STATED MEETING, HELD MAY 1, 1911

The Vice-President, Dr. John H. Gibbon, in the Chair.

RESULTS AFTER REMOVAL OF AN EPITHELIOMA OF THE MANDIBLE, INVOLVING THE FLOOR OF THE MOUTH, THE CONTIGUOUS SURFACE OF THE TONGUE, AND THE GLANDS IN THE DIGASTRIC TRIANGLE WITH LIGATION OF THE EXTERNAL CAROTID.

Dr. Addinell Hewson presented a man, aged fifty-four years, who, when first seen February, 1909, presented a growth extending from the median line, on the left side, surrounding the roots of the central left lateral incisor and first bicuspid teeth, and extending into the floor of the mouth. It was of almond shape, ulcerated, and in the last six months had bled slightly. Enlargements in the digastric triangle were distinctly palpable. The growth had been very slow, but in the last two weeks had been rapid. The urinary examination was negative, and the blood examination showed no marked leucocytosis. The hæmoglobin was 87 per cent. Slight increase in the lymphocytes and decrease in the polymorphonuclear neutrophiles. The left external carotid artery was ligated as a preliminary to the operation. The incision for the removal of the growth was made in the median line and carried along the caudal margin of the mandible as far as the facial growth. A stout ligature was passed through the tongue, and a Gigli saw introduced, severing the mandible at the right canine tooth. The saw was again introduced, severing the mandible ventrad to the left facial growth, thus permitting the tongue floor of the mouth to be in the grasp of the part removed. The incision was now completed, removing a portion of the growth on the under surface of the tongue, the mylohyoid muscle, the attachments of the glossal and suprahyoid muscles, and the contents of the digastric triangle without involving the incision for the ligation of the left external carotid artery. The glossal muscles and the suprahyoid muscles were fastened to the remainder of the mandible on the right side, the margins of the tongue to the remains of the caudal fornix of the vestibule of the

mouth, the wound closed with interrupted sutures, and a wick introduced in the bottom of each wound. The wound healed with slight stitch abscess, but there was no involvement of the carotid incision. The pathological report of the growth showed the presence of infiltration in the pearly bodies, also some infiltration into the tissue in the floor of the mouth and into the mucous and salivary glands. Some epithelial cells were found in the lymph-glands, and in some there was no infiltration whatever. The patient had an uneventful recovery, and was able to leave the hospital April 1. There was a slight recurrence in the alveolar process about the canine tooth, which was removed in May, 1910. Microscopically, this growth proved to be a slight recurrence. There was, at this time, no enlargement anywhere; patient's health was good, although absolutely adentulous, and compelled to eat soft food. In December, 1910, he reported, complaining of a small tumor about the size of a chestnut in the right supraclavicular region, which was very painful on manipulation. However, no manifestation of any connection with the mouth, and the swelling was treated as a result of cold and soon disappeared. This proved to be a fact, as, when the patient next appeared this growth had disappeared. At this date, May 1, 1911, there has been absolutely no return anywhere. The contraction of the muscles had produced rather a pointed chin, and the interval between the severed portions of the mandible was just the breadth of a finger. The tongue can be protruded to its normal length from the mouth, and the voice sounds give the impression of the patient lisping with a quid of tobacco in the mouth.

THE TREATMENT OF LACERATED AND INCISED WOUNDS OF THE EXTREMITIES.

WITH A REPORT OF FIVE TYPICAL CASES.

BY JAMES A. KELLY, M.D.,

OF PHILADELPHIA.

Visiting Surgeon to St. Mary's Hospital; Associate in Surgery, and Pathologist to the Philadelphia Polyclinic Hospital and College for Graduates in Medicine.

ALTHOUGH marked advances have been made in the technic and treatment of abdominal conditions, our attention is often attracted to the fact that the treatment of lacerated, incised, and punctured wounds of the extremities has not kept pace with the work done in the other branches of surgery, and while the percentage of cases that were treated by primary amputation for destruction of the arterial or nerve supply, or by secondary amputation for gangrene due to thrombosis of infection, is not so great, the fact remains that the ultimate result, as shown in the loss of function, muscular atrophy, contractures, and the often-marked involvement of sutured tendons, nerves, and blood-vessels in one mass of cicatricial tissue, is very poor. This condition greatly limits the usefulness of the individual, decreases his earning capacity, and too frequently ends in prolonged lawsuits for indemnity. It is with the object of bringing this common condition before the attention of the Fellows that I wish to present this report of five typical cases.

CASE I.—*Cartridge shell wound of the arm, involving the brachial artery, basilic vein, and median nerve; circular arteriorrhaphy, circular phleborrhaphy, and neurorrhaphy.*

Mrs. A. G., sixty-six, w. housewife, Germany, admitted to St. Mary's Hospital July 4, 1910. Patient, while walking along the street July 4, 1910, heard an explosion as a trolley car passed and at the same time felt something strike her in the upper arm, accompanied by a sharp stabbing pain in the same region which radiated down the forearm to the hand and fingers. The patient noticed a small amount of bleeding from the wound, and on account of this and the pain went to the hospital.

On admission the arm was thoroughly cleansed and an antiseptic dressing applied. The wound was not considered to be of great importance by the resident physician and he did not notify me until the next morning, when examination showed complete paralysis of the muscles supplied by the median nerve and apparently no injury to other important structures. The arm showed a small transverse wound 1 to 1.5 cm. long on the anterior surface of the right arm about the junction of the middle and upper thirds, through which there was a small amount of blood oozing. The entire inner aspect of the arm was swollen over an area of about three to four inches and was ecchymotic. Radial and ulnar pulses were distinctly palpable, but not as full as on the left side. An X-ray examination showed the presence of a small foreign body about 8 to 10 mm. square.

Under ether anæsthesia longitudinal incision 5½ inches in length was made, with its centre at the wound of entrance. On cutting through the deep fascia a large blood-clot was evacuated, and this was followed by a gush of arterial blood. A tourniquet above the wound and a careful dissection showed a transverse wound of the brachial artery involving half of its calibre, almost complete severance of the median nerve, and a transverse wound of the basilic vein involving its entire calibre. Further dissection revealed a small piece of a cartridge shell about 1 cm. square imbedded in the coracobrachialis muscle. The wound was thoroughly irrigated with hot normal salt solution, the edges of the wound of entrance excised, and the wounds in the brachial artery and basilic vein were closed by circular arteriorrhaphy and phleborrhaphy by Carrel's method. The cut ends of the median nerve were united by means of two fine silk sutures passed directly through the nerve. The operative wound was then closed with continuous catgut sutures uniting the deep fascia and interrupted silkworm gut through the skin. Drainage was provided for through a small stab wound about two inches above the internal condyle, using rubber dam. A dry sterile dressing and an internal angular splint were applied. The wound healed by primary union; the drain was removed in 48 hours, and the sutures at the end of eight days. The patient was discharged at the end of three weeks and recommended to return for massage and passive motion.

Examination three months after operation showed normal

pulsation of brachial and radial arteries, marked atrophy of flexor muscles, anæsthesia over areas supplied by median nerve; marked changes were present in the skin of the hand, particularly the fingers and thumb being thin, smooth, shiny, and cold; the nails were dry, dark in color, striated longitudinally, and there was marked sweating of the palm of the hand. There was marked stiffness of the elbow-joint in a position of semi-flexion, and also of the wrist and phalangeal joints. Voluntary flexion was absent in the fingers, was weak at the wrist-joint, and pronation of the hand was impossible. The patient complained of a general pain throughout the forearm and hand on attempts at movement.

Examination six months after operation showed a moderate return of sensation, muscular power, and a lessening of atrophic changes.

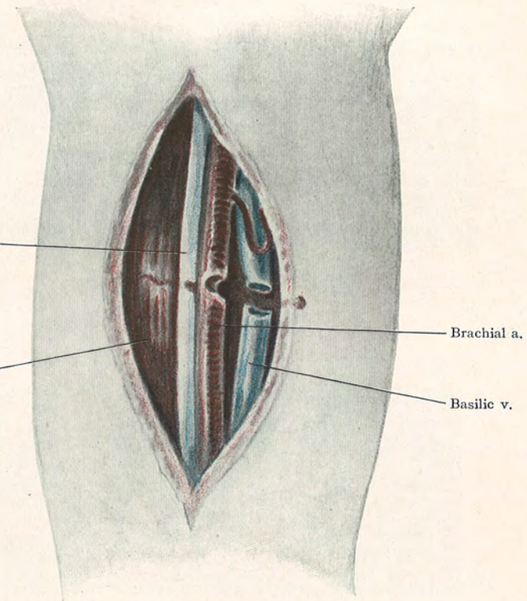
Examination March 30, 1911, showed a moderate degree of muscular atrophy, motions at elbow and wrist free, pronation and supination normal, flexion of fingers fair, still some trophic changes present over terminal phalanges, nails becoming smooth and normal in color at bases. No pain present on motion. General condition satisfactory.

CASE II.—*Lacerated wound of arm, severing biceps, portion of brachialis anticus, brachial artery, basilic vein, median and ulnar nerves; arteriorrhaphy, phleborrhaphy and neurorrhaphy.*

Jacob G., sixty-six years old, U. S., shuttle maker, admitted to St. Mary's Hospital September 23, 1910, at 2 P. M. Patient while at work had his clothing caught in a portion of the machinery and received a lacerated wound of the right arm from a circular saw. Admitted to the hospital in a profound state of shock.

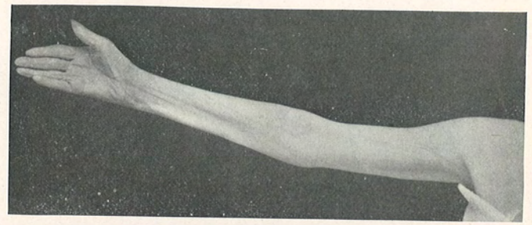
Examination on Admission.—Patient in a profound state of shock. On the right arm there was a lacerated wound about six inches in length, extending from the junction of the middle and upper thirds on the external surface running downward and inward. Inspection of wound showed the biceps muscle, the brachialis anticus muscle, brachial artery, the basilic and cephalic veins, the median and ulnar nerves to be completely severed and the cut ends retracted, and the wound partially filled with blood-clot. The bleeding had been temporarily controlled by means of a cloth tourniquet. The patient was given an intravenous injection of one litre of normal salt solution, a shock

FIG. 1.



Lesion present after exposure by incision. (Case I.)

FIG. 2.

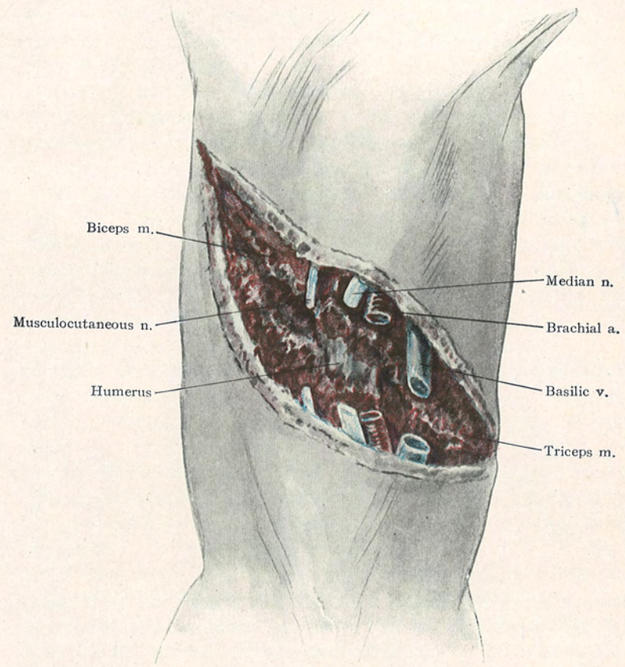


Shows healed wound with scar of punctured wound at centre. Hand in position of full extension. Note the degree of atrophy still present. (Case II.)

FIG. 3.

Shows the degree of flexion present, which is limited entirely by the stiffness present in the phalangeal joints. (Case I.)

FIG. 4.



Showing the extent of the lacerated wound. (Case II.)

enema and a temporary antiseptic dressing placed around the arm. At the end of three hours the patient had sufficiently reacted from shock to warrant operative intervention.

The patient was given morphine ¼ gr., atropine 1/100. The arm was thoroughly cleaned with soap and water and alcohol 70 per cent., and the wound irrigated with hot normal saline solution. Circular arteriorrhaphy of the brachial artery and circular phleborrhaphy of the basilic vein were performed, using the method of Carrel. It was then found necessary to give the patient a little ether to continue the operation. The cut ends of the median and ulnar nerves were sutured with fine silk by the direct method, and the cut portions of the biceps and brachialis anticus muscles were sutured with No. 1 interrupted chromic catgut, the fascia and skin being united with interrupted sutures of silkworm gut and drainage provided for at the lower angle of the wound with rubber dam. A sterile dressing and an internal angular splint were then applied. The patient was fully stimulated, and in spite of everything that could be done he failed to react and died about ten hours after leaving the operating room.

CASE III.—*Incised wound of the arm involving the brachialis anticus muscle; the tendon of the biceps, the basilic vein, the median and ulnar nerves, tenorrhaphy, myorrhaphy, neurorrhaphy.*

M. McD., sixteen years of age, schoolboy, admitted to the Polyclinic Hospital, September 8, 1910, service of Dr. Louis A. Steinbach, to whom I am indebted for the privilege of reporting this case.

Patient while painting the outside of the window frame was supporting his weight with his hand against the window pane, when the latter suddenly gave way and the patient partially fell through the window severely cutting his right arm with a piece of the broken glass. Admitted to the accident room of the hospital in a state of shock with a tourniquet around the upper part of the arm.

Examination on admission showed patient to be in a moderate degree of shock. The right arm presented an irregular incised wound about four inches in length, beginning at the junction of the middle and lower thirds of the arm on the anterior surface running downward and inward. Retraction of the edges of the wound showed complete severence of the

tendon of the biceps, a portion of the brachialis anticus muscle, the basilic vein, the median and ulnar nerves. Under ether anæsthesia the arm was cleaned with soap and water and alcohol 70 per cent., and the wound irrigated with hot normal saline solution. The separated portions of the brachialis anticus muscle and the tendon of the biceps muscles were sutured with No. 1 chromized catgut, the divided median and ulnar nerves were united with interrupted sutures of fine silk, the cephalic vein was ligated, and the fascia and skin closed with interrupted silkworm gut sutures. Drainage was provided for at the lower angle of the wound, and a dry sterile dressing applied. The wound showed a marked degree of infection several days after operation, which necessitated the removal of several of the sutures. The patient was discharged to the out-patient department for subsequent treatment September 24, 1910, sixteen days after admission. (Dr. Butler, Chief Resident.)

Examination March 30, 1911, showed normal flexion at the elbow, restricted motion of the wrist and of the fingers, most marked in the ring and middle fingers, still loss of sensation of index, middle, ring, and little fingers on flexor surfaces. Pronation and supination were still impaired.

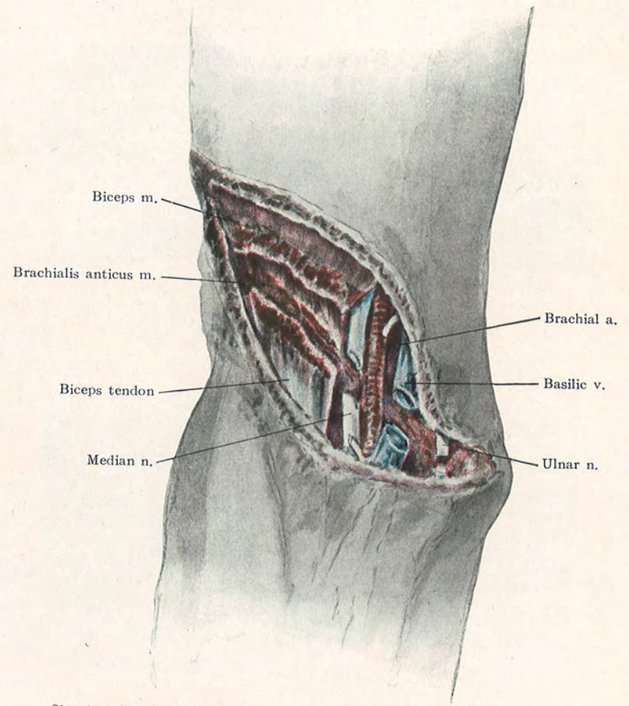
CASE IV.—*Incised wound of forearm, flexor surface, involving the tendons of the flexor carpi ulnaris, palmaris longus, flexor sublimis digitorum, flexor profundus digitorum, excepting the division to the index and middle fingers, the ulnar artery, and the median ulnar nerves; multiple tenorrhaphy, neurorrhaphy.*

E. P., thirty-seven years of age, machinist. Accident occurred January 18, 1911. Patient, while at work at Cramp's shipyard, was struck on flexor surface of right wrist by a piece of a falling arclight globe.

Examination on admission showed a transverse incised wound about two inches in length on the flexor surface of the right forearm one inch about the hand. Through the separated edges of the wound were seen the cut ends of the ulnar and median nerves, the cut ends of the ulnar artery, the divided ends of the tendons of the flexor carpi ulnaris, the palmaris longus, the flexor sublimis digitorum, and the flexor profundus digitorum, excepting the divisions to the index and middle fingers.

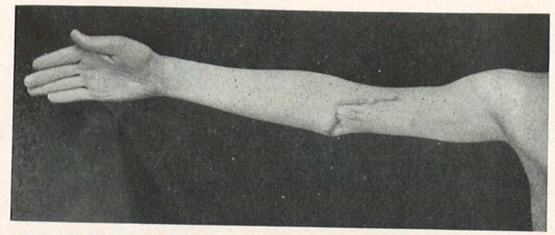
The operation was performed by the Resident Physician, Dr. McBride, without an anæsthetic, as the patient refused an anæs-

FIG. 5.



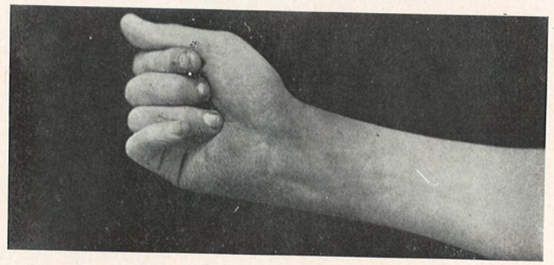
Showing the extent of the lacerated wound and the involved structures. (Case III.)

FIG. 6.



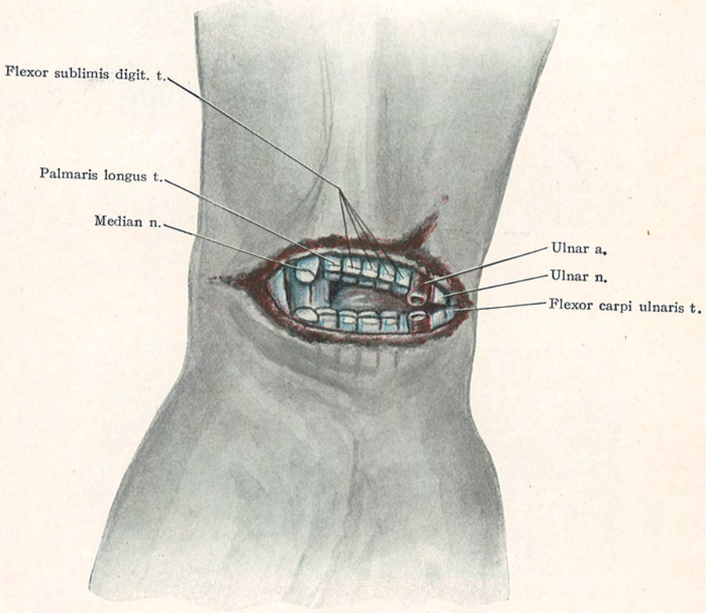
Showing the healed wound, the muscular atrophy, and the degree of extension of the hand. (Case III.)

FIG. 7.



Showing the degree of flexion possible. (Case III.)

FIG. 8.



Showing the extent of the incised wound and the involved structures. (Case IV.)

FIG. 9.

Showing the healed wound and the amount of extension. (Case IV.)

FIG. 10.

Showing the degree of flexion possible. (Case IV.)

thetic. The arm was cleansed with soap and water and alcohol 70 per cent., and the wound irrigated with hot normal saline solution. The severed tendons were united individually with two interrupted sutures of silk, the cut ends of the nerves were united with interrupted silk sutures, the ulnar artery was ligated, the wound closed with interrupted silkworm gut sutures, a dry sterile dressing applied, and the hand dressed in extension on a splint. The wound healed by primary union, the sutures were removed on the eighth day and the splint at the end of two and a half weeks. Massage and passive motion were then instituted.

Examination March 30, 1911, showed the affected tendons to be firmly surrounded by scar tissue and united with the cicatrix of the skin; flexion of all the fingers was limited, particularly that of the ring and little fingers; cutaneous anæsthesia of hypothenar portion of the palm of the hand and the outer side of the ring and of the little fingers. There was marked tremor of the hand, which was cold and perspiring; the finger nails were moderately darkened, irregularly ridged, and longitudinally striated. The skin of the hand was thin, shiny, and bluish white. The scar was very tender and supersensitive. (In this case there is evidently separation of the cut ends of the ulnar nerve and a secondary nerve suture will be required.)

CASE V.—*Incised wound of the flexor surface of the forearm one inch above the wrist-joint, involving the tendons of the flexor carpi ulnaris, the palmaris longus, the flexor carpi radialis, the flexor longus pollicis, the flexor sublimis digitorum, the flexor profundus digitorum excepting the divisions to the ring and little fingers, the median and ulnar nerves, and the ulnar artery; multiple tenorrhaphy and neurorrhaphy.*

F. N., thirty-seven years of age, machinist. While at work the patient fell a distance of about 15 feet onto a skylight, the latter breaking, and he received an incised wound of the right wrist in addition to other injuries. Admitted to St. Mary's Hispital August 3, 1910. Treated by Dr. Wolf, Resident Physician. Ether anæsthesia.

Examination on admission showed a transverse lacerated wound about two inches in length of the flexor surface of the right forearm about one inch above the hand. Separation of the edges of the wound showed complete division of the flexor carpi

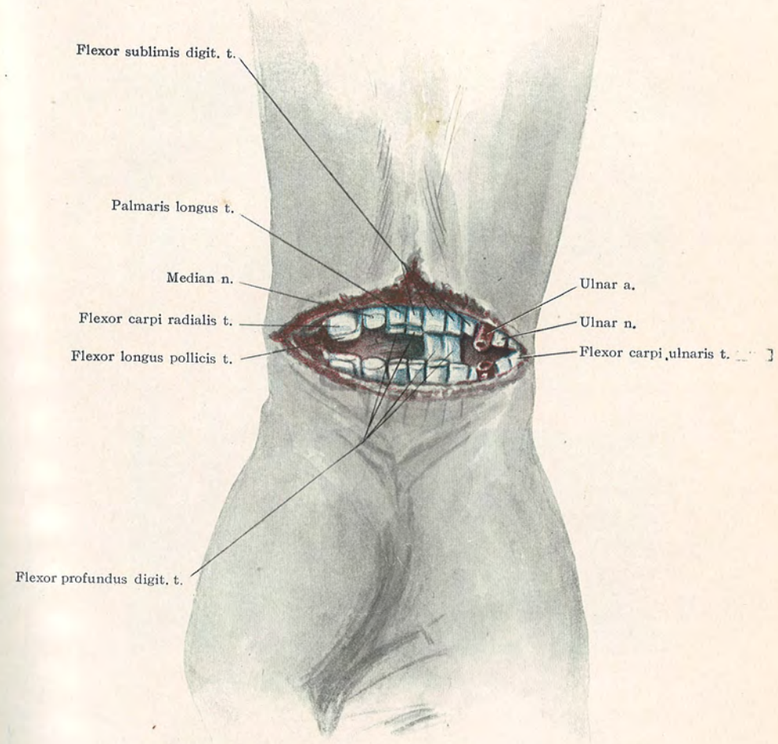
ulnaris, the palmaris longus, the flexor carpi radialis, the flexor longus pollicis, the flexor sublimis digitorum, the flexor profundus digitorum excepting the divisions to the ring and little fingers of the latter; division of the median and ulnar nerves; and of the ulnar artery.

The forearm was thoroughly cleansed with soap and sterile water and alcohol 70 per cent. The wound was then irrigated with hot normal salt solution. The wound was then enlarged; the divided tendons were united separately with interrupted sutures of No. 1 chromicized catgut; the ulnar artery was ligated, and the divided ends of the median and ulnar nerves were separately united with through-and-through interrupted sutures of No. 1 chromicized catgut. The wound was then closed by interrupted sutures of silkworm gut. A dry sterile dressing was applied, and the hand and fingers placed in a position of marked flexion. The wound did nicely until the fourth or fifth day, when it was necessary to remove several sutures on the radial side of the wound, and it was found that there was a moderate degree of suppuration present which eventually resulted in a partial sloughing of the tendon of the flexor longus pollicis and separation of the cut ends. At the end of three weeks the wound had entirely healed. The patient has had very thorough and efficient massage since leaving the hospital, and is now at work.

Examination March 30, 1911, showed very little atrophy of muscles, extension of the fingers was good, excepting that of the distal phalanges; extension of the thumb was limited by the fixation of the distal end of the flexor longus pollicis at the wrist, and flexion was absent for the same reason; and in addition it was apparent that the site of suture had given way, and the cut proximal end had retracted. Flexion of the fingers was good in all, but was still somewhat diminished in the ring and little fingers. Complete flexion was limited by adhesion of the tendons at the site of the injury. Trophic changes were still present, although rapidly diminishing on the fingers; the flexor surface of the fingers felt cold, also tips on extensor surfaces, skin was atrophic, and nails were slightly roughened and longitudinally striated.

The most common cause of incised and lacerated wounds of the extremities is from machinery accidents, gunshot wounds,

FIG. 11.



Showing the incised wound and the involved structures. (Case V.)

FIG. 12.

Showing the degree of extension possible in the fingers, and the fixation of the thumb (Case V.)

FIG. 13.

Showing the degree of flexion possible. (Case V.)

explosions, cuts from scythes, glass, and sharp cutting instruments. In these accidents there is not only division of the superficial structures, but generally also division of muscles, tendons, blood-vessels, and nerves. In addition to the injury of the special structures there is very frequently, in lacerated wounds, a considerable destruction of the skin.

On first examining these wounds many problems are to be considered, dependent upon the extent of the wound and the structures involved. In the severe lacerated and incised wounds, where formerly amputation was the justifiable procedure, to-day entire parts are saved, useful limbs are preserved, and good functional results obtained by suture of muscles, blood-vessels, nerves, and tendons. Very frequently considerable judgment is necessary to come to the best possible conclusion, and in some cases operative procedure should be delayed on account of the shock so frequently present in many of these cases. Our primary interference should be limited to moderate cleansing, the removal of imbedded portions of clothing and foreign bodies, the ligation of small arteries, and an antiseptic dressing applied to the parts until the patient has thoroughly recovered from shock.

One of the most important problems in the treatment of these wounds is that of infection introduced at the time of the accident, either from the patient's clothing, his skin, or from the foreign body that produced the wound. Another very important consideration is the period that has elapsed from the time in which the wound was received and the time of seeing the patient. These two points have a great determining factor in the production of infection. In the treatment of these wounds they must all be generally considered as infected. We, however, know that very many of them can be thoroughly cleansed, and that they will heal by primary union. This is especially so of incised wounds. It is only from experience that we learn which ones should be drained, and which will probably heal without drainage. The chief infections to be feared are tetanus, streptococcus, gas bacillus, and staphylococcus forms. The great determining factors in the production of

infection are the condition of the parts, clothing, and trauma at the time of the injury. A secondary determining factor in the extent of infection is the amount of the destruction of tissue produced by crushing. In addition to infection the most dangerous immediate effect of these wounds is hemorrhage. Fortunately to-day our means of combating hemorrhage are very efficient, and in the use of normal saline solution by hypodermoclysis, proctoclysis, intravenously, and in the more urgent cases by direct blood transfusion we are generally able to meet all of these cases successfully, if the patient is seen early enough and there is not too great a degree of shock present.

In many of these wounds the chances of primary union are not good unless they are caused by clean, sharp cutting instruments and thorough cleansing of the parts is instituted. In a large majority the edges of the wound are primarily grossly infected, crushed, and devitalized, and in spite of the most thorough cleansing, dirt and grease cannot be entirely removed from the skin, and the edges of the wound in its entire depth have been so badly devitalized that either sloughing occurs in clean wounds or the resistance of the parts has been so lowered that infection readily occurs. An interesting form of treatment in these cases is that suggested by Reclus, who prefers never to irrigate with antiseptic solutions, who does not advise primary closure of the wound, and who dresses the wound with antiseptic ointment of vaseline 300, antipyrine 5, boric acid 3, salol 3, iodoform 1, carbolic acid 1, bichloride of mercury 10. He irrigates the wound with hot water under high pressure and then places the above ointment directly to the wound. In the treatment of these wounds I think that the best results are to be obtained from the following methods: thorough washing with soap and water, shaving the entire part, a second washing with soap and water using a firm brush, then washing the parts with alcohol 70 per cent. for two minutes, and in cases where the skin is covered with grease or any other oily substance to wash with ether. The wound should be thoroughly irrigated with hot normal saline solu-

tion, all foreign particles removed, and all badly soiled and devitalized tissue should be cut away with a sharp knife.

After the above cleansing has been performed, a careful examination of the wound should be made for divided muscles, tendons, blood-vessels and nerves. The thorough approximation of these structures, especially the last two, is very important. Very often it will be found necessary to enlarge the superficial wound and to make a rather extensive dissection before the divided ends of all of the cut structures can be found. When deliberate suture has been performed, drainage of the wound must depend upon the degree of soiling by infectious material, the length of time that has elapsed since the accident, the amount of pressure destruction of the edges of the wound, and its position. The importance of a careful search for cut structures cannot be too greatly emphasized. How frequently do we see cases of comparatively trivial superficial wounds, in which division of important tendons and nerves has not been recognized until the resulting paralysis and atrophy call our attention to the nature of the injury!

EXPERIENCES IN THORACIC SURGERY UNDER ANÆSTHESIA BY THE INTRATRACHEAL INSUFFLATION OF AIR AND ETHER.

WITH REMARKS ON THE VALUE OF THE METHOD FOR GENERAL ANÆSTHESIA.

BY CHARLES A. ELSBERG, M.D.,

OF NEW YORK.

Professor of Clinical Surgery, University and Bellevue Medical College Hospital.

About two years ago, Meltzer and Auer first described the method of artificial respiration by the intratracheal insufflation of air. In later publications they showed that in animals the method was of great value for experimental investigations in which one or both pleural cavities had to be opened. They described a very simple method by which the animals could be anæsthetized by intratracheal insufflation of air and ether, and expressed their belief that the method would be of great value for thoracic surgery in the human being. Soon afterward, Carrel made use of the method for his operations upon the heart and aorta of dogs, and recommended it for intrathoracic experimental work. At the same time, the writer had been making a large number of investigations on dogs, and with the aid of Dr. Neuhof had performed a not inconsiderable number of operations upon the lungs, the bronchi, and the œsophagus in these animals. Thus we removed one or several lobes of one or both lungs, made incisions into bronchi, with subsequent suture, etc. In all of these operations the method of intratracheal insufflation worked admirably. One or both pleural cavities could be widely opened, and all the necessary intrathoracic manipulations performed and the animals remain in good condition throughout the operations. After the thoracic wall had been closed by suture and the intratracheal insufflation stopped and the intratracheal tube removed, the animals began to breathe again in a perfectly normal manner. Unless death occurred from sepsis or fol-

lowed from an unsuccessful operative procedure, the animals recovered entirely. When the dogs were killed days, weeks, or months after the operations, the larynx, trachea, and lungs were found in perfectly normal condition.

As has been described in previous papers, the insufflation was carried on by means of a very simple apparatus which had been devised by Meltzer and Auer, and no care was taken to filter, warm, or moisten the air which was blown into the trachea. Nevertheless no lesion could be found post mortem in the respiratory tract of these dogs. The anæsthesia was a very good one and seemed to be absolutely devoid of danger. It is well known that it is easy to kill a dog by means of ether given by inhalation, but we have found it impossible to kill the animals with ether given by intratracheal insufflation. This safety is probably due to the fact that so much of the ether escapes upward in the trachea and out through the larynx and mouth.

In previous papers, I have described a simple and portable apparatus for intratracheal insufflation anæsthesia in man. In what follows I shall give an account of our experiences with the method for general anæsthesia and shall report upon the cases of intrathoracic surgery which we have had up to the present time.

The Value of Insufflation Anæsthesia for General Surgery.—We have, at Mt. Sinai Hospital, New York, anæsthetized about 200 patients by means of intratracheal insufflation, and have found the method very valuable for a great many operations. In all but a few cases, the anæsthesia was a very satisfactory one, particularly free from complications and after effects. It is very easy to keep the patients under full anæsthesia, vomiting has never occurred during the anæsthesia, and the patients were never too deeply under the ether. At the conclusion of the operations, the patients awakened very rapidly, especially if pure air was insufflated for a few minutes before the intratracheal catheter was withdrawn. Vomiting after the operation was very unusual no matter what the surgical procedure that had been performed, and the pa-

tients never complained of pain or discomfort in their laryngeal regions. We have thus far not seen any pulmonary complications after insufflation anæsthesia.

In one patient, we failed to obtain complete muscular relaxation so that the necessary intra-abdominal manipulations could be accomplished.

In the case of a young girl, who was to be operated upon for chronic appendicitis, it was found impossible to cause complete relaxation of the abdominal walls. We finally attempted to obtain complete anæsthesia by means of ether given by inhalation, but the patient still struggled. Only when chloroform was given by inhalation was perfect relaxation obtained.

This patient was evidently one who was refractory to ether. It is possible that the intratracheal tube that we used was too small, so that too much of the air and ether mixture escaped by the side of the tube.

Operations under insufflation anæsthesia were performed upon patients suffering from a variety of acute and chronic surgical diseases. Our experience up to the present time will allow us to mention the following operations in which we have found the anæsthesia of especial value. In operations upon the neck and more especially those around the trachea such as thyroidectomy, the method is very useful. Not only is the anæsthetizer never near the field of operation, but the operator can work around the trachea without causing any interference with the breathing. There is no danger of sudden collapse of the trachea when a large goitre has been removed, and no matter how much the trachea is handled, the anæsthesia continues smoothly and evenly. Intratracheal anæsthesia should be very advantageous for the operation of laryngectomy. The intratracheal tube could either be introduced through a tracheotomy wound and the trachea packed with gauze above this point, or the tube could be passed through the glottis in the usual manner, and removed only at the moment when the trachea is to be divided across after the entire larynx is free.

We have found that operations upon the face and jaws

and mouth, where the buccal cavity or pharynx has to be invaded, are made more easy and safe when done under insufflation anæsthesia. No blood or secretions can run down the trachea, for the out-flowing current passing upward in the trachea blows out any fluid that might run down into the larynx.

In operations upon the brain and spinal cord where the patient must often be placed in the prone position, the anæsthesia is very useful. As soon as the intratracheal tube has been introduced and the insufflation has been begun, the patient's head and body can be placed in any position desired and the anæsthesia given from a distance. The anæsthetizer need not be seated underneath the table as is ordinarily necessary.

Experiences with Insufflation Anæsthesia in Thoracic Surgery.—Insufflation anæsthesia is a positive pressure method and was primarily suggested for intrathoracic surgery. On account of the simplicity and apparent safety of the method it may take the place of all the more complicated positive and negative pressure cabinets. The operations upon animals gave such very satisfactory results, that we were very hopeful that the method would give as good results in thoracic operations in the human being. We were very careful in our first human operations, but, with increasing experience, have gained more and more confidence in the efficiency of insufflation in man. In the following are recorded the experiences we have had up to the present time:

CASE I (Reported in the ANNALS OF SURGERY, July, 1910).—*Abscess of the lung; thoracotomy and aspiration of the lung under intratracheal insufflation. Recovery.*

B. F., a butcher, fifty-five years of age, was referred to the II Surgical Service by Dr. Manges with the diagnosis of an abscess of the middle lobe of the right lung.

February 14: The patient was anæsthetized with ether, and the attempt was made to introduce a small catheter into the trachea. The patient took the ether very badly, and I did not have on hand the proper kind of a tube nor the necessary instruments for the intubation. After a number of unsuccessful attempts to pass a catheter through the larynx we determined to put off the intubation until a later time. The operator (Dr. Lilienthal) then resected four inches of the eighth and ninth ribs and packed the wound cavity with gauze.

February 20: Operation by Dr. Lilienthal, intratracheal insufflation by Dr. Elsberg. Ether anæsthesia; larynx and pharynx thoroughly anæsthetized with cocaine. A soft rubber tube, No. 28 French scale, was passed through the glottis by means of a laryngeal forceps and pushed downward until a slight resistance was encountered. The tube was then fixed to the upper teeth by means of a gag. The tube was connected with the insufflation apparatus and a mixture of air and ether blown in under a pressure of 15 mm. of mercury. The patient began to cough violently, therefore the intratracheal tube was withdrawn about one inch. The coughing ceased at once, and at the same time all evidences of mucus in the trachea or pharynx disappeared. The patient's color was good, respirations regular, pulse of good quality. The patient was now turned on the left side and the operation begun.

3.10—No cyanosis, pulse 120; incision 12 cm. in length into right pleural cavity; pulse unchanged, color good, no cough. Pressure of current now raised to 20 mm. Palpation of the lobes of the right lung.

3.20—Pulse 108; respirations 48; color good with slight cyanosis; pleural cavity is wide open.

3.25—Heart action excellent; pulse 96; color good, no cyanosis; aspiration of middle lobe of lung.

3.30—Pulse 105; respirations 42; color good.

3.35—Pulse 108; respirations regular, 40. The current of air is interrupted several times in order to observe the appearance of the lung. When the current is prevented from entering the intratracheal tube the lung collapses and is of a dark green mottled color; when the lung is markedly distended (25 mm. pressure) the lung is of a bluish color with areas of red. When the lung is collapsed the œsophagus and aorta can be seen and examined.

3.40—Suture of incision in pleura. While the last stitches are being passed the pressure is raised to 30 millimetres in order to slightly overdistend the lung so that as little air as possible shall remain in the pleural cavity.

3.45—Pleura closed with small drain; pulse 132 and of good quality.

3.50—Color good, no cyanosis; respirations 32.

3.55—Suture of muscles and skin; voluminous dressing. The intratracheal tube is withdrawn. Pulse now 120, of good quality; respirations regular, no cyanosis.

Four minutes after the patient was taken to his bed he was awake. He said that he did not have any pain in his larynx; he was not hoarse. The morning after the operation the patient was in very good condition. He complained of some pain in the right chest and had considerable mucopurulent expectoration. He was not hoarse and did not complain of any pain in his laryngeal region. The auscultation of the right side of the chest through the bandages was not satisfactory, but breathing sounds could be heard over the entire side.

From this time on the patient steadily improved, the cough and expectoration grew less daily; he was out of bed on March 10 and was discharged from the hospital with his wound almost healed on March 25. When last seen (April 22) he was in excellent condition; the breathing sounds over the right side of the chest seemed normal; he had almost no cough and practically no expectoration; he had gained considerable flesh and strength.

The patient returned to the hospital about six months later on account of a large pulmonary hemorrhage. He had another large hemorrhage from the lungs soon after his admission, to which he succumbed. No autopsy could be done.

CASE II.—John H., fifty-two years of age, admitted to Mt. Sinai Hospital on January 2, 1911, with the history of increasing difficulty in swallowing for ten months. He had lost 40 pounds in weight and was able to swallow only small quantities of fluids. The stomach tube was arrested 12 cm. from the teeth, and an X-ray picture taken after the ingestion of bismuth showed a marked narrowing of the œsophagus at this point.

On January 7 the patient was anæsthetized with ether in the usual manner, a catheter No. 24 French introduced into the trachea, and intratracheal insufflation begun. The patient was turned on the right side, and an incision was made in the seventh intercostal space from the costal cartilage in front to the angle of the ribs behind (Dr. Elsberg). The incision was deepened through the muscles until the pleura was exposed. The lungs were now momentarily collapsed while the incision in the pleura was made. The ribs were now drawn apart by means of the rib spreader and the left pleural cavity widely exposed. The lungs were of a mottled pink color and moderately distended (pressure 30 mm.). Pulse slow and of good quality; very superficial respiratory movements. The lung was now carefully drawn toward the median line and the pericardium exposed; this was also drawn to the right so that the root of the lung was visible as well as the aorta and the œsophagus with the left vagus nerve.

About five inches above the diaphragm there was a hard nodular tumor of the œsophagus of the size of a large plum. There were no enlarged glands at the root of the lung. The tumor was free on all sides excepting where it lay against the aorta. The attempt was made to free it from its attachments to the aorta, but this was found impossible without great danger to the wall of the vessel. The tumor was, therefore, considered inoperable.

The incision in the pleura was closed by a fine running cat-

gut suture, with interrupted sutures of strong catgut around the adjoining ribs. When the last stitches in the pleura were being passed, the anæsthetizer was instructed to raise the pressure to 50 mm. of mercury, so as to distend the lung and expel as much air as possible from the pleural cavity. Then followed suture of the intercostal and pectoral muscles and skin in the usual manner. Large vaseline gauze dressing.

During the entire operation, which had lasted 57 minutes, the patient was in good condition; color of face pink, breathing superficial, pulse of good quality. Insufflation of pure air for three minutes at end of operation; then removal of intratracheal catheter.

Five minutes later the patient was awake and responded to questions. Four hours after the operation the respirations were 24 to the minute, and upon auscultation through the dressings, breathing sounds could be heard all over the left chest.

Convalescence thereafter was smooth and uncomplicated; the patient never had any respiratory difficulty; his pulse and respirations were practically normal; he was sitting up in bed on the third day after the operation.

On the evening of the sixth day after the operation, his temperature suddenly rose to 102°, and he suddenly complained of severe pain in the left chest, his pulse became very rapid and feeble. In spite of active stimulation he soon went into a condition of collapse and died a few hours later.

The post-mortem examination showed that there had occurred an infection of the pleural cavity by direct extension from the ulcerated carcinoma of the œsophagus.

Remarks.—From the stand-point of the insufflation, the operation was highly successful, and all the manipulations within the chest were accomplished with perfect ease. The lungs were distended and collapsed at will, and all parts of the pleural cavity could be well exposed. At no time was the operator disturbed by violent movements of the lung; the slight respiratory movements which the patient made were not at all communicated to the lung, which remained practically immobile. The fatal outcome was probably due to an infection from the ulcerated tumor, although an operative infection may have occurred.

CASE III.—*Abscess of the lung in a man of twenty-four years. Chronic abscess of the middle lobe of the right lung.* Marked cyanosis during the preliminary ether anæsthesia by inhalation. Color became good as soon as the insufflation anæsthesia was begun; pulse good during the entire operation. Thoracotomy; incision of the lung; drainage of an abscess cavity in the middle lobe of the right lung (Dr. E.). Uncomplicated convalescence with persistence of bronchial fistula. Death after several months from a metastatic abscess of the brain.

CASE IV.—Female. *Bronchiectatic abscess of the right lower lobe.* Thoracotomy and exploration of the lung (Dr. E.) under insufflation anæsthesia (pressure 25 to 35 mm.). Condition of patient good during entire operation. The abscess cavity had emptied itself before the operation and could not be found.

CASE V.—Female. *Metastatic abscess of the lung after an infarct following another operation.* Intratracheal insufflation, thoracotomy and drainage of abscesses in left upper and lower lobes (Dr. E.). Condition of patient during operation good. Breathing movements ceased as soon as pressure is raised to 40 mm. of mercury. Recovery from the operation rapid and uncomplicated, but fever persisted. Patient died about six weeks after the operation. The autopsy showed that there were numerous abscesses that had not been drained.

CASE VI.—Female. *Interlobar empyema.* Thoracotomy and drainage under insufflation anæsthesia (Dr. Gerster [1]). Recovery.

CASE VII.—Female. *Gangrene of the lung.* Intratracheal insufflation anæsthesia. Marked cyanosis during preliminary anæsthesia; insufflation of air, oxygen, and ether. Color pink after insufflation was begun. Thoracotomy and drainage of gangrenous areas in right lung (Dr. Gerster [1]). Insufflation anæsthesia very satisfactory; satisfactory recovery from the operation itself. Death about one week after the operation from exhaustion from the sepsis.

CASE VIII.—Male. *Interlobar empyema.* Intratracheal insufflation. Thoracotomy and drainage (Dr. E.). Insufflation anæsthesia very efficient; lungs could be distended and collapsed at will. General condition of patient remained good during the entire operation. Uncomplicated recovery.

[1] I am indebted to Dr. A. G. Gerster for permission to include his two cases.

CASE IX.—Female, operated upon in Worcester, Mass. *Recurrent carcinoma of chest-wall* after extirpation of breast for carcinoma seven years before. Insufflation anæsthesia; catheter No. 24 F. used; pressure 25 mm. of mercury. Radical extirpation of affected area of right chest-wall with parts of two ribs and of the sternum. Large opening in right pleural cavity. When pleura was opened, lungs were found moderately distended and immobile. Opening in pleura closed by continuous suture of fine catgut; while last stitch was passed pressure raised to 40 mm. so as to expel as much air as possible from the pleura. Suture line of pleura covered by a muscle flap from the serratus. Suture of skin with the aid of plastic flaps; large vaseline dressing. Anæsthesia and operation uncomplicated; pulse 90 to 100 during operation; slight respiratory movements during entire insufflation. Patient awake before she had been removed from the operating table. Convalescence thus far uneventful.

In all of the thoracic operations above reported, as well as in a large number of thoracotomies for empyema that we have done, the anæsthesia was a very good one. In not a single instance were any changes in the patient's condition observed when the pleural cavity was first opened; the pulse remained regular and of good quality and the patient's color remained good. In several of the cases, there were adhesions between the visceral and parietal pleuræ, but in most of the patients whose histories are given above, there were no adhesions, and the practically normal pleural cavity was invaded. We have not yet had occasion to operate upon a patient in whom both pleural cavities have to be opened. Such a case would be the supreme test of intratracheal insufflation. There is, however, every justification for the belief—based upon the results of animal experiments in which both pleural cavities were widely opened, and upon the experiences we have had with insufflation as a method of artificial respiration in several patients in whom all respiratory movements had been abolished—that it will be safe to open both pleural cavities if necessary, as far as the dangers from the double pneumothorax are concerned. The cases here reported are too few to allow one to

draw final conclusions, but they do indicate that in the method of intratracheal insufflation we have at last a simple method for the avoidance of those dangers which have prevented the development of surgery of the intrathoracic viscera.

DR. W. W. KEEN said that eighteen months ago he had the pleasure of seeing Dr. Carrel at the Rockefeller Institute do a remarkable series of operations upon animals, using this method, with a very simple apparatus. The etherizer used the foot bellows, and there were two tubes, one going directly into the respiratory tube while by the other the air passed through a bottle of ether, with a clamp on each. Thus pure air or air with ether vapor could be used in any proportion. It was startling to see Carrel with one sweep of a large knife open widely both thoracic cavities, exploring lungs, heart, and pericardium without the slightest trouble. There was no disturbance of the circulation nor any change in the color of the animal so far as one could judge. Carrel was able then to handle the lungs and displace them and the heart freely. He then severed and anastomosed the aorta, first clamping the aorta above and below the point where he did the anastomosis. He had intended originally to introduce a piece of vena cava that had been in cold storage for a number of days, but the specimen proved not to be a good one, and finally he had to abandon this and sutured the two ends of the aorta to each other. The œsophagus was fully exposed and handled. The operation took about an hour and a quarter. The dog at no time was in the slightest apparent danger of death. The lungs were pink, and whenever it was deemed necessary a little more pressure was put on or the pressure was diminished at will, and finally when the operation was completed the lungs were considerably distended to displace all the air in the thoracic cavity, the walls of the thorax were sutured in layers, and in the course of two or three minutes after the conclusion of the operation the tube was withdrawn and the dog was breathing as naturally as if an abdominal and not a thoracic operation had been performed. Dr. Keen was very much struck at the time with the simplicity of the operation, with the possibility of doing almost any operation by means of this method. It is a vast improvement over the expensive differential pressure chambers. The usefulness of this apparatus will be broadened very much.

Dr. Charles H. Frazier said that he had recently witnessed a demonstration of this apparatus by Dr. Elsberg and he had been impressed with its effectiveness and the apparent freedom from risk. The operation, an appendectomy, was being performed by Dr. Elsberg's assistant. Dr. Elsberg gave his attention wholly to the apparatus which worked perfectly, and while it appears rather complicated, one should readily master its mechanism. It will replace general anæsthesia by the ether drop method in a number of instances, particularly in thoracic operations, in all operations in which the patient is in the prone position (face down) as well as in those about the buccal cavity where there is always danger of the possibility of the inhalation of blood with inhalation anæsthesia. Dr. Elsberg has shown by experiment that the force of the outgoing air is sufficient to prevent particles of blood, or as he used in his experiments lampblack, entering the trachea or bronchi. This is a very practical consideration and should not be lost sight of.

GIANT APPENDIX.

Dr. John A. Jopson showed a giant appendix vermiformis. The patient from whom he had removed it was a woman about fifty-eight years of age, exhibiting the symptoms of acute appendicitis, and who was operated upon the fourth day after the onset. The appendix was retrocæcal, pointing upward and adherent to the posterior surface of the cæcum and colon, and from its peculiar shape, size, and color, not easily recognized. It was separated from its attachment to the posterior wall of the cæcum, and when turned downward appeared as a large pouch communicating with the extremity of the cæcum, which was rather short. It lacked a mesentery, was white in color, and apparently undergoing necrosis, a sharp line of demarcation being present at its base. The base was crushed, ligated, divided, and the broad stump inverted by interrupted sutures. A drain was left in the wound to guard against leakage, but none occurred, and the patient, who suffered from chronic nephritis, made a good recovery. The appendix, which was quite empty, measured 7.5 cm. in length, by 4 cm. in diameter (Fig. 1). The wall was nearly a centimetre thick at the base, and there were two points of beginning perforation at the tip. Microscopic examination of sections was made by Dr. Speese, who furnished the following

Fig. 1.

Giant appendix vermiformis.

report: "The examination does not reveal any glandular tissue or any structure which is suggestive of the same. To some extent the section resembles the normal structure of the intestine, in that some lymphoid tissue is present and arrangements suggestive of the normal coats of the intestine. The outline of these areas is, however, greatly distorted, and the muscle tissue separated by granulation tissue, dense in structure and apparently of long standing. There is an organized exudate or what appears to be the serosa, and throughout the appendix blood-vessels are distended and leucocytic infiltration points to an acute exacerbation. It is noteworthy that many eosinophilic leucocytes are present in the tissues. The examination discloses a process which resembles the lesions of acute and chronic interstitial appendicitis."

The appendix in this case would seem to be a reversion to a primitive type, in which the differentiation between the cæcum and appendix was much behind that normally observed in the human subject. It was interesting to compare it with those observed in some of the lower animals, as figured in Huntingdon's diagrams, reproduced with additional drawings in Kelly and Hurdon's work. In their shape and proportions the cæcum and appendix in this case resembled somewhat those normally present in the aard-wolf, the harbor seal, the collared peccary, and the American tapir.

THE SURGICAL CLINIC OF THE PROTESTANT EPISCOPAL HOSPITAL OF PHILADELPHIA.

REVIEW OF 150 CONSECUTIVE OPERATIONS.

BY CHARLES HARRISON FRAZIER, M.D.,

OF PHILADELPHIA.

THE series of cases herein discussed represent the surgical experience at the Episcopal Hospital in a three months' service, excluding a not inconsiderable number operated upon by one of the assistant surgeons or internes.

Morbidity.—Of the 150 operations of our series almost 100 were for lesions of the abdominal organs. Of the total number there were four deaths, a mortality of about 2.5 per cent. Two of these four deaths, as will be seen, may properly be excluded, so that the mortality may be reckoned as 1.3 per cent. The series include 30 operations for appendicitis and its complications, 22 for hernia, 8 for lesions of the stomach or duodenum, 18 for operations on the pelvic organs with 4 hysterectomies, 4 operations on the biliary passages, 14 upon the urinary organs, and 3 thyroidectomies.

Of the four fatal cases one was a case of tuberculous meningitis, which because of certain focal phenomena was regarded before operation as a brain abscess. An exploratory craniotomy seemed justifiable. The patient survived the operation but a short time, and the autopsy revealed the true nature of the lesion. The second was a strangulated umbilical hernia in an aged patient almost moribund, who scarcely survived the initial incision. These two might be regarded as inoperable.

The third death followed a suprapubic prostatectomy and bilateral herniorrhaphy under spinal anæsthesia in a patient 75 years of age. The patient's condition at the end of the operation was excellent and continued so beyond the period at which post-operative shock would have developed. But his

vital processes gradually failed, and he died three and a half days after the operation. The fourth of the fatal series was in a patient who had been operated upon for gall stones. This case presented some interesting features and will be alluded to later.

Technic.—In the preparation of the field of operation the Grossitch or iodine method was used, preceded by a single preparation with soap, alcohol, and bichloride. The addition of iodine to the technic has so diminished instances of accidental infection that I am disposed to omit altogether any attempt at chemical disinfection with alcohol and bichloride. There was but one frank suppuration in our wounds, and in that instance there were a few small pustules at the site of the wound before the operation to which the infection may be attributed.

In the post-operative period, after operations with incipient or advanced peritonitis, after operations in the upper abdomen, and in all cases of advanced years with few exceptions, the patients were put in the sitting posture for at least 48 hours. This I believe minimizes the incidence of pulmonary congestion and in many instances adds materially to the comfort of the patient.

Proctoclysis was employed wherever for any reason the administration of water or liquids of any character by mouth was prohibited.

Anæsthesia.—The selection of an anæsthetic deserves much more attention than it receives at the hands of most surgeons. No matter how skilled the anæsthetizer may be in the administration of ether, there are certain cases where for the comfort and safety of the patient either spinal or nitrous oxide anæsthesia should be employed. While I do not believe nitrous oxide anæsthesia will ever come to be universally used as a substitute for ether, there are many occasions where it is an important factor in the saving of life. In cases of severe toxæmia, where patients are profoundly septic, as in some cases of gangrenous appendicitis, of peritonitis or gangrenous cholecystitis, in empyemata while resecting the rib, in supra-

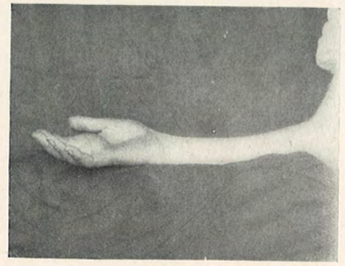
pubic cystotomy for drainage or stone, in kidney decapsulation or nephrectomies in septic cases, or in strangulated hernias; in all these, as in many other minor procedures, there can be no question as to the value of nitrous oxide anæsthesia. Its safety in competent hands is unquestioned; it relieves the patient of the ether discomforts, but above all it minimizes the risk of operation where life is hanging in the balance and the depressing effects of ether would be enough to turn the scale. Where abdominal relaxation is necessary, ether is substituted for a few moments until relaxation is obtained, returning to nitrous oxide.

Spinal anæsthesia, too, has its special indications, it seems to me, particularly in patients with pulmonary tuberculosis and in elderly people, where, because of valvular lesions or myocarditis, the administration of nitrous oxide may be not unattended with risk. In this series I used spinal anæsthesia in the following operations: a colostomy for inoperable carcinoma of the rectum; suprapubic drainage of a large abscess of the pelvic region in a septic patient; in a laparotomy for tubercular peritonitis and another for cirrhosis of the liver; in a suprapubic cystotomy; in a suprapubic prostatectomy; in the repair of a vesicorectal fistula. Scopolamine gr. 1/150 two hours before and morphine sulphate, gr. 1/6 one half hour before the operation so benumbs the sensibility of the patient, that, though conscious during the operation, he suffers from none of the ill effects which might come from fright in a wide-awake patient. From spinal and nitrous oxide anæsthesia there were no ill effects. The only serious complication occurred in an operation for hydrocele. The patient was an alcoholic; after a considerable quantity of ether had been administered without avail, chloroform was substituted, and just as the incision was made the heart stopped beating. Cardiac massage was resorted to by the transdiaphragmatic method, and in the course of a few moments feeble fibrillary contractions could be felt. Gradually the cardiac contractions became more perceptible and regular, and after ten minutes resuscitation was established. The abdominal wound was closed, and the operation on the hydrocele completed. The

FIG. 1.

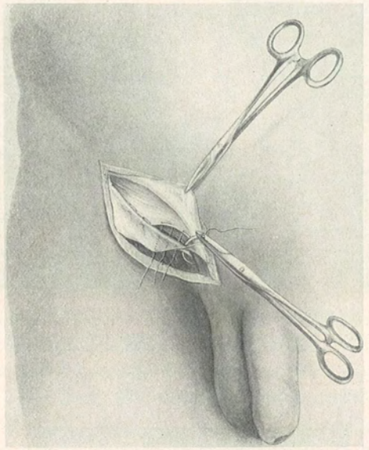
Photograph showing a fibrolipoma of the sartorius muscle mistaken before operation for a hernia. Note protrusion on the anterior surface of the upper portion of thigh.

FIG. 2.



Photograph of a congenital cavernous angioma of the hand with digital extensions.

FIG. 3.



Application of the sutures in the operation for radical cure of inguinal hernia.

FIG. 4.

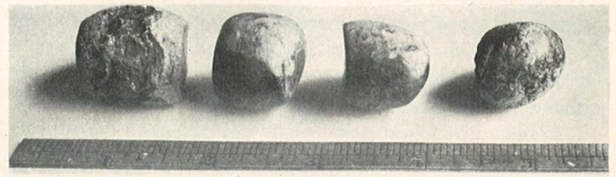
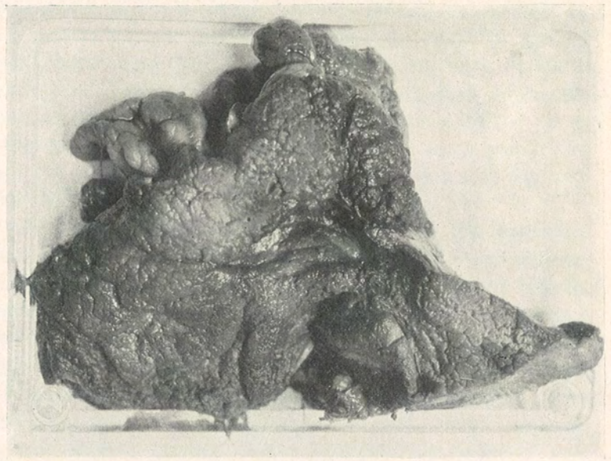


Illustration showing series of gall-stones arranged in column as they were found im bedded in a mass of inflammatory tissue after having escaped from the gall-bladder of a patient who had been free from symptoms until within two months of the date of the operation.

FIG. 5.



Portion of stomach removed, showing in centre of specimen the cavity of an indurated ulcer on the lesser curvature.

patient suffered no relapse, and the subsequent course of events was uneventful.

Tumors.—Curiously enough the district upon which the hospital draws for its material is not a fertile one for tumors. Relatively speaking there are few operations for cancer, exclusive of the uterus, and I have often attributed the paucity of malignant cases in the clinic to the popular impression among the less enlightened classes, that cancer is a disease of the blood and removed by operation always returns in some other place. Of the benign tumors there were three unusual enough to deserve mention. One was a lipoma in the belly of the sartorius muscle, about eight inches below Poupart's ligament (Fig. 1). The tumor protruded above the surface only when the patient contracted the muscle. On first examination the character of the lesion was not suspected; it was thought to be a muscle hernia. The second was a tumor of the breast, which, because of the associated enlargement of the axillary lymph-nodes, was thought to be either carcinoma or chronic cystic mastitis; but upon histological examination proved to be a fibroma. In the third case there was a large congenital angioma involving the palmar surface of the hand (Fig. 2) with digital extensions.

Appendectomies.—In the management of the appendix cases no hard or fast rules were laid down. It was not our practice to attempt to classify our cases as early or late to gratify the statistician, according to whether they were operated upon in the first 48 or 72 hours or later. In the acute cases with few exceptions the operations were performed as soon as the diagnosis was made. To this general rule there were certain exceptions. When the patient was first seen at the end or near the end of a mild attack we consulted our convenience as to the time of operation. Furthermore we advocated the starvation plan in a few cases of the following type: usually some time has elapsed since the onset of the attack; it may be only two days, more likely, however, three to five; the patient looks toxic, he is toxic; his pulse is rapid, over 120; the abdomen is distended and more or less tender everywhere; peristalsis has been altogether or par-

tially arrested, perhaps reversed with vomiting; restlessness and anxiety are written on the patient's face. In other words the infection is a wide-spread one. Sometimes this picture develops earlier, sometimes later, but whenever it comes I am convinced that the best results will be obtained by conservative practice, *i. e.*, by privation as to solids or liquids by mouth, proctoclysis, and posture.

One often hears or reads of bitter disputes as to whether the time limit between the early and late cases should be placed at 48 hours or later. Such discussions are futile, for early or late are but relative terms when applied to a given case. Each case must be a law unto itself, and no rules can be laid down comprehensive enough to allow for the innumerable variations.

It has been said, and very properly, that appendicitis is a surgical disease; no one denies it. The surgeon reserves as his privilege the right to decide upon the operability of a given case; that privilege is usually accorded him. In the exercise of this privilege he selects some cases for the Ochsner treatment and some of those cases may—before being operated upon—die. In the publication of his mortality statistics the surgeon usually excludes these. I believe, however, the time has come when the only means of determining the morbidity of appendicitis is to include in our death-rate those treated by both conservative and operative measures. We used to throw the responsibility on the medical men for all unoperated cases. But we cannot consistently do this any longer, if we take the stand, as I believe we should, that appendicitis is a surgical affection first, last, and always, and reserve the right ourselves to set aside a certain group, as I also believe we should, for conservative treatment. Having assumed entire responsibility for all cases, we must include in our statistics the fatal results in the unoperated as well as operated cases.

Irrespective of the appendices removed incidentally at other operations, there were 30 removed which were found at operation or in the laboratory to be diseased. There were no fatalities in this series, but *apropos* of what has just been said

of the mortality statistics I should refer to the case of a young man, who when first seen on the fifth day of the disease, was desperately sick. I declined to operate, and watched him carefully from day to day. Under the treatment prescribed his improvement with each 12 hours was marked, until four days later the distention had subsided to a marked degree, his tenderness had become circumscribed to the right iliac fossa, the pulse fell to 70, and the clinical picture was transformed from one of general to one of local peritonitis. I had planned to operate on the following day, but in the course of the early morning hours, the patient without warning developed signs of collapse from which he did not rally. No autopsy was performed and the cause of death was a mystery. At the same time it should occupy just as conspicuous a place in my statistics as a death following operation.

The technic of the operation calls for little if any comment save with reference to the matter of drainage. In this I find myself using drainage in an increasingly smaller number of cases, and when drainage is required using less drainage material, rarely anything but split rubber tubing with a wick of gauze. The fundamental principle in draining the peritoneal cavity is the relief of pressure afforded by the opening in the abdominal wall. This need not be larger than to accommodate one or two full sized drainage tubes. I no longer have a wound entirely open and filled with gauze, and I close wounds without drainage sometimes even when there is a small accumulation around the appendix, thoroughly disinfecting the region with alcohol.

Hernia.—Of the hernia series there were 22 cases, of which 13 were indirect and 3 direct inguinal, 2 recurrent, 1 femoral, 2 ventral, and 1 umbilical. There were no unusual types except an irreducible omental hernia in a young adult, a case in which the diagnosis was not established until the operation. Without impulse it presented the earmarks of a lipoma. Of the series there was one fatal case in a large strangulated umbilical hernia of four or five days' duration, in the person of an aged woman who was generously referred to my service by a practising surgeon of a neighboring hospital. The pa-

tient was almost moribund at the time, and did not more than survive the hasty attempt to expose and free the contents of the sac.

The method of procedure in the inguinal type varied according to the character of the hernia; in some instances the simple Ferguson, in some the Bassini, and in others the imbricating method of Andrews was used. In the selection of the method I have always tried to observe the general principle of disturbing in the least degree the normal anatomical relations. Thus in the hernias of children and the incipient hernias of young adults where the rings are not large and the musculature all that could be desired it is not necessary to transplant the cord. After isolating the sac and freeing the neck from its attachments and ligating it an inch beyond the margins of the internal ring, the internal oblique and conjoined tendon were sutured to Poupart's ligament without transplanting the cord; and the wound in the external oblique sutured without imbrication. In complete hernias of longer duration with larger rings the Bassini method was adopted. The remaining group included hernias of still longer duration, where the rings are more or less approximated, all direct hernias, all hernias in elderly people with musculature flabby and without tone, and hernias in which the conjoined tendon is altogether obliterated. Here I invariably resorted to the imbricating method of Andrews, in some cases splitting the sheath of the rectus and using either the belly of the muscle or flap of the sheath to fortify the defective area at the lower portion of the canal. This operation in this particular group is vastly superior to the Bassini method and should always be given preference. In all the operations, the incision in the external oblique is made a little above, instead of directly over, the canal and carried down as Judd recommends above and to the inner side of the internal pillar of the external ring so as to leave this structure intact. In introducing the deep mattress sutures in the reconstructive stage, my practice differs somewhat from the conventional procedure, in that I introduce the needle from the external aspect of the shelving edge of Poupart's ligament, and the knot is tied

in the outer rather than the inner aspect (Fig. 3). This is a matter of but minor consideration, but has been adopted because it avoids the splitting or tearing of the edge of Poupart's ligaments, which sometimes happens when traction in the suture is made to approximate the edges. For this suture I prefer to use a double strand of No. 0 or No. 1 catgut to a heavier single strand, as I always feel a little more confident of the sterility of the finer material.

We are gradually being weaned from the tradition that gall-stones are innocuous in many instances throughout life to be discovered only at autopsy. That many cases of cholethiasis have been treated for many years for stomach trouble we know too well, but in exceptional instances one runs across a patient in whose history there is nothing either indicative or even suggestive of the existence of gall-stones.

Such was the case in K. S., aged fifty, who told me she had never been sick in bed, that she had never been treated for dyspepsia, and had none of the digestive disturbances so common in cholelithiasis much less any of the acute exacerbations of biliary colic or subacute cholecystitis, at least until two months before the operation, when she had attacks of pain in the upper abdomen which had confined her to bed for a while. I questioned her myself with great care, as the physical signs pointed to the biliary passages. There was a mass in the abdomen about the size of a fetal head, extending from the margin of the ribs to the umbilicus. It did not move freely with respiration, and was not continuous with the margin of the liver. Through a right rectus incision I came down at once upon a mass, surrounded by adhesions, which were separated with great difficulty. Finally a cavity was opened containing pus and four large gall-stones (see Fig. 4). These were firmly imbedded in the inflammatory mass, arranged in single column, and faceted at either end where they were in direct contact. There was no escape of bile at any time, and nothing which could be identified as a gall-bladder was seen. The gall-stones, which must have been there months if not years, had ulcerated through the gall-bladder and became imbedded in a mass of inflammatory tissue. For two days the patient's condition was most satisfactory, but on the third day there was for the first time a copious discharge from the wound, which was

believed to be bile. On the fourth day 90 ounces of this fluid were collected.

Her pulse was growing more rapid and weaker, her skin leaky. I was at a loss to account for her rapidly failing strength. I began to suspect the fluid draining in such quantities was not pure bile; specimen examined disclosed hydrochloric acid, and further investigation pointed to a fistulous communication with stomach and duodenum, probably resulting from the trauma incidental to the liberation of the gall-stones from the inflammatory bed. The patient was taken to the operating room again, and through a left rectus incision our suspicions were confirmed. The tissues about the perforation were so fragile that it could not be satisfactorily closed with sutures. Accordingly a gastrojejunostomy was performed and the pyloric outlet closed. The patient did not react and died the following day. Had the true nature of this lesion been recognized sooner, I cannot but feel she would have survived the second operation.

Of the lesions of the upper digestive tract there were in all nine cases, two gastric carcinomas, two gastroptoses, three gastric and two duodenal ulcers. All were operated upon and there were no fatalities. It is interesting to note that in the ulcer cases the proportion of males to females was four to one, a further evidence of the greater prevalence of ulcer in the male sex.

Before discussing the operative procedures in this series I will refer to some interesting facts bearing upon the diagnosis and symptomatology.

In one case, B. F., an engineer, fifty-five years of age, the pre-operative diagnosis was cholelithiasis. There was a history of stomach trouble covering a period of two years, with bilious attacks and occasional vomiting; the patient stated that he had been jaundiced off and on, that his stools had been clay colored, and that discomfort followed eating. There was some rigidity and tenderness over the gall-bladder, and the scleræ were jaundiced. At the operation a typical saddle-back ulcer was discovered, with an unusually extensive infiltration of the gastrohepatic omentum. To the encroachment of this upon the common duct we attributed the signs of obstructive jaundice which led us astray in the diagnosis. The ulcer-bearing area with a portion of the gastrohepatic omentum was resected, and all the symptoms, including those of common duct obstruction, disappeared (see Fig. 5).

The unreliability of the gastric analysis in the diagnosis of gastric or duodenal ulcer or cancer was forcibly illustrated in our cases. As to the presence of hyperacidity or of occult blood in the contents of the stomach or bowel, I am becoming more and more convinced that to wait for such laboratory indications of ulcer is unjustifiable in the presence of a reasonably clear history. It is after all the history upon which we must place the most reliance, and upon which our decision for or against operation must be founded. Unfortunately the "history," so called, is often not an accurate record of the development of the disease in chronologic order, but a collection of isolated facts forced from the patient by a system of cross-examination at the hands of one who often approaches the case with preconceived notions as to the diagnosis and conducts his examination accordingly. A better term, as some one has recently pointed out, is anamnesis, which implies a record of the disease from the patient's recollection, and if the patient is intelligent enough it should be written by the patient and not for him. That one may sometimes be misled, however, by the history is shown in my experience with a young woman evidently neurasthenic in temperament. Although skeptical about the existence of a gross lesion, I was finally persuaded to explore the upper abdomen, because of the very positive evidence of hæmatemesis and of aggravated attacks of vomiting and pain. The findings at the operation were negative and I ascertained afterwards from the patient that she was in the habit of sucking the gums till they bled, swallowing the blood, and then inducing vomiting. Hence the hæmatemesis.

To me an interesting case, because of the difficulty in diagnosis and the duration of the disease, was of a young man then thirty-one years of age, who had been ailing twenty years off and on; at the age of eleven he had an attack of vomiting with abdominal pain which confined him to bed for ten days; and even

prior to that time had what he called indigestion. He had served in the army during the Spanish War, and since then had worked steadily as a machinist. His work had never been interrupted, he ate everything, had never vomited, and never had any blood in stools. His chief and only complaint was pain, worse when the stomach was empty, often having to get up at night for a glass of hot milk or water. There was no occult blood, no hyperacidity, no dilatation of stomach. He was tender over his epigastrium but he was tender also over his appendix. Although the clinical picture did not conform altogether to type, I thought we were dealing with a case of appendicular dyspepsia, a chronic appendix with gastric symptoms, and proceeded accordingly. Through a gridiron incision I explored the appendix, and found it buried in a mass of adhesions, and liberated it with much difficulty. Though there was no doubt as to the existence of a lesion of the appendix, I was still in doubt about the upper abdomen, which I explored through a right rectus incision and found the stomach and omentum plastered to the parietal peritoneum, and on further investigation an ulcer of the lesser curvature. From the extent of the peritoneal invasion there had evidently been at one time some leakage. The operation concluded with a gastrojejunal anastomosis. Recovery was uneventful.

The method of procedure in gastric ulcer necessarily varies. However, I strongly advocate excision of the ulcer when this is feasible, and especially in the large indurative type, including the saddle-back ulcer in patients approaching middle life. It is in this type that carcinoma is most frequently implanted, and for this reason alone, if for no other, we owe it to our patients to practise the more radical procedure. These ulcers should be looked upon as precancerous conditions and treated accordingly. When the ulcer is so situated or so adherent to adjunct structures as to make excision difficult, the pyloric outlet of the stomach should be closed by infolding as the surest safeguard against recurrence and as the most rational way (in the light of our present knowledge of the pathogenesis of ulcer) of securing permanent results. The same practice is indicated, I believe, in duodenal ulcer as well, although in my experience the tendency to recurrence in the latter is not as great as in gastric ulcer. The operations

in this series of gastric cases were carried out according to these principles. In technic the no-loop gastro-jejunostomy, vertical opening was used, the line of sutures protected as Mr. Moynihan suggests with the gastrocolic omentum.

The management of actively bleeding ulcers requires the exercise of one's discretion. Ordinarily I favor palliative procedures.

For example one of our patients, a young woman of twenty-two, with a five-year ulcer history, had three large hemorrhages in five days, once vomiting three quarts and with a large quantity of blood in the stools. On admission she looked exsanguinated, her hæmoglobin was low. I decided not to operate at once, ordered 20 cc. of horse serum given hypodermatically, morphine q.s. to allay pain and restlessness, and small quantities of saline solution by bowel, and an ice bag to the abdomen. After five days of freedom from hemorrhage or vomiting I operated and found an ulcer on the greater curvature. If, on the other hand, the plan of treatment had been of no avail and hemorrhages recurred, with increasing frequency or in increasing amounts, there would then have been but one recourse, immediate operation.

Of the pelvic cases, in fact of the entire series, the most puzzling was in the person of a patient fifty years of age referred to me by Dr. E. F. Walsh. She told me that she had not been well since the birth of her last child three years ago, and prior to that had had one miscarriage, that her menstruation had been regular until the last period now two weeks overdue. She laid emphasis on troublesome attacks of indigestion with vomiting, for which her physician had treated her from time to time. Eight days prior to admission, after a hearty meal, she was seized with a violent pain and vomited. For the next three days vomiting continued but the pain was less severe. She remained in bed with a normal temperature on a liquid diet and on the day before admission she had had another attack of severe pain similar to the first. When I saw her she appeared exsanguinated, her hæmoglobin was 20 per cent., the leucocytes 22,400, and pulse 140; the abdomen was distended, and she referred her pain to the epigastrium and precordium. My first thought in view of the history of digestive disturbance, the intense pain, and attacks of vomiting was hemorrhage from a duodenal ulcer. In

her present condition operation seemed out of the question, so I watched her carefully day by day and gradually the symptoms of the upper abdomen disappeared and were replaced by an area of dulness and tenderness in the lower abdomen. To make a long story short, when her condition justified it I opened the abdomen and found we were dealing with an ectopic gestation. From a pint to a quart of partially organized blood-clot was removed together with the sac. There was no post-operative shock, and convalescence was rapid and uneventful.

Unfortunately the Episcopal Hospital is so far removed from the center of the city as to be inaccessible both for the casual visitor and student alike. This isolation is a great drawback, as there is nothing so stimulating to the whole staff of a hospital, from the highest to the lowest officer, as the constant criticism and searching inquiry of those who are seeking useful information in modern methods of procedure. Because of its isolation the physical equipment of the hospital is known to few of the profession, resident and non-resident. Perhaps the most favorably situated of the larger hospitals for service to the working classes, it has a wealth of material representing the whole field of surgery. Of the lesions of the extremities, there is an extraordinary opportunity to study fractures of every description, and of the abdominal lesions there is a veritable mine of examples of inflammatory conditions of the pelvis, most of which are the result of improper care at childbirth at the hands of incompetent midwives or the patients themselves. To the philanthropically inclined I know of no better object for investment than the establishment of a maternity department for the poor of that district.

The service of this hospital, as of many others, is an interrupted one. The disadvantage of this system pertaining in many institutions is well recognized and so patent as to admit of no dispute. Far better is the European system, where in each hospital a limited number of surgeons devote their entire time to the instruction of young physicians and surgeons and the utilization of the material at their command for the advancement of medicine as a science and an art.

STATED MEETING, HELD OCTOBER 2, 1911

The Vice-President, Dr. G. G. Davis, in the Chair.

EXCISION OF THE ASTRAGALUS FOR FRACTURE-DISLOCATION.

Dr. Astley P. C. Ashhurst presented a man aged 45 years, who was admitted to Dr. Frazier's service in the Episcopal Hospital on August 2, 1911. He had just fallen a height of about 8 or 9 feet, into a hole, landing on his feet, and injuring the left ankle.

Examination showed considerable swelling around the left ankle, but the skin was unbroken. The foot was held in slight plantar flexion but could not be brought up to a right angle with the leg; plantar flexion was possible to the same degree as in the uninjured foot. Lateral motions were very painful and limited. The leg bones were uninjured. The head of the astragalus could be felt beneath the skin, anterior to its normal position, but still articulating with the scaphoid, and retaining its normal relation to the cuboid; beneath the tendo Achillis the posterior margin of the astragalus could be felt indistinctly. The foot was in slight "cavus" position, the anterior tarsus and metatarsus dropping.

A skiagraph (Fig. 1) showed a transverse fracture through the neck of the astragalus, the posterior fragment being dislocated backward leaving only about half of its articulating surface still in contact with the mortise of the ankle-joint. The relation of the posterior half of the astragalus to the calcaneum was not disturbed. The anterior fragment of the astragalus was dislocated forward and outward, the fragments of the astragalus being separated by about one inch and a half.

The dislocation was irreducible, so it was determined to incise the soft parts and if reduction still was impossible, to excise both fragments of the astragalus.

Operation, August 5, 1911, three days after injury. No Esmarch band was employed. An incision about two and a half inches long was made from below the external malleolus forward