book is the illustrations, numbering over one thousand line drawings made especially under the author's personal supervision from actual apparatus, living models, and dissections on the cadaver. These line drawings show in detail the procedures and operations without obscuring their purpose by unnecessary and unimportant anatomic surroundings, thus enabling the student to see at a glance the exact method employed. All the methods, tests, etc., discussed have been carefully verified by the author so as to assure their value and accuracy. Definite and precise instructions are given as to how to preserve specimens of morbid tissue and secretions, and how to deliver them in good condition to the pathologist.

Howard A. Kelly, M. D.

Professor of Gynecology, Johns Hopkins University

"It is different from anything that has as yet appeared. The illustrations are particularly clear and satisfactory. One specially good feature is the pains with which you describe so many details so often left to the imagination."

Charles B. Penrose, M. D.

Formerly Professor of Gynecology in the University of Pennsylvania

"I know of no book that goes so thoroughly and satisfactorily into all the *details* of everything connected with the subject. In this respect your book differs from the others."

George M. Edebohls, M. D.

Professor of Diseases of Women, New York Post-Graduate Medical School

"A text-book most admirably adapted to *teach* gynecology to those who must get their knowledge, even to the minutest and most elementary details, from books."

Hirst's Diseases of Women

A Text-Book of Diseases of Women. By BARTON COOKE HIRST, M. D., Professor of Obstetrics, University of Pennsylvania; Gynecologist to the Howard, the Orthopedic, and the Philadelphia Hospitals. Octavo of 745 pages, with 701 original illustrations, many in colors. Cloth, $5.00 net.

JUST ISSUED — NEW (2d) EDITION
WITH 701 ORIGINAL ILLUSTRATIONS

The new edition of this work has just been issued after a careful revision. As diagnosis and treatment are of the greatest importance in considering diseases of women, particular attention has been devoted to these divisions. To this end, also, the work has been magnificently illuminated with 701 illustrations, for the most part original photographs and water-colors of actual clinical cases accumulated during the past fifteen years. The palliative treatment, as well as the radical operative, is fully described, enabling the general practitioner to treat many of his own patients without referring them to a specialist. An entire section is devoted to a full description of all modern gynecologic operations, illuminated and elucidated by numerous photographs. The author's extensive experience renders this work of unusual value.

OPINIONS OF THE MEDICAL PRESS

Medical Record, New York

"Its merits can be appreciated only by a careful perusal. . . . Nearly one hundred pages are devoted to technic, this chapter being in some respects superior to the descriptions in many other text- boks."

Boston Medical and Surgical Journal

"The author has given special attention to diagnosis and treatment throughout the book, and has produced a practical treatise which should be of the greatest value to the student, the general practitioner, and the specialist."

Medical News, New York

"Office treatment is given a due amount of consideration, so that the work will be as useful to the non-operator as to the specialist."

Hirst's Text-Book of Obstetrics

Fourth Edition, Thoroughly Revised and Enlarged

A Text-Book of Obstetrics. By BARTON COOKE HIRST, M. D., Professor of Obstetrics in the University of Pennsylvania. Handsome octavo, 899 pages, with 746 illustrations, 39 of them in colors. Cloth, $5.00 net; Sheep or Half Morocco, $6.00 net.

RECENTLY ISSUED

Immediately on its publication this work took its place as the leading text-book on the subject. Both in this country and in England it is recognized as the most satisfactorily written and clearly illustrated work on obstetrics in the language. The illustrations form one of the features of the book. They are numerous and the most of them are original. In this edition the book has been thoroughly revised. More attention has been given to the diseases of the genital organs associated with or following childbirth. Many of the old illustrations have been replaced by better ones, and there have been added a number entirely new. The work treats the subject from a clinical standpoint.

OPINIONS OF THE MEDICAL PRESS

British Medical Journal

"The popularity of American text-books in this country is one of the features of recent years. The popularity is probably chiefly due to the great superiority of their illustrations over those of the English text-books. The illustrations in Dr. Hirst's volume are far more numerous and far better executed, and therefore more instructive, than those commonly found in the works of writers on obstetrics in our own country."

Bulletin of Johns Hopkins Hospital

"The work is an admirable one in every sense of the word, concisely but comprehensively written."

The Medical Record, New York

"The illustrations are numerous and are works of art, many of them appearing for the first time. The author's style, though condensed, is singularly clear, so that it is never necessary to re-read a sentence in order to grasp the meaning. As a true model of what a modern text-book on obstetrics should be, we feel justified in affirming that Dr. Hirst's book is without a rival."

Webster's Text-Book of Obstetrics

A Text-Book of Obstetrics. By J. CLARENCE WEBSTER, M.D. (EDIN.), F. R. C. P. E., Professor of Obstetrics and Gynecology in Rush Medical College, in Affiliation with the University of Chicago; Obstetrician and Gynecologist to the Presbyterian Hospital, Chicago. Handsome octavo volume of 767 pages, beautifully illustrated, including many in colors. Cloth, $5.00 net; Sheep or Half Morocco, $6.00 net.

RECENTLY ISSUED—BEAUTIFULLY ILLUSTRATED

This entirely new work is written for the student of obstetrics as well as for the active practitioner. The anatomic changes accompanying pregnancy, labor, and the puerperium are described more fully and lucidly than in any other text-book on the subject. The exposition of these sections is based mainly upon studies of frozen specimens, in which department the author has had a larger experience than any other worker. Unusual consideration is given to embryologic and physiologic data of importance in their relation to obstetrics. Great care was taken in the selection of the illustrations, aiming to meet the varied requirements of both the undergraduate and the practising physician. The book expresses the most advanced thought of the day.

OPINIONS OF THE MEDICAL PRESS

Medical Record, New York

"The author's remarks on asepsis and antisepsis are admirable, the chapter on eclampsia is full of good material, and . . . the book can be cordially recommended as a safe guide."

Buffalo Medical Journal

"As a practical text-book on obstetrics for both student and practitioner, there is left very little to be desired, it being as near perfection as any compact work that has been published."

Dublin Journal of Medical Science

"Both to the student . . . and to the practitioner who requires the latest opinion on any point of practice, Dr. Webster's book will be of the greatest value."

GET THE BEST

American Illustrated Dictionary

THE NEW STANDARD

Third Revised Edition—Recently Issued

The American Illustrated Medical Dictionary. A new and complete dictionary of the terms used in Medicine, Surgery, Dentistry, Pharmacy, Chemistry, and kindred branches; with over 100 new and elaborate tables and many handsome illustrations. By W. A. NEWMAN DORLAND, M. D., Editor of "The American Pocket Medical Dictionary." Large octavo, nearly 800 pages, bound in full flexible leather. Price, $4.50 net; with thumb index, $5.00 net.

Gives a Maximum Amount of Matter in a Minimum Space, and at the Lowest Possible Cost

THREE EDITIONS IN THREE YEARS—WITH 1500 NEW TERMS

The immediate success of this work is due to the special features that distinguish it from other books of its kind. It gives a maximum of matter in a minimum space and at the lowest possible cost. Though it is practically unabridged, yet by the use of thin bible paper and flexible morocco binding it is only 1¾ inches thick. The result is a truly luxurious specimen of book-making. In this new edition the book has been thoroughly revised, and upward of fifteen hundred new terms that have appeared in recent medical literature have been added, thus bringing the book absolutely up to date. The book contains hundreds of terms not to be found in any other dictionary, over 100 original tables, and many handsome illustrations, a number in colors.

PERSONAL OPINIONS

Howard A. Kelly, M. D.,

Professor of Gynecology, Johns Hopkins University, Baltimore.

"Dr. Dorland's dictionary is admirable. It is so well gotten up and of such convenient size. No errors have been found in my use of it."

Roswell Park, M. D.,

Professor of Principles and Practice of Surgery and of Clinical Surgery, University of Buffalo.

"I must acknowledge my astonishment at seeing how much he has condensed within relatively small space. I find nothing to criticize, very much to commend, and was interested in finding some of the new words which are not in other recent dictionaries."

The American Text-Book of Obstetrics

Second Edition, Thoroughly Revised and Enlarged

The American Text-Book of Obstetrics. In two volumes. Edited by RICHARD C. NORRIS, M.D., Assistant Professor of Obstetrics in the University of Pennsylvania; Art Editor, Robert L. Dickinson, M.D., Assistant Obstetrician, Long Island College Hospital, N. Y. Two handsome octavo volumes of about 600 pages each; nearly 900 illustrations, including 49 colored and half-tone plates. Per volume: Cloth, $3.50 net; Sheep or Half Morocco, $4.00 net.

RECENTLY ISSUED—IN TWO VOLUMES

Since the appearance of the first edition of this work many important advances have been made in the science and art of obstetrics. The results of bacteriologic and of chemicobiologic research as applied to the pathology of midwifery; the wider range of the surgery of pregnancy, labor, and of the puerperal period, embrace new problems in obstetrics. In this new edition, therefore, a thorough and critical revision was required, some of the chapters being entirely rewritten, and others brought up to date by careful scrutiny. A number of new illustrations have been added, and some that appeared in the first edition have been replaced by others of greater excellence. By reason of these extensive additions the new edition has been presented in two volumes, in order to facilitate ease in handling. The price, however, remains unchanged.

PERSONAL AND PRESS OPINIONS

Alex. J. C. Skene, M. D.,

Late Professor of Gynecology, Long Island College Hospital, Brooklyn.

"Permit me to say that 'The American Text-Book of Obstetrics' is the most magnificent medical work that I have ever seen. I congratulate you and thank you for this superb work, which alone is sufficient to place you first in the ranks of medical publishers."

Matthew D. Mann, M. D.,

Professor of Obstetrics and Gynecology in the University of Buffalo.

"I like it exceedingly and have recommended the first volume as a text-book for our sophomore class. It is certainly a most excellent work. I know of none better."

American Journal of the Medical Sciences

"As an authority, as a book of reference, as a 'working book' for the student or practitioner, we commend it because we believe there is no better."

Penrose's Diseases of Women

Fifth Revised Edition

A Text-Book of Diseases of Women. By CHARLES B. PENROSE, M. D., PH. D., formerly Professor of Gynecology in the University of Pennsylvania; Surgeon to the Gynecean Hospital, Philadelphia. Octavo volume of 550 pages, with 225 fine original illustrations. Cloth, $3.75 net.

RECENTLY ISSUED

Regularly every year a new edition of this excellent text-book is called for, and it appears to be in as great favor with physicians as with students. Indeed, this book has taken its place as the ideal work for the general practitioner. The author presents the best teaching of modern gynecology, untrammeled by antiquated ideas and methods. In every case the most modern and progressive technique is adopted, and the main points are made clear by excellent illustrations. The new edition has been carefully revised, much new matter has been added, and a number of new original illustrations have been introduced. In its revised form this volume continues to be an admirable exposition of the present status of gynecologic practice.

PERSONAL AND PRESS OPINIONS

Howard A. Kelly, M. D.,

Professor of Gynecology and Obstetrics, Johns Hopkins University, Baltimore.

"I shall value very highly the copy of Penrose's 'Diseases of Women' received. I have already recommended it to my class as THE BEST book."

E. E. Montgomery, M. D.,

Professor of Gynecology, Jefferson Medical College, Philadelphia.

"The copy of 'A Text-Book of Diseases of Women' by Penrose, received to-day. I have looked over it and admire it very much. I have no doubt it will have a large sale, as it justly merits."

Bristol Medico-Chirurgical Journal

"This is an excellent work which goes straight to the mark. . . . The book may be taken as a trustworthy exposition of modern gynecology."

Garrigues' Diseases of Women

Third Edition, Thoroughly Revised

A Text-Book of Diseases of Women. By HENRY J. GARRIGUES, A. M., M. D., Gynecologist to St. Mark's Hospital and to the German Dispensary, New York City. Handsome octavo, 756 pages, with 367 engravings and colored plates. Cloth, $4.50 net; Sheep or Half Morocco, $5.50 net.

INCLUDING EMBRYOLOGY AND ANATOMY OF THE GENITALIA

The first two editions of this work met with a most appreciative reception by the medical profession both in this country and abroad. In this edition the entire work has been carefully and thoroughly revised, and considerable new matter added, bringing the work precisely down to date. Many new illustrations have been introduced, thus greatly increasing the value of the book both as a text-book and book of reference. In fact, the illustrations form a complete atlas of the embryology and anatomy of the female genitalia, besides portraying most accurately numerous pathologic conditions and the various steps in the gynecologic operations detailed. The work is, throughout, practical, theoretical discussions being carefully avoided.

PERSONAL AND PRESS OPINIONS

Thad. A. Reamy, M. D.

Professor of Clinical Gynecology, Medical College of Ohio.

"One of the best text-books for students and practitioners which has been published in the English language; it is condensed, clear, and comprehensive. The profound learning and great clinical experience of the distinguished author find expression in this book in a most attractive and instructive form."

Bache Emmet, M. D.

Professor of Gynecology in the New York Post-Graduate Medical School.

"I think that the profession at large owes you gratitude for having given to the medical world so valuable a treatise. I shall certainly put it forward to my classes as one of the best guides with which I am familiar, not only with which to study, but for constant consultations."

American Journal of the Medical Sciences

"It reflects the large experience of the author, both as a clinician and a teacher, and comprehends much not ordinarily found in text-books on gynecology. The book is one of the most complete treatises on gynecology that we have, dealing broadly with all phases of the subject."

Saunders' Year-Book

The American Year-Book of Medicine and Surgery. A Yearly Digest of Scientific Progress and Authoritative Opinion in all branches of Medicine and Surgery. Arranged with critical editorial comments by eminent American specialists, under the editorial charge of GEORGE M. GOULD, M. D. Vol. I., *General Medicine;* Vol. II., *General Surgery* Per volume: Cloth, $3.00 net; Half Morocco, $3.75 net. *Sold by Subscription.*

EQUIVALENT TO A POST GRADUATE COURSE

The contents of these volumes, critically selected from leading journals, monographs, and text-books, is much more than a compilation of data. The extracts are carefully edited and commented upon by eminent specialists, the reader thus obtaining also the invaluable annotations and criticisms of the editors.

The Lancet, London

"It is much more than a mere compilation of abstracts, for, as each section is entrusted to experienced and able contributors, the reader has the advantage of certain critical commentaries and expositions . . . proceeding from writers fully qualified to perform these tasks."

Barton and Wells' Medical Thesaurus

A Thesaurus of Medical Words and Phrases. By WILFRED M. BARTON, M. D., Assistant to Professor of Materia Medica and Therapeutics, Georgetown University, Washington, D. C.; and WALTER A. WELLS, M. D., Demonstrator of Laryngology, Georgetown University, Washington, D. C. 12mo of 534 pages. Flexible leather, $2.50 net; with thumb index, $3.00 net.

A UNIQUE WORK—RECENTLY ISSUED

This work is just the opposite of a dictionary: when the idea or meaning is in the mind, it endeavors to supply the word or phrase to express that idea. Its value is evident.

Boston Medical and Surgical Journal

"We can easily see the value of such a book, and can certainly recommend it to our readers."

American Text-Book of Gynecology

Second Edition, Thoroughly Revised

American Text-Book of Gynecology: MEDICAL AND SURGICAL. By 10 of the leading Gynecologists of America. Edited by J. M. BALDY, M. D., Professor of Gynecology in the Philadelphia Polyclinic. Handsome imperial octavo volume of 718 pages, with 341 illustrations in the text, and 38 colored and half-tone plates. Cloth, $6.00 net; Sheep or Half Morocco, $7.00 net.

MEDICAL AND SURGICAL

This volume is thoroughly practical in its teachings, and is intended to be a working text-book for physicians and students. Many of the most important subjects are considered from an entirely new standpoint, and are grouped together in a manner somewhat foreign to the accepted custom. In the revised edition of this book much new material has been added and some of the old eliminated or modified. More than forty of the old illustrations have been replaced by new ones. The portions devoted to plastic work have been so greatly improved as to be practically new. Hysterectomy, both abdominal and vaginal, has been rewritten, and all the descriptions of operative procedures have been carefully revised and fully illustrated.

OPINIONS OF THE MEDICAL PRESS

The Lancet, London

"Contains a large amount of information upon special points in the technique of gynecological operations which is not to be found in the ordinary text-book of gynecology."

British Medical Journal

"The nature of the text may be judged from its authorship; the distinguished authorities who have compiled this publication have done their work well. This addition to medical literature deserves favorable comment."

Boston Medical and Surgical Journal

"The most complete exponent of gynecology which we have. No subject seems to have been neglected . . . and the gynecologist and surgeon, and the general practitioner who has any desire to practise diseases of women, will find it of practical value. In the matter of illustrations and plates the book surpasses anything we have seen."

Dorland's Modern Obstetrics

Modern Obstetrics: General and Operative. By W. A. NEWMAN DORLAND, A. M., M. D., Assistant Instructor in Obstetrics, University of Pennsylvania; Associate in Gynecology in the Philadelphia Polyclinic. Handsome octavo volume of 797 pages, with 201 illustrations. Cloth, $4.00 net.

Second Edition, Revised and Greatly Enlarged

In this edition the book has been entirely rewritten and very greatly enlarged. Among the new subjects introduced are the surgical treatment of puerperal sepsis, infant mortality, placental transmission of diseases, serum-therapy of puerperal sepsis, etc. By new illustrations the text has been elucidated, and the subject presented in a most instructive and acceptable form.

Journal of the American Medical Association

"This work deserves commendation, and that it has received what it deserves at the hands of the profession is attested by the fact that a second edition is called for within such a short time. Especially deserving of praise is the chapter on puerperal sepsis."

Davis' Obstetric and Gynecologic Nursing

Obstetric and Gynecologic Nursing. By EDWARD P. DAVIS, A. M., M. D., Professor of Obstetrics in the Jefferson Medical College and Philadelphia Polyclinic; Obstetrician and Gynecologist, Philadelphia Hospital. 12mo of 400 pages, illustrated. Buckram, $1.75 net.

RECENTLY ISSUED—SECOND REVISED EDITION

Obstetric nursing demands some knowledge of natural pregnancy, and gynecologic nursing, really a branch of surgical nursing, requires special instruction and training. This volume presents this information in the most convenient form. This second edition has been very carefully revised throughout, bringing the subject down to date.

The Lancet, London

"Not only nurses, but even newly qualified medical men, would learn a great deal by a perusal of this book. It is written in a clear and pleasant style, and is a work we can recommend."

Schäffer and Edgar's Labor and Operative Obstetrics

Atlas and Epitome of Labor and Operative Obstetrics. By DR. O. SCHÄFFER, of Heidelberg. *From the Fifth Revised and Enlarged German Edition.* Edited, with additions, by J. CLIFTON EDGAR, M. D., Professor of Obstetrics and Clinical Midwifery, Cornell University Medical School, New York. With 14 lithographic plates in colors, 139 other illustrations, and 111 pages of text. Cloth, $2.00 net. *In Saunders' Hand-Atlas Series.*

This book presents the act of parturition and the various obstetric operations in a series of easily understood illustrations, accompanied by a text treating the subject from a practical standpoint. The author has added many accurate representations of manipulations and conditions never before clearly illustrated.

American Medicine

"The method of presenting obstetric operations is admirable. The drawings, representing original work, have the commendable merit of illustrating instead of confusing. It would be difficult to find one hundred pages in better form or containing more practical points for students or practitioners."

Schäffer and Edgar's Obstetric Diagnosis and Treatment

Atlas and Epitome of Obstetric Diagnosis and Treatment. By DR. O. SCHÄFFER, of Heidelberg. *From the Second Revised German Edition.* Edited, with additions, by J. CLIFTON EDGAR, M. D., Professor of Obstetrics and Clinical Midwifery, Cornell University Medical School, N. Y. With 122 colored figures on 56 plates, 38 text-cuts, and 315 pages of text. Cloth, $3.00 net. *In Saunders' Hand-Atlas Series.*

This book treats particularly of obstetric operations, and, besides the wealth of beautiful lithographic illustrations, contains an extensive text of great value. This text deals with the practical, clinical side of the subject. The symptomatology and diagnosis are discussed with all necessary fullness, and the indications for treatment are definite and complete.

New York Medical Journal

"The illustrations are admirably executed, as they are in all of these atlases, and the text can safely be commended, not only as elucidatory of the plates, but as expounding the scientific midwifery of to-day."

Schäffer and Norris' Gynecology

Atlas and Epitome of Gynecology. By DR. O. SCHÄFFER, of Heidelberg. *From the Second Revised and Enlarged German Edition.* Edited, with additions, by RICHARD C. NORRIS, A. M., M. D., Gynecologist to Methodist Episcopal and Philadelphia Hospitals. With 207 colored figures on 90 plates, 65 text-cuts, and 308 pages of text. Cloth, $3.50 net. *In Saunders' Hand-Atlas Series.*

The value of this atlas to the medical student and to the general practitioner will be found not only in the concise explanatory text, but especially in the illustrations. The large number of colored plates, reproducing the appearance of fresh specimens, give an accurate mental picture and a knowledge of the changes induced by disease of the pelvic organs that cannot be obtained from mere description.

American Journal of the Medical Sciences

"Of the illustrations it is difficult to speak in too high terms of approval. They are so clear and true to nature that the accompanying explanations are almost superfluous. We commend it most earnestly."

Galbraith's Four Epochs of Woman's Life

Second Revised Edition—Recently Issued

The Four Epochs of Woman's Life: A STUDY IN HYGIENE. By ANNA M. GALBRAITH, M. D., Fellow of the New York Academy of Medicine, etc. With an Introductory Note by JOHN H. MUSSER, M. D., Professor of Clinical Medicine, University of Pennsylvania. 12mo of 247 pages. Cloth, $1.50 net.

MAIDENHOOD, MARRIAGE, MATERNITY, MENOPAUSE

In this instructive work are stated, in a modest, pleasing, and conclusive manner, those truths of which every woman should have a thorough knowledge. Written, as it is, for the laity, the subject is discussed in language readily grasped even by those most unfamiliar with medical subjects.

Birmingham Medical Review, England

"We do not as a rule care for medical books written for the instruction of the public. But we must admit that the advice in Dr. Galbraith's work is in the main wise and wholesome."

Schäffer and Webster's Operative Gynecology

Atlas and Epitome of Operative Gynecology. By DR. O. SCHAFFER, of Heidelberg. Edited, with additions, by J. CLARENCE WEBSTER, M.D. (Edin.), F.R.C.P.E., Professor of Obstetrics and Gynecology in Rush Medical College, in affiliation with the University of Chicago. 42 colored lithographic plates, many text-cuts, a number in colors, and 138 pages of text. *In Saunders' Hand-Atlas Series.* Cloth, $3.00 net.

RECENTLY ISSUED

Much patient endeavor has been expended by the author, the artist, and the lithographer in the preparation of the plates of this atlas. They are based on hundreds of photographs taken from nature, and illustrate most faithfully the various surgical situations. Dr. Schaffer has made a specialty of demonstrating by illustrations.

Medical Record, New York

"The volume should prove most helpful to students and others in grasping details usually to be acquired only in the amphitheater itself."

De Lee's Obstetrics for Nurses

Obstetrics for Nurses. By JOSEPH B. DE LEE, M.D., Professor of Obstetrics in the Northwestern University Medical School; Lecturer in the Nurses' Training Schools of Mercy, Wesley, Provident, Cook County, and Chicago Lying-In Hospitals. 12mo volume of 460 pages, fully illustrated. Cloth, $2.50 net.

RECENTLY ISSUED

While Dr. De Lee has written his work especially for nurses, yet the practitioner will find it useful and instructive, since the duties of a nurse often devolve upon him in the early years of his practice. The illustrations are nearly all original, and represent photographs taken from actual scenes. The text is the result of the author's eight years' experience in lecturing to the nurses of five different training schools.

J. Clifton Edgar, M. D.,

Professor of Obstetrics and Clinical Midwifery, Cornell University, New York.

"It is far and away the best that has come to my notice, and I shall take great pleasure in recommending it to my nurses, and students as well."

American Pocket Dictionary

Fourth Revised Edition Recently Issued

THE AMERICAN POCKET MEDICAL DICTIONARY. Edited by W. A. NEWMAN DORLAND, A.M., M.D., Assistant Obstetrician to the Hospital of the University of Pennsylvania; Fellow of the American Academy of Medicine. Over 550 pages. Full leather, limp, with gold edges. $1.00 net; with patent thumb index, $1.25 net.

James W. Holland, M.D.,

Professor of Medical Chemistry and Toxicology, and Dean, Jefferson Medical College Philadelphia.

"I am struck at once with admiration at the compact size and attractive exterior. I can recommend it to our students without reserve."

Cragin's Gynecology.

Just Issued New (6th) Edition

ESSENTIALS OF GYNECOLOGY. By EDWIN B. CRAGIN, M.D., Professor of Obstetrics, College of Physicians and Surgeons, New York. Crown octavo, 215 pages, 62 illustrations. Cloth, $1.00 net. *In Saunders' Question-Compend Series.*

The Medical Record, New York

"A handy volume and a distinct improvement on students' compends in general. No author who was not himself a practical gynecologist could have consulted the student's needs so thoroughly as Dr. Cragin has done."

Boisliniere's Obstetric Accidents, Emergencies, and Operations

OBSTETRIC ACCIDENTS, EMERGENCIES, AND OPERATIONS. By the late L. CH. BOISLINIERE, M.D., Emeritus Professor of Obstetrics, St. Louis Medical College; Consulting Physician, St. Louis Female Hospital. 381 pages, illustrated. Cloth, $2.00 net.

British Medical Journal

"It is clearly and concisely written, and is evidently the work of a teacher and practitioner of large experience. Its merit lies in the judgment which comes from experience."

Ashton's Obstetrics.

Just Issued—New (6th) Edition

ESSENTIALS OF OBSTETRICS. By W. EASTERLY ASHTON, M.D., Professor of Gynecology in the Medico-Chirurgical College, Philadelphia. Crown octavo, 256 pages, 75 illustrations. Cloth, $1.00 net. *In Saunders' Question-Compend Series.*

Southern Practitioner

"An excellent little volume containing correct and practical knowledge. An admirable compend, and the best condensation we have seen."

RD66 F82

Fowler

(1)