Much more encouraging reports are made from the use of the Roentgen ray, but as it has no direct action on the organism and acts simply by producing epilation (Sequeira), it would not appear to be applicable in combating the condition in the nails.

In view of the tediousness and uncertainty of medical treatment, the avulsion of the nail and the application of some germicide to the matrix may be justifiable. We have adopted this procedure in two cases.

PROPHYLAXIS

When the hands and nails are involved by either of these fungi, the likelihood of their transmission to others is probably much greater than in cases of the same disorder occurring in the scalp. The sufferer is constantly scattering far and wide particles of disintegrated nail substance and flakes of skin which are loaded with the organism. His hands are continually in contact with objects of common use and very often directly with the persons of others. More ideal conditions for disseminating the infection could scarcely be devised. Imagine the situation should a barber or hair-dresser contract the disease in the nails and continue to practice his vocation!

Fig. 20.—Old favus, recovered, of the scalp, in man aged 28. Note the loss of hair and the coarse, wiry appearance of the hair present.

Favus of the scalp or nails is a severe and loathsome disease. Unless energetically and carefully treated from the start for a very long period, it always results in permanent loss of the hair and scarring of the scalp in the areas involved with great disfigurement (Figs. 19 and 20).

Fortunately the disease is rather infrequent in America and our strict immigration inspection prevents new cases from being introduced from those foreign countries in which it is prevalent.

In view of the danger to the community at large, it would seem that favus should be added to the list of notifiable diseases and that cases occurring in this country should be placed under such restraint by the local health authorities as may be necessary to prevent the spread of the disease to others.

My thanks are due to Surgeon L. L. Williams of the U. S. Public Health Service for his kindness in permitting me to refer to these cases. I desire also to make my acknowledgments to Assistant Surgeon J. H. Smith, who has done the microscopic work, and to Pharmacist Charles Slough who has given valuable assistance in making the negatives.

Ellis Island.

A COURSE IN SURGICAL TECHNIC*

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The course in surgical technic here described was designed to meet a demand in the surgical training given in Columbia University. It is realized that familiarity, by actual observations on animals, with the use of aseptic materials, the appearance and manipulation of living tissues, the control of hemorrhage, and the methods employed to prevent contamination and subsequent infection of recent wounds, is an equal advantage to the graduate whether he enters practice immediately on graduation or prepares himself further by a hospital training. The opportunity to participate in operating-room routine, such as the preparation of the patient, the surgeon, the instruments and materials, is now of recognized value, and this recognition has created a need for special training in the details of aseptic surgical technic.

The course is given to fourth-year medical students in the Laboratory of Surgical Research, where there is a well-equipped animal hospital. In order to provide an opportunity to educate recent hospital graduates in teaching methods as well as to instruct the students, the teaching staff has been made unusually large. It includes twelve instructors in surgical technic and two in surgical pathology, all of whom have had surgical service in a hospital.

Four of these instructors are on duty at the same time. Each instructor serves for three months, but, by a scheme of rotation, he acts as assistant instructor during the first two, supervising the students at one table where he fills the place of second assistant, while during the third month he is instructor in chief and attending surgeon at the University Animal Hospital, where he makes a daily visit. The schedule is so arranged that each instructor becomes the chief twice in a period of twenty-four scholastic months.

The course is an optional one, but so great is the interest it has aroused that at least three-fourths of the fourth-year students elect it, and each of the sections into which the class is divided contains ten men on an average. Each section receives instruction for eight periods of two hours each. It is divided into groups of three men, so that an average section furnishes operating staffs for three tables, and the men at each table rotate at successive lessons in the position of anesthetist, first assistant and operator.

The nurse in charge is a graduate of a hospital training-school. She is familiar with all surgical requirements and has supervision over the animal hospital and operating-room, under the direction of the attending surgeon on duty. At its initial lesson she instructs each section in the preparation of surgical supplies and their sterilization, the care of instruments and utensils, and in the manipulation of sterile gowns, gloves, etc. She also prepares for the operative sessions exactly as in the operating pavilion of any first-class hospital.

The operating-room is furnished and equipped on modern lines. It is 20 feet square, lighted by side-lights and skylights, and provided with powerful arc-lights. Adjacent rooms are used for sterilizing, anes-

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thetia and private operations, and there is a detached room for necropsies. The sterilizing plant includes an autoclave, instrument boiler, utensil boiler and water sterilizers of the latest type.

The animal hospital has been fitted up with every regard for the animals' comfort. Each animal has a separate cage, and there are especially heated ones for recovery from anesthesia. The entire time and attention of one man is given to these animal patients. The animals themselves, as well as their surroundings, are kept scrupulously clean with the aid of a bath-tub, sluicing-hose, proper disinfectants and abundant light and ventilation. As the hospital is maintained to treat animals with surgical lesions, many dogs suffering from tumors, infections and prolapsus uteri have been received as private patients. Thus the students under direction of the attending surgeon have had the opportunity of assisting at operations on real pathologic conditions. In his daily visits the attending surgeon inspects all the animals and gives such directions for

performed, and intestinal suture illustrated. Technic of applying dressings.

THIRD SESSION: Lateral entero-enterostomy.

FOURTH SESSION: Posterior gastro-enterostomy.

FIFTH SESSION: End-to-end entero-enterostomy, by suture.

SIXTH SESSION: Exploratory laparotomy, for a stab-wound of the abdomen, inflicted under anesthesia. The location and repair of the lesions are demonstrated.

SEVENTH SESSION: Nephrectomy, illustrating the treatment of the pedicle.

EIGHTH SESSION: Repetition by each table of any operation which has been unsuccessful.

The routine of a session is as follows: The chief instructor outlines briefly, at the beginning of the lesson, the steps of the operation to be performed, illustrating them by diagrams on the blackboard. He then assigns the students to their duties, and the usual routine of an operating-room begins. The anesthetist starts the anesthesia in the etherizing-room, the animal is placed on the operating-table and the field prepared by the first assistant (the hair has been removed and the animal given a full bath on the day before by the attendant). The skin is prepared by scrubbing with green soap and water, then with alcohol 70 per cent., and rinsing with mercuric chlorid 1:10,000. The table is then wheeled into the operating-room and draped with sterile sheets by the operator, who has previously scrubbed up and has put on cap, mask, gown and gloves, under the supervision of his instructor.

During the operation the instructor at each table directs every step and calls particular attention to the observation of asepsis, handling of instruments, placing of sutures, control of hemorrhage and the importance of handling living tissues with gentleness. Before leaving the room the student operator writes a description of his procedure on the history sheet of the chart, which is to hang by the animal's cage.

At the conclusion of the operation, every step of which has been

done under full anesthesia in every case, suitable dressings are applied to the wound and the animal is carried to the hospital and placed in a "warming cage," in order that chill may be prevented and the animal made comfortable. The animal receives special attention during convalescence, its temperature and general condition are noted daily on the chart, and the diet is carefully regulated by the attending surgeon. The student-operator is urged to visit his convalescent patient and to consider the outcome of his procedure of importance equal to that of the operative result on a human being.

At the beginning of each operative session, necropsies are performed by one of the instructors in surgical pathology on any animals which have died as a result of operation. A few, selected from the convalescents, are chloroformed and necropsied for the purpose of showing the students the contrast between the normal repair at various intervals after operation, and

Operating-room for the class in surgical technic, Department of Surgery, Columbia University.

their care as may be necessary to the nurse in charge and her assistant. Daily notes of temperature and general condition are entered on each patient's chart for the information of the surgeon and the students.

In order to preserve uniformity of instruction, the professor of surgery has prescribed a definite series of demonstrations and operations for the course. A printed outline of these is furnished to every student at his first lesson.

FIRST SESSION: The course opens with a lecture and demonstration on (a) suture materials and instruments; (b) preparation and sterilization of surgical supplies; (c) the administration of anesthetics to animals; (d) the preparation of the animal for operation; (e) the sterilization of the surgeon's hands, and relative values of different methods in use, and (f) prescribed method of putting on cap, mask, gown and gloves.

SECOND SESSION: The abdominal incision and its repair in layers. Repair of wounds in the intestine. Enterotomy

the pathologic conditions produced when an operation has been unsuccessful. Attention is drawn to the resistance of the healing wound to tension, in both abdominal and intestinal walls, to the constant formation of peritoneal adhesions, and to the benefit or harm which may result from the attachment of the great omentum to the various viscera. Preceding a necropsy on a pathologic animal, the student who operated on it is questioned as to his procedure, and as to any postoperative symptoms which might indicate the cause of death. He is also questioned regarding the treatment he would pursue with a human patient who exhibited similar signs and symptoms, and is asked to give his reasons therefor. Thus a constant effort is made to keep clear in the minds of the students the clinical aspects of the case, and the importance of necropsies is emphasized, as a means of correlating them with the various pathologic conditions and processes that are found to exist. This practice is intended as an aid to the interpretation of physical signs and to the understanding of the principles of treatment in human surgery.

Specimens of tissues are selected at the necropsies, and microscopic sections are made to show the students the cellular morphology of all common postoperative conditions, including wounds healing by first intention, infected wounds, and the various types of peritonitis, with or without adhesions. At the close of each necropsy, the student-operator is required to write a complete report of the pathologic findings, and these reports are bound with the histories. To increase the interest of the students, a comparative record of the results of each section's work is kept, which proves a stimulus to both students and instructors.

The routine performance of necropsies has brought out many interesting surgical facts which should be of lasting benefit to the students. Peritonitis occurred most frequently after the operation of end-to-end intestinal anastomosis. In the cases of gastro-enterostomy the most frequent cause of death was pneumonia, suggesting the increased percentage of pneumonia due to surgical interference in the upper abdominal cavity. To indicate the value of pathologic material that may occur during the year and the benefits that may be derived from the study of such material, a few of the unusual causes of death occurring with the various operations are briefly mentioned here:

1. *Gastro-Enterostomy*.—One case of enormously distended stomach with contracted intestines, due to a small band with a valve-like action, causing obstruction to the entrance to the jejunum. One case of death due to inanition caused by anastomosis of the stomach to the descending colon; here sufficient care had not been taken to identify the loop of intestine used for the anastomosis.

2. *Enterorrhaphy*.—One case of gangrene of the intestine in which the intestinal clamps had been too tightly applied.

3. *End-to-End Entero-Enterostomy*.—One case of cirrhosis of the liver with ascites; death was due to oozing. One case of infection of the abdominal wound, followed by protrusion of the omentum with beginning gangrene.

4. *Exploratory Laparotomy for Stab-Wound*.—One case of general peritonitis, due to an overlooked stab-wound in the intestine. One case of thrombosis of the

superior mesenteric vein, with gangrene of the small intestine. This was probably due to excessive traction on the mesentery, as no other cause could be found. One case of general peritonitis due to a gauze sponge that had been left in the abdominal cavity.

The sections that saw these last three necropsies learned a lesson in surgery which they will probably never forget, so clearly was brought out the necessity for careful handling of the tissues, and for keen systematic observation.

Intussusception was found to be a frequent cause of death, and has apparently no relation to the type of operation performed. It is probably due to the handling of the intestine. Both cross-sections and longitudinal sections have been made to show the students the relations of the layers of intestine and constriction of the mesentery in such conditions.

The private animal patients admitted to the hospital have been the means of demonstrating several neoplasms as well as other instructive conditions. One student section had the opportunity of operating on congenital oblique inguinal hernia occurring in three youthful pigs, all from the same litter. The students had the subsequent satisfaction of having these three animals returned home, discharged cured, and the wounds healed by first intention.

The advantages of a course of this kind are numerous. The existence of a staff of instructors, each occupying in turn the position of chief, not only makes each instructor's service short enough to maintain constant enthusiasm, but also acts as a stimulus, because of the element of competition. Each surgeon has an opportunity to observe the teaching methods of his associates, and to note their merits or defects, with a view to increasing his own efficiency. The combination in a single course of the technic of operative procedure with the pathologic findings in the cases in which operation has been performed leads the student, when brought into contact with clinical cases, to reason in terms of pathologic processes and conditions. This assists him to correlate his knowledge of anatomy, pathology, bacteriology and physiology with surgery. He is trained to base his conclusions on observations of facts rather than on dogmas.

Finally, after such a course the student has become acquainted with the technic of asepsis, the use of surgical instruments and the other essentials of general surgical procedure; he has learned that an operation must be conducted exactly and methodically, and he has felt a personal responsibility for its success or failure.

When, therefore, he enters practice and is confronted with the necessity of operating, he is no longer an untried apprentice. Already familiar with the fundamental principles of aseptic surgical work, he is enabled to avoid many a costly mistake, and is far better fitted to do credit to himself and justice to his human patients.

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The Logical Starting-Point.—The diseases common to child life are spread by the mingling of the sick with those who are well. The public schools are the places where the children of all ages and degree assemble. It follows then that the public school is the logical point at which to begin the important work of controlling those diseases that are spread as has been stated, by the mingling of the sick with the well.—*Bull. Chicago School Sanit. Instr.*