and second ribs. They undertook its removal by the œsophagoscope and the safety-pin closer of Dr. Sidney G. Ankauer of New York. They saw it, then it became dislodged and they did not see it again. An X-ray made immediately after the sitting disclosed the pin the stomach, and three days later he successfully removed it by gastrotomy.

The third case was one of laryngeal papilloma, in a child who had been under their care for four years and is now about seven years of age. When he was three years of age a tracheotomy was done on account of an increasing obstruction of the larynx due to laryngeal papilloma. He had worn a tracheotomy tube since then. By the use of the bronchoscope on two occasions they were able to thoroughly clear out the papilloma from above. He has had the tracheotomy tube corked up for a month and is breathing and talking in a very satisfactory manner. In these young children in whom removal of the papilloma by aid of the laryngeal mirror is very unsatisfactory, the Jackson tubes offer a very good means for their extirpation under direct inspection.

Dr. Benjamin A. Thomas, commenting upon the difficulty of examinations of the bronchial tubes, recalled the case of a colored child six years old which illustrated that the younger the child the more difficult is the operation, because of the necessity of employing smaller sized tubes. This child had the history of a tack in his lungs and the X-ray showed it to be presumably in the left bronchus about its bifurcation into the second division. The introduction of the 5 mm. bronchoscope showed an area of partially necrotic mucous membrane extending from the division of the left bronchus down into the left inferior lobe bronchus for 3 or 4 centimetres. In the lumen of the left inferior lobe bronchus was a quantity of pus, about an ounce or an ounce and a half. The tack was not visible, being evidently embedded in the mucous membrane which was considerably swollen and partially necrotic. After a rather prolonged search the operation was abandoned and two months later the child was running around and was in fairly good health, excepting for an occasional cough. About a month ago he had looked up the history of this case to see what the end result was, and learned that three months after the child left the hospital the tack was expelled one night in a paroxysm of coughing.

STATED MEETING, HELD MAY 3, 1909.

The President, Dr. William J. Taylor, in the Chair.

MULTIPLE FRACTURES, INVOLVING THE FACE BONES, THE LEFT ELBOW, AND BOTH FEMURS.

Dr. Astley Paston Cooper Ashhurst said that in a paper on Multiple Fractures, which he read before the Philadelphia Academy of Surgery in April, 1907 (Annals of Surgery, 1907, xlvi, 263) statistics were presented showing that multiple fractures form only about 1.44 per cent. of fractures in general, and that the mortality at the present day is at least 25 per cent., even when cases of crush of the extremities calling for immediate amputation and other cases dying in a few hours from shock are excluded. The mortality of fractures in general was found to be about 2.7 per cent., so that the outlook in a case of multiple fractures is just about ten times as gloomy as in ordinary cases. The case now reported, with the kind permission of Dr. Chas. H. Frazier, is one in which, in addition to numerous other fractures, both femurs were broken and could not be reduced without operation. Among the 73 cases of multiple fractures from the statistics of the Episcopal Hospital, reported in 1907, there were only two in which both femurs were fractured; both of these patients died. Among 121 recent fractures of the femur at the Episcopal Hospital, reported a year ago (Annals of Surgery, 1908, xlviii, 748) in collaboration with Dr. Wm. A. Newell, there was not one case in which operation had to be done. So that the present case is remarkable both for his recovery, and from the fact that operation was required on both femurs.

Frank R., a sailor, aged 26 years, was admitted to Dr. Frazier's service in the Episcopal Hospital at 7 P.M., December 5, 1908. While at work on a ship lying at the dock he had fallen a distance of fifty-five feet into the hold, landing on piles of copper ore.

Examination showed the following injuries: There was no vision in the left eye, the pupil being widely dilated, with hem-

orrhage into the anterior chamber, and dislocation of the lens. The left malar bone was broken near its articulation with the superior maxillary. Both the right and left superior maxillæ were fractured, the line of fracture crossing the median line of the alveolus. There was a comminuted fracture of the nasal bones. The inferior maxilla was broken in three separate places: (1) through the left ramus; (2) just to the left of the symphysis; (3) through the body on the right side. The left humerus presented a fracture of the external condyle; and there was a fracture of the head of the left radius, with dislocation, along with the fragment of the humerus. There was a comminuted fracture of the right femur into the knee-joint, the internal condyle with a fragment of the posterior surface of the external condyle being dislocated posteriorly along with the tibia and fibula, the patella being impacted between the fragments, and the external condyle jutting out and almost rupturing the skin, in the neighborhood of the head of the fibula; the skin, though much abraded and contused, was not broken. In addition to these injuries there was a compound comminuted fracture below the middle of the left femur, with rupture of the ligamentum patellæ, and a large hæmatoma over the seat of fracture.

The man was in profound shock. His temperature on admission was 95.4° F. By midnight it had risen to 97.8° F., and the next morning reached normal. He was appropriately treated for the shock, and though death seemed imminent, dressings were applied to the various fractures. A chin-cap and Gibson bandage were applied to the face; the dislocation of the radius was reduced, and the elbow was dressed in acute flexion. Buck's extension and sand-bags were applied to each lower extremity. It was imposible to reduce the fracture-dislocation of the right knee; and no great force was used in attempting to set the left femur, as the condition of the soft parts (hæmatoma and wound of compound fracture) did not warrant it.

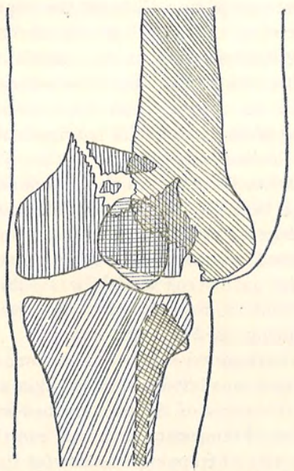
Contrary to expectation, the patient's general condition gradually improved; his temperature on the afternoon of the second day was 100.6° F., and this was the highest ever reached. The wound in the left thigh healed without becoming infected.

On December 11, six days after admission, Dr. Frazier attempted under ether to reduce the dislocation of the right knee, but was unable to do so. It seemed imperative to secure reduction, as the skin was stretched so tightly over the projecting external condyle that it was feared sloughing would soon occur. Accordingly, the next day Dr. Ashhurst operated for Dr. Frazier, as the patient, though still delirious, seemed able to stand a formal operation. In order to avoid the abraded and granulating skin, which was swabbed with iodine before beginning the operation, the joint was opened as for a fracture of the patella, by a curved incision, with convexity below (the ligamentum patellæ was not divided). This flap was turned up, and the external condyle was found projecting through the capsule of the joint, just beneath the skin. The capsule was therefore opened, but reduction was still impossible, as the patella was firmly fixed between the shaft of the femur, above the external condyle, on its outer side and the inner condyle on the inner side. The patella was rotated about 90 degrees on its longitudinal axis, so that its anterior surface looked outward (Fig. 1). To extract it, the rectus femoris had to be cut from the vastus externus, and then the patella could be pried out from behind the condyles, and the fracture reduced. As very good apposition of the fragments was obtained, no wires, screws, or plates were used to retain them. The quadriceps tendon was sutured again to the vastus externus, and the capsule was then closed, buried sutures of chromic gut being used in both instances. The skin wound was closed with interrupted sutures of chromic gut, and a small drain of plain catgut was left beneath the skin at the outer angle of the incision. This was of course absorbed in a few days, but served the purpose of temporary drainage into the dressings, and obviated the necessity of trapping the cast for its removal. Strict *asepsis* was used throughout the operation, which took thirty-five minutes. A Buck's extension was then applied, and over all the dressings a plaster cast, which extended from the toes to the groin. The entire operation was done while the patient was lying in his bed, as it was feared that removal to the operating table might injure his other femur. During this anæsthetization the patient's upper and lower jaws, which had begun to knit, were unavoidably refractured. The next day his temperature was normal, but on the second day it reached 100.6° F., and then again became normal. The cast was left on for over five weeks, and on removal (January 19, 1909) the patella was found movable, and the fragments firmly united and in excellent position.

There were a few granulations at the outer angle of the wound, where it had been drained. Passive motion was then begun.

When four weeks had elapsed from the time of the accident, it was found that there was no union in the left femur, which had been the seat of a compound comminuted fracture; and as the skiagraph showed overlapping of about two inches, and as this could not be reduced by traction, it seemed proper to operate on this femur also.

FIG. 1



Tracing of skiagraph of right knee. Comminuted fracture through external condyle of femur, with posterior dislocation of tibia and lower fragment and impaction of patella between fragments.

Accordingly, on January 2, 1909, when substituting for Dr. G. G. Davis, and after consultation with Dr. Frazier, Dr. Ashhurst operated on the left femur, through an external incision of 8 inches, excising the callus which prevented reduction, and removing some loose fragments of the shaft. The upper fragment was anterior and inward, projecting into the rectus muscle. It was possible to secure very good apposition without resecting any of the femur, as the fracture was nearly transverse, and the comminution involved the inner surface only. A silver plate, with three screws in each fragment, was used to retain the bones.

The wound was thoroughly washed out with hot bichloride, and was closed with two layers of buried sutures of chromic gut, which was also used for the skin sutures. A rubber drainage-tube was brought out through the lower angle of the wound, passing beneath the bone to the inner side of the line of fracture. The time of the operation was sixty-five minutes. A Buck's extension was applied, and over all a plaster cast from the toes to the groin. The drainage-tube was removed through a window in the cast on the second day. On the third day the temperature reached 100.6° F., and then again fell to normal. This cast was removed February 8, 1909, during the sixth week after operation. The position of the fragments was good, and fibrous union was present.

In March, the patient was about in a wheel chair, and motion in the knees was improving. Dr. Van Pelt took charge of the ocular condition, and sight gradually returned. Early in April the patient began to walk with crutches, and in two weeks time could walk with only one cane. He now walks without support of any kind. The right knee has slight lateral mobility in full extension, and for some time felt a little weak in walking. The left femur has bowed somewhat outward, but union is firm, and the silver plate is producing no irritation. The right lower extremity is only one-half a centimetre shorter than the left. Both knees have a range of motion through about 40 degrees—from full extension to about 140 degrees. The fractures of the face have healed with only slight deformity, the alignment of the teeth being perfect, and very little distortion of the features remaining. The left elbow has a range of motion from 40 to 140 degrees, full extension being impossible on account of thickening of the head of the radius. The ruptured left ligamentum patellæ gives no further trouble. The left eye can now be used for reading, and the patient declares it to be as good as his other eye; the pupil remains dilated.

RESECTION OF THE COLON FOR CANCER AND TUBERCULOSIS.*

BY JOHN H. GIBBON, M.D.,

OF PHILADELPHIA,

Professor of Surgery in Jefferson Medical College; Surgeon to the Pennsylvania Hospital.

THE following ten cases which have occurred in the last six years constitute my entire experience in resection and anastomosis of the colon for cancer and tuberculosis. I have excluded those cases of cancer of the upper rectum in which the sigmoid has been anastomosed with the lower rectum, as this operation is one of entirely different technic from that required for growths above the rectum. I have also excluded several resections of the small intestine up to the ileocolic juncture with lateral anastomosis between the ileum and the colon. I have eliminated a few cases where I have anastomosed the small intestine with the sigmoid for the purpose of side-tracking the colon. In other words, the discussion will be limited entirely to pure resections and anastomoses of the colon. Of these ten cases eight suffered from carcinoma and two from tuberculosis:

CASE I.—H. D.; male; 55 years of age; Pennsylvania Hospital. Diagnosis: *Acute intestinal obstruction; carcinoma of colon; thoracic aneurism and chronic endocarditis. Resection of descending colon and immediate anastomosis,* July 24, 1903. *Sudden death eight hours later.*

This man presented the appearance of having been a hard drinker. His abdomen was markedly distended, with no particular rigidity, pain or tenderness. He was nauseated but had not vomited. Bowels had not moved for five days, in spite of laxatives and enemata. The transverse colon was very much distended and could be easily made out. The abdomen was opened in the median line by an incision extending above and below the

* The Annual Oration before the Philadelphia Academy of Surgery, delivered May 3, 1909.

umbilicus. When the peritoneum was opened a dark-colored fluid escaped. The colon was first examined. It was found normal throughout, excepting just above the sigmoid flexure, where a hard mass could easily be felt. When this was delivered it was found to be a carcinoma, producing absolute obstruction. The abdominal cavity was filled with a quantity of dark fluid containing flakes of lymph. The carcinomatous mass, together with a proper amount of bowel, was resected; two glands were removed from the mesocolon and an end-to-end anastomosis, by means of two rows of silk sutures, was performed. A rectal tube was introduced well above the point of anastomosis; two strips of gauze were placed about the seat of anastomosis and the bowel returned to the abdomen. The cavity was then thoroughly irrigated and closed. A large quantity of gas and liquid fæces escaped through the tube. The operation occupied more time than it should have done, because of the difficulty in bringing the diseased bowel out through the median incision. In another such case I would feel inclined to make a second incision in the left iliac region. The patient did well after operation for about eight hours, when he was suddenly taken ill with cardiac symptoms and died. At the autopsy a large aneurism of the thoracic aorta was discovered, and Dr. Longcope, pathologist of the Pennsylvania Hospital, thinks that the cardiac condition present was sufficient to account for the sudden death. There were evidences, however, as there were at the time of the operation, of peritonitis.

Comments: In this case I should have made a second incision, done a colostomy and postponed the resection until later, or performed a resection and drained the bowel and made the anastomosis later. A lateral anastomosis would have been better than the end-to-end one which I did. Under the circumstances the overlooking of the thoracic aneurism would seem justifiable.

Pathology: Adenocarcinoma of colon; serofibrinous peritonitis; congestion of lungs; general arterial sclerosis; diffuse aneurism of arch of aorta; chronic aortic and mitral endocarditis; left-sided cardiac hypertrophy and slight diffuse nephritis.

CASE II.—M. D.; female; 70 years of age; Pennsylvania Hospital. Diagnosis: *Acute intestinal obstruction; adenocarcinoma of colon. Resection and immediate anastomosis,* January 7, 1905. *Death twenty-third day after operation.*

I saw the patient first about nine o'clock on the day of operation, with Drs. Bennett and Musser; there was nothing in the previous history to throw any light on the cause of the obstruction. She had suffered from moderate constipation and had had some attacks of abdominal pain. She had always been very secretive about herself and it was difficult to get any satisfactory history. One noticeable point was that she had habitually restricted her diet to very simple things. She had not lost weight. For four days previous she had been unable to have a bowel movement and had become gradually more and more distended. The distention was more marked on the right side of the abdomen, but at no time was Dr. Bennett able to feel any mass. There had been no nausea or vomiting excepting once, when oil had been given. The temperature was normal; pulse about 80; the abdomen greatly distended, slightly more so on the right side than on the left. The patient complained of some pain on the left side which came on in paroxysms. Nothing could be felt by the rectum or by the vagina. Her general condition was very good, but it was evident that she was suffering from complete obstruction of the bowels, which in a short time would end fatally unless some radical relief was offered promptly. I thought that she was suffering from a volvulus or else from a growth in the cæcal region. A notable point in view of the findings at the operation is the fact that there was no history of ribbon stools or the passage of bloody mucus. Considerable time was lost in convincing the patient of the necessity for an operation, and especially of the necessity for her removal to a hospital. This was finally accomplished, and at about three o'clock I operated. As the right side of the abdomen was more distended than the left, I determined to open through the right rectus. The moment the peritoneum was divided there escaped a quantity of peculiar gelatinous material, light in color, resembling the contents of a colloid cyst. There also presented in the wound an enormously distended cæcum, dark in color, which looked like a cyst. I supposed that there had been a rupture of a malignant ovarian cyst. When the wound was enlarged, however, the cæcum was delivered. It was distended more than I had ever seen it. The appendix was also very much thickened but not distended, and attached to it was a quantity of the same gelatinous material which had escaped from the abdomen. The cæcum

was so distended that I realized that I would be able to do nothing inside the abdomen until its size was reduced. When delivered, a quantity of its contents rushed into the small intestine, rapidly distending this portion of the bowel which had before been practically empty. I thought that in some way the opening from the ileum into the cæcum had been obstructed. The cæcum was punctured with a knife; a large quantity of gas rapidly escaped and the bowel collapsed. The opening was then closed and I made an exploration of the abdominal cavity. There was no mass in the pelvis, the uterus being very small and the ovaries atrophied. I noticed one or two small nodules over the broad ligament, however. Examining the colon I found a mass about the middle of the descending colon. This could not be delivered through the wound on the right side and I therefore opened the abdomen through the left semilunaris. Before I did this, however, I was obliged to reopen the cæcum because it could not be returned to the abdomen, as it had again become distended with gas. Through the opening on the left side I delivered the mass in the colon which seemed to be a carcinomatous growth producing an annular contraction of the bowel. With some difficulty, because of the shortness of the mesocolon, I succeeded in resecting about ten or twelve inches of this bowel, going about 8 inches above the growth and about 3 inches below it. An end-to-end anastomosis was made by means of a large Murphy button. A gauze drain was introduced down to the site of anastomosis and the wound closed. Before closing the wound on the right side I removed the appendix; and it presented the appearance already described which I had never seen before. The patient was on the operating table one hour and forty minutes. Her pulse at the end of the operation was 100 and her condition remarkably good. I was prepared for considerable shock but was surprised later to find the patient in excellent condition and remarkably free from pain.

January 9, 1905: Since the operation the patient's progress has been surprisingly satisfactory. Last night her temperature rose to about 102, but this morning it is 99 and her pulse about 110. She has been taking a moderate amount of liquid nourishment and salt solution enemata. Yesterday and last night she passed a large amount of flatus and is much more comfortable. The distention of the abdomen is greater this morning than it

has been since the operation, but there is less pain and the patient is much more comfortable. She has received small doses of calomel to relieve her distention, and this morning in addition to this she was given strychnia.

January 10: Last evening the distention had increased considerably, the patient was very uncomfortable from it,—had some difficulty in breathing and was belching a good deal. I therefore decided to open the wound on the right side and tap the cæcum. This I did without any difficulty at all, administering the patient a small amount of ethyl chloride. The colon was exposed for an area of one and one-half inches, and a small trocar introduced. A quantity of gas escaped through the cannula, which was left in position, and the patient was rendered more comfortable at once. Since doing this, there has been a marked improvement in her condition; she has had two bowel movements and her temperature and pulse are both lower. It looks now as if she would certainly recover.

January 16: Continues to improve, temperature remains about normal. On the sixth day after the operation there was a marked odor to the dressing on the left side, and when I removed the gauze packing there was an escape of gas and some liquid fæces. For twenty-four hours previous to this the patient had been unable to void the urine, and had to be catheterized. Since the change of dressing she has voided her urine. The discharge from the left wound has been quite free, and contains some fecal matter. There has been less fecal matter passed per rectum, and also less flatus. The right wound looks well; it is packed with iodoform gauze down to the exposed bowel, from which there is no leakage. To-day the patient is taking semi-solid food and looks much better. The button has not passed.

January 30: Two days ago, when dressing the left wound, I extracted two large pieces of mucus which looked like sponges. These were evidently sloughs from the colon somewhere and I suspect from the cæcum. After their passage there was some leakage from the small puncture of the cæcum of the right wound. Yesterday I introduced a glass catheter into this opening and passed quantities of salt solution through the colon, washing out a quantity of fæces but no more sloughs. I then injected some salt solution and whiskey which was followed later by malted milk. This was done because the patient declined to take sufficient food. She gradually grew much weaker and has been comatose at times. To-day she grew still weaker, and died about 2 P.M.

A post-mortem examination was made by Dr. Longcope, who found that the colon had sloughed at the point of anastomosis and that the button had dropped into a pocket behind the colon.

Comments: A primary resection should not have been done in this case nor should a Murphy button have been used. A lateral anastomosis would have been better than an end-to-end one.

Case III.—G. D.; female; 68 years of age; Pennsylvania Hospital. Diagnosis: *Partial obstruction and carcinoma of transverse colon and sigmoid. Resection of transverse and descending colon; immediate anastomosis,* March 5, 1905. *Recovery;* well to-day.

I saw this patient in consultation with Dr. David Edsall. The history of active trouble in this case extends over but three weeks. Previous to that time, however, the patient had had considerable trouble with her digestion and, at times, difficulty in having her bowels move. She had also had attacks of acute pain, evidently peristaltic in character. Three weeks ago she was suddenly seized with severe abdominal pain, and her bowels were opened with some difficulty. There was little distention at any time, but there was a great deal of abdominal pain and marked peristalsis. The peristalsis was visible through the abdominal wall. Examination a few days later revealed a mass in the left iliac fossa which was movable and tender; it varied much in size, and sometimes a little kneading would cause it almost entirely to disappear. There was never at any time a discharge of blood or mucus. When, with Dr. Edsall, I saw her we discussed but two possibilities: one, malignant disease of the sigmoid, and the other a chronic intussusception. My inclination was toward the first of these, as the mass seemed hard and there had been no discharge of blood or mucus as would have occurred with an intussusception. The patient was removed to the Pennsylvania Hospital.

I opened the abdomen through the outer border of the left rectus, opposite the spine of the ilium. As soon as the peritoneum was divided there presented in the wound what I supposed to be a dilated colon, but which proved to be the stomach. After

some difficulty I was able to differentiate the various structures and discovered we were dealing with a large malignant mass about the middle of the transverse colon which had gravitated to the left iliac fossa, dragging the stomach with it. Here the mass had become adherent to the sigmoid, the wall of which was involved in the cancer mass, but the sigmoid was not obstructed. The distal portions of the transverse and the descending colon were perfectly flat—contracted, in fact, to about the size of the small intestine. Proximally to the growth there was not much distention. My first idea was to do a double resection, first of the transverse colon and then of the sigmoid. The entire mass was surrounded by omentum. I tied off the omentum close to the greater curvature of the stomach and included in the ligatures the mesocolon, in order to shut off the lesser peritoneal cavity. When I had done this I found that if I resected a proper amount of bowel at the two situations there would be left only about five or six inches of descending colon, and rather than leave this and make two anastomoses I concluded to remove the entire transverse and descending colon with the involved portion of the sigmoid and attach the hepatic flexure of the colon to the distal portion of the sigmoid by the end-to-end method. This I did without any difficulty after the method of Moynihan, using the Doyen forceps. The anastomosis was the most satisfactory one I have ever made; there did not seem to be the slightest possibility of any leakage. Therefore I did not insert a drain, but closed the abdomen in layers. The operation took one and one-quarter hours. The patient was anæsthetized with ethyl chloride and ether. The glands in the mesocolon and mesosigmoid were not much larger than normal. The patient reacted well from the operation. At the beginning of the operation her pulse was 120; at the conclusion it was 90.

March 6, 1905: Her temperature since the operation has not reached 100 and her pulse at one time was 108. This morning it was 88. She has passed urine frequently but without difficulty and also expelled some flatus through the nozzle of a syringe. She has been very troublesome and nervous, but so far as her general condition is concerned she is in excellent shape and, I think, should make a good recovery.

March 13: Since operation the patient has done remarkably well; the bowels have moved freely and, excepting a marked

melancholic tendency, there has been nothing to worry about. For the last day or two she has complained of frequent micturition. To-day I dressed the wound and found the skin lifted up by an accumulation of very odoriferous pus. Quite a little gas escaped when the wound was opened. The skin had healed perfectly; all the stitches were removed. This infection had taken place without disturbing her general condition and without giving her any amount of pain. I believe that the infection is only a superficial one and do not think it is connected in any way with the seat of anastomosis.

March 22: Since the last note there has been more or less fecal discharge every day through the wound; at times it has been quite profuse. Lately there has been a slight rise in temperature at night, but otherwise the general condition seems to be good. Inability to control the urine at times is very distressing to the patient. For three days she has been sitting up in a wheel chair for an hour or more.

March 29: There has been no fecal discharge from the wound for three or four days and her condition is greatly improved, the bowels moving regularly without aid. She is eating much better. She spends four or five hours out of bed every day.

April 2: The wound is healing rapidly, but she developed last night a phlebitis of the left leg.

April 3: The pain in the leg is less but the swelling remains about the same, and there is a slight increase in the pulse rate with no fever.

May 10: She has been doing very well until about two weeks ago, when the sinus was so nearly healed that I thought that I might leave out the gauze packing, which I did for two days. When I came to dress it at the end of this time an accumulation of pus had taken place and some burrowing under the skin externally. Since then there has been more pus and a small amount of fecal matter discharged. To-day I determined in view of the fact that there had been a slight rise in temperature in the evening, that there must be some fault in the drainage, and gave her ethyl chloride, opened up the wound thoroughly, curetted out two pockets and packed it with gauze.

May 22: Wound has been rapidly contracting and her general health has been much better. She is able to go about and is going home to-morrow.

May 1, 1909: Patient's wound has remained healed and she is well to-day; no evidence of recurrence.

Comments: Probably a lateral anastomosis here would have given a better result, or perhaps a drain might have shortened the convalescent period.

Pathological diagnosis: Polypoid adenocarcinoma and tuberculosis of colon.

CASE IV.—J. S.; male; 40 years of age; Pennsylvania Hospital. *Tuberculous strictures of ileum; tuberculous peritonitis. Resection of ileum and cæcum,* September 28, 1905. *Second operation,* January 20, 1906, *for fecal fistula. Lateral anastomosis of ileum and transverse colon. Third operation,* January 11, 1907, *same condition; lateral anastomosis of ileum and sigmoid. Fourth operation,* May 1, 1907; *resection of transverse colon with a portion of the ileum. Fifth operation,* May 19, 1907; *jejunostomy. Died* May 21, 1907, *twenty months after his first operation.*

This patient, a negro, had been in the hospital ten days or two weeks. His symptoms were so obscure that it was impossible to make a diagnosis. He complained of general pain in the lower half of the abdomen, with considerable disturbance of digestion. He said he had vomited, but he vomited only once or twice after his admission. A test meal was given but nothing abnormal was found in the examination. His abdomen was always scaphoid and somewhat rigid. On the right side in the iliac region, on two occasions I thought I felt a distinct movable mass which was probably an enlarged gland. There was no fever at any time and no blood or mucus in the bowel movements. A rectal examination showed some tenderness behind the bladder. After keeping him under observation for a number of days I concluded that he had probably a tuberculous peritonitis, and that an operation was justifiable. When the abdomen was opened through the right rectus the first thing which the hand encountered was the ileum very much contracted at two points, one near the cæcum and the other a number of inches away from it. These areas of contraction were probably one and one-half to two inches in length and the whole thickness of the bowel was involved, the peritoneal coat being studded with small tubercles. The mesocolic glands were enormous; the mesenteric glands on either side of the diseased ones seemed perfectly normal. There

was not an excessive amount of fluid in the peritoneal cavity. There was no evidence of tuberculosis elsewhere. I determined to excise the entire diseased area together with the cæcum and the enlarged glands. In order to get out all the glands and the mesentery which contained them, I found it necessary to divide the ileum at least 12 to 18 inches away from the proximal side of disease. The colon was divided at the middle of its ascending portion and its end inverted by two rows of sutures—one of catgut and one of celluloid thread. The same was done with the end of the ileum, and then a lateral anastomosis of the ileum and transverse colon was made with the Doyen forceps. The operation was perfectly clean and there was no possible soiling. It occupied a very long time, two hours and ten minutes. This was partly due to the fact that after making one division of the ileum and inverting the ends, I found it necessary to go higher up on the bowel because of the enlarged glands in the mesentery. On examining the specimen after removal it was found that the distended portion between the two strictures contained several ounces of watermelon seeds. He said that he had not eaten watermelons for nearly a year, but considering the season and the tendencies of his race this is to be doubted.

September 30, 1905: He has done very well since the operation and shows no bad symptoms at all.

October 2: He had considerable pain in the abdomen last night and vomited. To-day his abdomen is rigid and there is some soiling of the gauze drain which was introduced. Ethyl chloride was administered and the drain withdrawn. There escaped a quantity of gas and considerable liquid fecal matter. This leak, I think, comes from the inverted ends of the bowel as the gauze drain extended down to this point and not to the point of anastomosis. Notwithstanding this leak he is now comfortable and the bowels have moved. A fresh gauze drain was introduced. The patient was discharged December 19 with a small sinus.

January 20, 1906: The patient has improved a great deal since his first operation but has continued to suffer from a slight fecal fistula. The discharge from this fistula is almost liquid, but at times—the patient says—fecal matter comes out. He complains also of painful peristalsis, and I had an opportunity

to observe this in a distended coil of bowel extending from the left iliac fossa up in the direction of the wound. Thinking that possibly the fistula led to the blind pouch of colon left at the previous operation, I determined to make the incision on the outer side of the old scar, and this I did. Before being able to make out the situation, however, I was obliged to separate the fistulous opening in the wall from the bowel and do considerable separation of adhesions. Finally I discovered that the fistula opened into the bowel probably at the point of anastomosis. The proximal portion of the ileum was enormously distended and hypertrophied. This extended up for about two or three feet. The colon was quite collapsed. As the intestines were so matted together in the right upper quadrant I determined to make a new anastomosis between the ileum and the transverse colon, and this I did after the manner of Moynihan. The fistulous opening into the bowel I closed with two catgut sutures and introduced a drain down to this point. The new anastomosis was surrounded by omentum and the abdomen closed, excepting at the point of drainage.

January 22: Patient is more comfortable to-day and has done remarkably well since his operation.

March 1: Patient was discharged from the hospital to-day, the sinus still persisting but no fecal discharge.

January 11, 1907: Since his last operation he has been free of pain and has gained considerably in weight. The fecal fistula redeveloped, however, and has continued open ever since. In March, Dr. Le Conte operated and tried to close the fistula, but unsuccessfully. There is no longer any painful or visible peristalsis, but large quantities of fecal matter escape through the fistula. I determined that the best thing to do was to open the abdomen on the left side, divide the ileum near the old point of anastomosis and attach the proximal end by lateral anastomosis to the sigmoid. I opened the abdomen through the sheath of the left rectus and found the abdominal cavity in good condition excepting for numerous small tubercles over the bowel and mesentery. There was no fluid and no enlarged glands. The last anastomosis was in good condition and working. There was no hypertrophy or distention of the bowel. At the second operation I did not divide the ileum but simply made a lateral anastomosis. To-day I cut the ileum near the old anastomosis,

inverted the two ends and attached the proximal portion to the upper portion of the sigmoid by a lateral anastomosis. The steps of the operation were easily performed and the result apparently was very satisfactory. The abdomen was closed without drainage. I did not do anything to the fistulæ on the right, hoping that they would close.

February 4: Since this operation the patient has progressed very satisfactorily. At first there was free discharge of fecal matter from the old fistula, but this stopped after a few days. The fistula was Y-shaped, having two external openings, one of which closed very promptly after operation, but the other is still discharging a small amount of mucus and pus. The patient's temperature is normal and he is able to move about and is quite comfortable.

The specimen removed at the original operation was exhibited at the meeting of the Philadelphia Academy of Surgery held on February 4, 1907. "It is 38 cm. long, 34 cm. of ileum and 4 cm. of cæcum. The mesentery is attached to the intestine and contains a number of enlarged glands. There are two constrictions, one 5 cm. from the ileocæcal juncture, and the other 13 cm. above this one. The bowel between the two constrictions is very much distended and thickened; in this distended portion between the two constrictions there were found, when the specimen was examined, two or three ounces of watermelon seeds with one grape seed. The peritoneal covering of the bowel and mesentery was studded with small tubercles, and numerous hard bodies can be felt in the intestinal wall. The mesentery is very thick and contains a number of large glands, the largest measuring 4 x 3½ x 2 cm. These glands on section proved to be caseous. The appendix is tightly bound down to the cæcum by adhesions. The lower stricture is 3 cm. in length and the lumen of the bowel at this point ½ cm. The second stricture is 1 cm. in length and the lumen 1½ cm." The pathological diagnosis was tuberculosis of the intestine with chronic ulceration; tuberculosis of the mesenteric glands, and hypertrophy of the muscular wall of the intestine.

May 1, 1907: Since the last operation the patient's general health has been very good, but there has continued to discharge from the sinus a quantity of pus and mucus. He says fecal material at times also passed out, but I have had his dressings

carefully watched for several consecutive days at the hospital, bringing him in for this purpose, but have found no fecal matter. He is very much disturbed by the discharge and the necessity of constant change of dressings, so I determined to open the abdomen again and remove all of the bowel that had been side-tracked by the last operation. To-day I opened the abdomen through the right rectus and excised the colon from the splenic flexure back to the point of original excision. Together with this bowel there were removed two feet of ileum. At the point of division of the colon the bowel was perfectly healthy, and I had no difficulty in turning it in. The whole intestine was one mass of adhesions and I had considerable difficulty in isolating the portion which I wished to remove. A thorough twisting and malposition of the small intestine made the operation long and difficult. The only portion of the bowel removed which was really distended was the ascending colon, and that was filled with tuberculous ulcers of the mucous membrane. The peritoneum generally was in much better condition than at the previous operation, and at several points on the small intestine there were cicatrices of healed tuberculous lesions. When I removed the bowel I felt that I had taken out all the diseased tissue except a few mesenteric glands, and hoped that the patient would be entirely relieved. The abdomen was closed without drainage excepting for a small piece of gauze extending just through the abdominal wall at the seat of the old fistula. The operation lasted about two hours.

May 3: Patient's temperature has remained normal since operation; he has had no vomiting, no distention, and his general condition has been very good.

May 21: The patient did very well for several days after his last operation. Then he began to have fecal discharge that I judged came from the loop of small intestine that had been adherent to the old abscess and which I had tried to cover with peritoneum. Discharge has increased during the last few days and the patient has emaciated a great deal. I tried rectal feeding, but this did not help matters. To-day I decided to do a jejunostomy or resection of the perforated bowel. The patient was in very poor shape. He was put on the operating table and four pints of normal salt solution put into his circulation. Under morphia, ethyl chloride and ether anæsthesia the wound was

opened up, the loop of bowel delivered, and the perforation found. It was too large to close, and after thoroughly cleansing the cavity the bowel was fastened in the wound with gauze packing and a tube passed down into the distal portion of the loop and fixed with a purse-string suture. The patient was immediately given a pint of salt solution and two ounces of whiskey through the tube.

May 20: Patient is in pretty bad shape, although he was much better last night than before his operation. He has been given raw eggs and peptonized milk through the tube every three hours and has vomited small amounts at times to-day. His temperature is subnormal and he seems in pretty bad condition.

May 21: Patient died to-day. At the postmortem his entire intestinal tract measured but 19 feet.

Case V.—S. B.; female; 57 years of age; Pennsylvania Hospital. Diagnosis: *Obstruction of bowels due to carcinoma of sigmoid. Operation: Colostomy, and eight days later resection and anastomosis. Recovery, with death from recurrence one year later.*

This patient was a rather thin person who gave a history of ribbon stools for some time with marked constipation. She stated that she had never passed blood excepting after the use of an enema and then only a slight amount. Had never had any previous attack of obstruction. She was a Christian Scientist, and her treatment was confined to this art until about a week ago when constipation became much more marked; she then took castor oil. For forty-eight hours she passed neither fecal matter nor gas, her abdomen becoming more and more distended, and she has vomited everything that has gone into her stomach. When I saw her at about 10 P.M., her condition was good,—the abdomen was markedly distended, coils of bowel and peristalsis being plainly visible through the abdominal wall. Dr. Lee had examined the rectum and could feel nothing abnormal. The sigmoid could be felt, and was markedly distended. Most of the pain and tenderness was located about the cæcum. I urged immediate operation, with the intention of establishing an artificial anus and later removing the cause of obstruction if it were removable. The abdomen was opened through the left rectus and a growth about the middle of the sigmoid readily found. There were a number of enlarged glands in the mesosigmoid.

The growth was of the contracting variety and had completely shut off the bowel. I had no difficulty in delivering the intestine, and then made an anastomosis between the bowel above and below the growth by means of a Murphy button. I left this knuckle of bowel completely outside the wound. In a few days, the patient being in better condition, I intended to resect all the involved intestine. I was greatly tempted to do this at the time of operation because the patient seemed in good condition, but because of past experience and the experience of others deemed it unwise.

September 10: Although patient has passed some flatus there has been no bowel movement. Some distention still exists and patient is very uncomfortable. To-day I opened the distal portion of the bowel; a prompt escape of a large amount of gas and fecal matter followed.

September 16: Two days ago, eight days after first operation, I resected the involved sigmoid. Patient had improved a great deal and seemed in good condition. I found that the wound had become infected from fecal discharge and had therefore to exercise great care to prevent infection of the peritoneum. The area was well walled off and I was able to draw the bowel out very satisfactorily. I made a wide resection of the involved portion, invaginated the two ends and did a lateral anastomosis, using linen thread. The operation was easily accomplished and satisfactory in every way. A small drain was put through the peritoneum in the middle of the wound and another down to the peritoneum at the upper angle where the infection had occurred. The patient stood the operation well and is now in good condition; her only complaint is of gas. She made a very satisfactory convalescence and was discharged October 12, 1907.

January 21, 1908: Patient came in to-day; seems perfectly well; weighs 104 pounds. Thinks she weighed 80 when she went to the hospital; weighed 79 pounds when she left. Bowels move regularly without a laxative.

June 2: Patient complains of considerable lassitude and says she has some abdominal pain. Bowels are moving, however, and I can feel no evidence of any recurrence. She thinks she has lost weight, but her weight is exactly what it was on her last visit.

July 22: Patient has been seen by a physician who told her she had a recurrence of her trouble and that all he could do for her was to make her comfortable. This has depressed her very much and tended rather to aggravate her symptoms. She says that she sleeps badly, her appetite is poor, and that she has almost constant pain in the left iliac fossa. The bowels, however, move regularly from cascara, and there has been no blood or mucus in the movements. Weight, 92½ pounds. On examination there is some hardness to be felt to the left of the wound, but it feels as if it might be in the abdominal wall. I am by no means sure she has a recurrence but have advised X-ray treatment, for which she will go to Dr. Manges.

Patient, a few weeks after this note was made, died from recurrence, but had no obstruction.

CASE VI.—M. W.; female; 58 years of age; Jefferson Hospital. Diagnosis: *Carcinoma of appendix and cæcum. Resection of cæcum, lateral anastomosis, October 5, 1907. Death on seventh day after operation.*

This patient was referred to me by Dr. Robert L. Gibbon, Charlotte, N. C. She had always been healthy, and had given birth to eight children. In February, 1906, she had an attack which was diagnosed as appendicitis. Was ill a week; the symptoms disappeared under rest and ice. Six weeks later she had a second attack which lasted but a few days. A marked symptom in these attacks was severe localized pain and slight temperature. No nausea or vomiting and no urinary symptoms in either of these attacks. She remained well until six weeks ago, when she had another attack similar to the first but more marked. There was considerable fever and, excepting for the nausea, the symptoms were typical of an acute appendicitis. In this last attack a mass could be felt in the cæcal region. She gradually improved and was quite comfortable when I saw her. Examination of the abdomen was negative excepting for a tender and slightly movable mass in the right iliac fossa. In view of the history and the absence of other symptoms it seemed likely that this was a case of appendicitis with a walled-off abscess. I advised operation, and two days later, October 5, I operated at the Jefferson Hospital.

The abdomen was opened through the right rectus and a hard mass encountered behind the cæcum. There were no omental adhesions. General abdominal and pelvic cavities were walled

off and a line of cleavage sought between the mass and the neighboring viscera. The mass was so dense that I feared I was dealing with a malignant growth. Finally I got the cæcum separated. When brought to the surface I found that the appendix had separated at its attachment and that there was quite a large opening in the cæcum. Where the appendix was detached there was evidently a malignant growth, and on examining the interior of the cæcum I found that this growth extended across the lower end of the bowel and up as far as the opening of the ileum. I then proceeded with a resection of the cæcum, going 6 or 8 inches above the growth and making a lateral anastomosis between the ascending colon and the ileum, using linen thread for the purpose. When I had completed the anastomosis I proceeded to get out what remained of the appendix; this was a difficult undertaking, as it was tightly bound down. The distal portion of the appendix, however, did not seem to be so much diseased as the proximal portion. It was impossible to ligate the mesoappendix as I simply had to dig the appendix out of its bed behind the cæcum. A gauze drain was put in and the wound partially closed.

October 8: Patient has done only fairly well since operation. Yesterday morning she seemed in good condition; but in the afternoon she suffered a great deal from nausea but vomited only once or twice, and then only small quantities. She voids urine voluntarily; her temperature range is between 99.2° and 101°. She has taken very little nourishment and drinks water in small quantities. The bowels have not moved though she passed some flatus to-day when an enema was given. There is no distention of the abdomen; the tongue is moist. Nausea and backache are the only complaints which she makes. Pulse has been somewhat rapid, ranging from 110 to 130.

October 9: Patient is better, though still has occasional nausea. She has complained of distention, but this is not perceptible, and has passed large quantities of gas by the bowel. Last night she had a slight movement following an enema. She has taken little in the way of nourishment excepting peptonoids, but she has had nutrient enemata. She passes a good quantity of urine. Her temperature varies from 99.2° to 101°.

October 11: Patient's bowels have moved very satisfactorily and a number of times. There is no vomiting but the nausea

continues, although she is able to take a certain amount of liquid nourishment and stimulation. Her temperature continues around 100° and 101°. Her pulse remains between 110 and 120. There has been a decided falling off in the urine and to-day she has passed little or none.

October 12: Her condition yesterday grew much worse. She was in a stuporous condition all day, secreted very little urine and declined to take nourishment. The bowels moved five or six times. I changed the drain the day before, and although it was soiled and had a bad odor there was no escape of fecal matter or pus on its withdrawal. Her condition continued to grow rapidly worse and she died at 4 o'clock this morning. It is hard to know exactly what caused this death. There is no doubt that the anastomosis was working perfectly satisfactorily. There was no distention and no vomiting, so I felt if there was a peritonitis it must have been a low grade of infection. There was some kidney secretion in the last twelve hours, but I think that the kidneys were largely the cause of the death.

Pathological diagnosis: Cylindric-celled carcinoma arising from an adenoma.

CASE VII.—G. N.; male; 33 years of age; Jefferson Hospital. Diagnosis: *Carcinoma of ascending colon,* March 28, 1908. *Recovery; well at the present time.*

This patient gave a history extending over 6 or 8 months. During this time he has had considerable soreness and tenderness in the right upper quadrant of the abdomen, in which a tumor has developed. He has had very black, tarry stools. Has never vomited, and pain is uninfluenced by eating. He has no pain referred to the shoulder or back. There is no apparent distention of the stomach. Examination shows a marked rigidity below the costal border and the sensation is conveyed to the hand as of a tumor beneath the upper half of the right rectus; it is exactly in the position of the gall-bladder. There is no history of colic, and I was inclined to believe that he had a duodenal ulcer with a mass of adhesions about it. Others thought that the tumor was probably a gall-bladder. His hæmoglobin was 65 per cent., but he had a good proportion of red blood cells. His bowel movements were very black, but it is reported that no blood was found. I opened the abdomen through the right rectus and found a large growth in the hepatic flexure of the colon, covered by adherent

omentum. There was no extension to the gall-bladder or liver, but there was an extensive involvement of the colic lymph-nodes. The patient was in no condition to stand an extensive operation; his pulse became quite weak on the table. I determined that it was worth while to attempt an excision of the growth, but thought it wiser to do the operation in two stages. I therefore divided the ileum near the ileocolic juncture, closed both ends and then made a lateral anastomosis (Moynihan's method) between the proximal portion of the ileum and the transverse colon. I put in a small drain down to the closed distal end of the ileum.

April 1: Patient is in good condition. Drain was changed to-day. I think in two or three days I will be able to complete the operation.

April 11: Patient has improved very much since the first operation, and seems in good condition to stand the second. The abdomen was opened through the same incision in which the drainage had been going on, and in which there was a slight infection. I had no difficulty in bringing up the cæcum and ligating its mesentery. I then divided the transverse colon and inverted it. In bringing the mass out of the abdomen, I was surprised to find a coil of small intestine adherent on its inner posterior aspect. On careful examination this proved to be the duodenum. At first it looked as if a resection of this portion of the bowel would also be necessary, but I found when I separated it that practically only its peritoneal coat was involved in the mass. Several sutures were put in to repair the loss of the peritoneum. There was no involvement of the liver or gall-bladder in the growth. The kidney was thoroughly exposed, but there was no extension of the disease to it. A posterior drain was carried out through a puncture in the loin. A small drain was then carried down to the inverted colon and another placed in the superficial wound at its lower extremity. Patient stood his operation well, considering the great extent of it.

April 15: Patient's condition is very satisfactory. Two days ago I was worried because he had considerable cough, which is probably due to the fact that he is a miner and has a miner's lung. His bowels have moved well.

April 24: Patient is making a very satisfactory recovery, although there has been considerable discharge of the wound, which was infected at the time of the second operation. Patient is sitting up and his bowels are moving normally.

May 17: Microscopical diagnosis: cylindric-cell epithelioma. Wound entirely healed. Patient gone home.

February 12, 1909: Letter from Dr. G. A. Cunningham, the patient's physician: "He has gained thirty pounds, has no indigestion, flatulence never occurred; he is now engaged at the laborious task of coal mining, but has had no complaint of any kind regarding weakness of the abdominal wall. He has had no medical assistance whatever since the operation. His bowels are regular."

CASE VIII.—M. A.; female; 71 years of age; Bryn Mawr Hospital. Diagnosis: *Acute intestinal obstruction due to carcinoma of splenic flexure. Colostomy,* May 12, 1908, *followed by resection* May 20, 1908. *Death* June 6, 1908.

This patient has had more or less trouble with her bowels for about a month, and during the last four or five days has had difficulty in having a movement. When I saw her just before operation her abdomen was distended; there was no evidence of fluid and she was vomiting. Her temperature and pulse were normal and she seemed in good condition. I thought it wise to operate at once, and as I believed the obstruction to be in the upper rectum, I made an incision through the outer portion of the lower left rectus. The small intestine was considerably distended and filled the pelvis. The rectum, sigmoid and descending colon were collapsed. The transverse colon was distended. Passing my hand up to the splenic flexure I found a small hard mass in the bowel. Instead of making a lateral anastomosis between the transverse colon and the sigmoid, which I could easily have done, I made another small opening in the upper portion of the rectus, hoping that I might be able to deliver the growth through it; I found, however, that it was situated just at the splenic flexure and that only with great tension could it be brought within the wound. It was about the size of a hulled walnut and was shaped like a Murphy button, and apparently completely obstructed the bowel. I then made an opening in the transverse colon after fixing it in the wound. I used Stewart's method for draining the bowel.

May 20: Patient has made a very good recovery from first operation, and to-day I undertook the removal of the growth. I first closed the colostomy opening, increased the wound, tied off the gastrocolic omentum, divided the colon proximal to the colostomy wound, and then proceeded to remove about 8 inches

of the transverse colon together with the splenic flexure in which a small hard growth was present. I also removed about 4 inches of the descending colon. I had considerable difficulty in separating the growth from the spleen, and in doing so tore off a small portion of the spleen, which caused a rather profuse hemorrhage, which was controlled by a pack. The mesocolon was so short that it was difficult to get the ligatures behind the growth. I finally managed to get the growth out fairly satisfactorily. There was present a small hard nodule in the kidney, but I could not make out that it had any connection with the growth in the colon. The ends of the divided colon were inverted and a lateral anastomosis made. Catgut sutures were used for the deeper suture and linen thread for the outer. The operation was an extremely difficult one and required about an hour and fifty minutes for its performance. I think it would have been easier if I had made a lateral anastomosis and short-circuited the growth at my first operation instead of doing a colostomy. The removal of the splenic flexure would have been just as difficult, however, but the operation would have taken less time. The patient stood the operation fairly well.

May 25: For several days after operation she had a great deal of nausea and vomiting. Gastric lavage relieved the vomiting. During the past two days she has had a bad attack of diarrhœa; during the last 24 hours but 15 stools, but in the previous 24 hours 28 stools. These occurred without the administration of any laxative whatever. Irrigation of the rectum relieved her a great deal and she is much better to-day. There is a good deal of odor about the wound and the drain has not yet been changed. Her temperature range is between normal and 100°. Her pulse, which was quite rapid on the day after operation, reaching about 160, has recently remained in the neighborhood of 100.

May 26: To-day I removed the packing. There was no bleeding; the wound is very foul and there is some sloughing along the muscle edges. She is still very weak but the diarrhœa is much better. The great difficulty is to get her to take sufficient food. She has been gotten up into a chair and put out in the yard, which I hope will help her.

May 28: Fecal fistula has developed—but free stools by rectum.

June 6: Patient died to-day after gradually growing weaker. Temperature has not been above 100° for a week and lately has remained a little below normal. Death probably resulted from a low-grade infection. No post-mortem examination was made. Through an error in technic the sections of this tumor were spoiled and the rest of the growth lost. There can be no doubt of the clinical diagnosis, as it resembled in every way the growths found in Cases I, II, V, and X.

CASE IX.—S. B.; female; 27 years of age; Pennsylvania Hospital. Diagnosis: *Tuberculosis of cæcum and peritoneum. Resection of cæcum. Recovery;* well to-day.

This negro girl was admitted to the ward because of what was supposed to be a pus tube on her right side. She stated that she had had trouble with menstruation and considerable abdominal pain for some time, and that the week or two before she came into the hospital she had a great deal of pain and, she thought, some fever. On admission her temperature was 99½°. There was a distinct mass in the right iliac region; there was great tenderness on vaginal examination, especially on the right side; the mass was very hard for a pus tube and I thought it likely that she had an appendicitis as well as a pus tube. She had no general abdominal pain. I opened the abdomen through the right rectus near the median line and found the omentum adherent over the cæcum. Exploration of the pelvis showed numerous adhesions between the uterus and the intestine and all around the tubes and the ovaries. These were recent and were easily broken up. The rest of the cavity was well walled off with gauze from the mass in the iliac region, and then I discovered that the mass was not the appendix but was composed of a thickened cæcal wall and adherent omentum. Close investigation showed thickening and a mass in the cæcal wall with extensive infiltration, making the cæcum quite friable. The omentum was then tied off. The mass was about the size of a silver dollar and involved the anterior wall of the cæcum. There were numerous enlarged glands in the mesentery of the ileum and cæcum and numerous tubercles over the small intestine. There was quite a ring of thickening around the ileum about a foot from the cæcum, but no constriction. I determined to resect the cæcum. I then discovered another mass higher up in the cæcum, and in order to get beyond the disease was obliged to

remove the colon as far up as the hepatic flexure. The ileum was divided near the cæcum and the ends inverted with catgut and linen thread. A lateral anastomosis was then made between the middle of the transverse colon and the ileum. The transverse colon was also covered with adhesions, the omentum being adherent to it, and it was quite difficult to find a clear spot for the anastomosis. The divided mesentery of the ileum was sutured to the mesocolon to prevent any possibility of a hernia through this opening. Two small gauze drains were passed, one to the site of anastomosis, the other to the inverted colon, and the wound closed. The appendix was imbedded between the cæcum and omentum but apparently was not the original seat of the trouble.

Except for some superficial infection of the wound and two alveolar abscesses the patient made a good recovery. The wound healed by granulation, but there was no leak. Discharged February 24, 1909. The patient's present condition is normal. The pathologist expected to find tubercle bacilli because of the appearance of the specimen, but was unable to do so on repeated examination. The gross picture was typical of tuberculosis.

CASE X.—M. H.; female; 57 years of age; Mercer Hospital, Trenton, N. J. Diagnosis: *Carcinoma of sigmoid. Resection and immediate anastomosis,* January 31, 1909. *Death,* February 14, 1909.

I saw this patient in consultation with Dr. Holcombe and Dr. Ridgeway. She has one child who is 20 years of age. The mother has always been very well until seven years ago, when the left breast was removed for what appeared to be cancer. No microscopic examination of the growth was made. For some months she has been troubled with constipation, but has passed neither blood nor mucus. She has also lost some weight in the last few months. It is said that she had a tumor in the right breast; the tumor has disappeared. From the history given of this growth, I think that it was probably a cyst. Three weeks ago she began vomiting and her abdomen became markedly distended; since when she has been able to retain practically no food and has had no satisfactory bowel movement. Numerous enemata have been given and small particles of fecal matter have at times been returned. She was a thin, anæmic woman, looking older than her age, but in fairly good condition. The abdomen

was markedly distended and the vomiting was more or less persistent, but not of a fecal type. Palpation showed some rigidity in the region of the sigmoid, but more in the upper right quadrant. The ascending colon seemed to be distended, and as there was much tenderness over the sigmoid, I concluded the obstruction was probably at this point.

Following a hypodermic of morphia and atropin, she was given ethyl chloride and ether, and the abdomen opened through the left rectus. I found the descending colon very much distended, and on withdrawing the sigmoid came at once upon the cause of the obstruction, which was a growth involving the interior of the bowel and producing so marked a constriction as to practically completely obstruct it. Only one gland could be felt in the mesentery. About 6 inches of bowel was excised, including the growth, and a lateral anastomosis done. The ends of the bowel were inverted with catgut and silk and the anastomosis made with catgut and silk; as the operation was accomplished outside of the abdomen and the wound well protected with gauze, no drainage was inserted. While the abdominal wound was being closed a rectal tube was inserted into the rectum and a quantity of gas and liquid fæces escaped and the abdominal distention at the same time disappeared.

February 8: The patient's wound is healed and there is no pain or abdominal tenderness. The abdomen has been perfectly flat ever since her operation. During the last few days she has been vomiting and has had a very troublesome diarrhœa, I am told. The night before last she vomited practically everything that was taken. I talked with Dr. Holcombe over the 'phone and advised that her stomach be washed out. To-day I got a very good report from her. There has been no vomiting since yesterday morning, the bowels have moved but once, and she has been able to retain liquid food.

February 14: I had supposed that this patient was doing very well until last evening, when I received a telephone message saying she was in a bad condition and that a mass had developed in the left loin. I felt sure that there had been a leak at the site of anastomosis, and advised that the wound be laid open freely, and arranged to see the patient to-day. When I arrived I found her in an extremely low condition. On removing the dressings I found them soaked with a quantity of dark liquid fecal matter.

The wound had opened throughout its length and there were great masses of necrotic muscle and fascia. I suppose she got rid of probably a pint of fecal material, and I hoped that its removal might bring about some improvement in its condition, but was informed later that she gradually sank and died this evening. She had no further obstructive symptoms at any time and her abdomen was not distended when I saw her; on the contrary it was scaphoid. I think that there is no doubt that this death resulted from toxæmia, the result of extravasation of intestinal contents around the anastomosis.

There are a number of practical points in regard to resections of the colon about which there is great variety of opinion and practice, and most of these points are brought out in the foregoing cases. Using these as a basis, I propose to discuss the following questions. First, where should incision be made in operating for diseases of the colon? Second, is one justified in doing a resection and an anastomosis in the presence of acute obstruction, or should the obstruction first be relieved by drainage? Third, what are the relative merits of end-to-end and lateral anastomosis? Fourth, what is the best method of making the anastomosis? Fifth, should drainage be used if the peritoneum is not already infected? Sixth, to what is the operative mortality due? Seventh, is ultimate mortality due to too limited excision of the bowel?

1. In answering the first question I would say that the incision should be made as nearly as possible over the growth, and if one has been unable to locate the growth, and operates simply for the obstruction, and finds that he is unable to gain ample access to the involved bowel, then a second incision, through which the bowel may easily be drawn, should be made. A second incision is much less objectionable than the injury to the bowel through an incision which does not permit of easy handling.

2. Regarding the second question, as to resection and anastomosis in the presence of obstruction, there can be little doubt, all surgeons having agreed that however easy the

operation is it should never be done. This conclusion was reached after sad experiences, to which I think my first and second cases and possibly my tenth case, might be added. In 1903 F. T. Paul (*Brit. Med. Jour.*, Aug 15, 1903) said that obstruction more than trebled the danger of colon resection, and he reminded us that even after a simple colostomy, done for obstruction of two or three days' standing, the patient may be in a precarious state for two or three weeks, even though apparently greatly improved for twenty-four hours. There is sufficient auto-intoxication, even when the drainage operation is done fairly early, to cause severe poisoning which is characterized especially by a foul diarrhœa, loss of appetite, slight fever and general depression. This condition is well shown in Case VIII of my series, and is a picture, I am sure, familiar to us all. Not only is the patient absorbing toxins from the intestinal fermentation, but ulceration of the colon, well above the obstruction, in these cases is quite common. To do a formal resection, however quickly and easily, at this time is to invite disaster. Moynihan ("Abdominal Operations") says, "There are few rules so binding upon the surgeon as that which prohibits the resection of growths and subsequent end-to-end anastomoses of the large intestine in cases of acute obstruction." One is strongly tempted to break this rule when the growth is easily accessible, as it is in the transverse and sigmoid colon, but there is every reason why he should refrain. Experience has taught surgeons everywhere this lesson, and it should not be forgotten.

A few successful resections and anastomoses of the upper portion of the small intestine for acute obstruction may mislead the operator to the false conclusion that the same procedure will work as well in the case of the colon, but the question is an entirely different one. The small upper portion of the intestine is comparatively free from bacteria, while the tract of the large intestine teems with them, and it is this fact that accounts for the peritonitis so frequently observed in cases of long standing obstruction of the lower intestine. The bowel wall becomes distended, its circulation bad and the organisms make an easy exit into the peritoneal

cavity. It is a well-known fact that the lower down in the intestinal tract an obstruction is the greater is the infection from the absorption of the intestinal contents, and this is due not to the greater absorbing area but to the greater number of pathogenic organisms in the lower portion of the small intestine and colon. Numerous have been the contributions to surgical literature in recent years showing the danger of this absorption even after a perfect resection and anastomosis. Monks and others have laid great stress upon the importance of emptying the bowel above the obstruction at the time of the operation, and his work and experiments in this matter have contributed largely to our improved results. He has shown us how a large portion of the small intestine can be emptied by puckering the intestine up on a large blunt tube passed into its interior, and that this is the only way in which it can be accomplished. The toxicity of the intestinal contents in acute obstruction is well shown by the experimental study made by Clairemont and Ranzi ("Proceedings of the German Medical Congress, 1903"; ANNALS OF SURGERY, December, 1903.). Their results are as follows: "The intestinal contents above the stenoses, after being rendered free from bacteria by filtration, always proved poisonous, whether administered intravenously or hypodermatically. Bouillon cultures of small quantities of the intestinal contents after four to five days gave toxins equally poisonous. Thus the poison is the result of bacterial growth. It can also withstand heat. The toxic action can be paralyzed by mixing the material with the brains of normal rabbits or guinea pigs. The filtered intestinal contents in some instances showed intense hæmolytic power when administered to dogs or horses. It was impossible to establish either active or passive immunity to the poisons, which seem to show that an extension of serumtherapy to the treatment of ileus is impossible." William J. Mayo (*Jour. Amer. Med. Assoc.*, September 14, 1907) says that a fair proportion of the mortality following resection for obstruction is due to perforation from thrombosis, and he therefore urges great care in the handling of the distended bowel on this account. He advises tracing the collapsed bowel up to the obstruction rather than the distended bowel down to the obstruction. Here, then, we have another reason for primary drainage of the large intestine in cases of obstruction before doing an anastomosis.

I think my own cases bear out all these points. In two I did a resection in the presence of an acute obstruction and lost both. In two others I did the drainage operation first and the resection later. One died and one recovered. In my last case I did a primary resection because I thought that as the obstruction was not complete there would be little danger from auto-intoxication, the result of absorption. As I have said before, this, I believe, was an error. What then should be the procedure in these cases of acute obstruction? Moynihan recommends Paul's operation, which consists in loosening the bowel from its attachment, bringing the growth out through the wound, dividing the bowel well above and below the growth, and inserting into the proximal and distal ends two glass tubes connected with a rubber drainage tube, and then the removal of the growth. By this operation the growth is removed at once and free drainage of the bowel is accomplished. Later, an anastomosis is accomplished by a crushing forceps and the fecal fistula closed. Von Mikulicz, Hartmann, and Mayo, all suggest methods quite similar to those of Paul. There is no doubt that these methods are superior to colostomy performed above the growth, as it renders subsequent operation very simple and easy. Where the growth cannot be delivered easily into the wound colostomy may be done or the obstructed portion of the colon may be side-tracked by performing ileocolostomy or colocolostomy. This method I pursued in one of my successful cases (Case VII). These operations are particularly advised where the obstruction is only partial, and sometimes are advantageous where there is no obstruction.

3. The relative merits of the end-to-end and lateral anastomoses depend largely upon the portion of bowel with which one is dealing. As a rule there is greater likelihood of leakage in the end-to-end operation because of the difficulty of getting an accurate and tight approximation of the two por-

tions at the mesenteric attachment. It can, I think, be said that unless the peritoneal coat can be brought in from the two lateral aspects and made to cover the divided mesenteric attachment a lateral anastomosis should be done. In the ascending and descending colon, and at the hepatic and splenic flexures, a large portion of the posterior aspect of the bowel has no peritoneal coat, and the mesentery is short and wide, so that here there is no chance of making a complete peritoneal approximation in an end-to-end anastomosis, and therefore the lateral method must be employed. In the transverse and sigmoid colon the entire bowel is covered with peritoneum, and it can be drawn in over the mesentery. It is only in these situations that the end-to-end method should be used. Even in the transverse colon and the sigmoid, I would prefer the lateral approximation. In resection of the cæcum, the ileum should be anastomosed with the transverse colon under the omentum, and by the lateral method. End-to-side anastomosis is more difficult and not, I think, as satisfactory. Another great advantage of the lateral anastomosis is that if properly done there is little drag upon the line of suture. In order to prevent this drag the two portions of bowel beyond the anastomotic opening in both directions should be approximated by several interrupted sutures. Many of the failures due to leakage in end-to-end anastomoses have occurred because an unhealthy portion of bowel was involved in the anastomosing sutures. This is much less likely to occur in the lateral anastomosis, and the surgeon knowing that he is going to perform a lateral anastomosis is much less likely to leave any of the diseased bowel. The argument that more time is required for the lateral anastomosis, is without weight as a rule. Still another point in favor of the lateral anastomosis is that there is no danger of stricture developing at the line of anastomosis, as there certainly is in an end-to-end suture. Moynihan lays great stress upon the importance of dividing the bowel obliquely, especially where an end-to-end anastomosis is to be made, as in this way there is less danger of including in the sutures a portion of intestine the circulation of which may be impaired. He

reports that he has done seven resections of the cæcum and ascending colon with end-to-end anastomoses. In this series there was one death due to leakage. His more recent practice is to employ the lateral anastomosis. Bilton Pollard (*Brit. Med. Jour.,* Jan. 23, 1904) advocates the end-to-end method and reports several successful operations done for carcinoma. Another strong advocate of operating in two or more stages is Neumann (*Deut. Med. Wochenschr.,* xxxii, No. 14), who details six cases of carcinoma of the colon in which he first practiced drainage and later resection. His results would certainly warrant his conclusions. Jonas (*Jour. Amer. Med. Assoc.,* Sept. 15, 1906) reports 16 cases of cancer of the colon in 15 of which resection was done. In this series he had 12 operative recoveries and three deaths. The three deaths were all due to a leakage at the point of anastomosis, and in each of these a Murphy button had been used.

In the first three of my own cases I did an end-to-end anastomosis; death occurred in one eight hours after operation, and leakage in the other two; in one a Murphy button was used, and perforation took place and the button dropped out of the bowel into a pocket behind it. Death occurred on the twenty-third day. In the third case simple suture was used, and the patient recovered in spite of a fecal leak and remains well to-day. In the last seven cases lateral anastomosis with simple suture was done. Leakage occurred in three and death in two cases. One died on the twenty-fifth day and one on the fourteenth. My own experience, then, tends to confirm that of the other operators already quoted who favor lateral anastomosis.

4. As regards the best method of making the anastomosis, I would say that it is difficult and practically useless for one operator to say what is the best method of suture to be employed by another in making intestinal anastomoses. I would advise one to use that method with which he is most familiar and which has given him the best results. There is one exception to this statement, however, and that is that some method of suture is far preferable to any mechanical device such as a button or a bobbin. I employed the Moynihan

operation, done with the aid of the Doyen forceps, in all of my cases excepting Case III, in which the Murphy button was used with subsequent necrosis and perforation. In my recent cases I have used a through-and-through suture of catgut and reinforcing suture of celluloid thread or silk. Some such forceps as those of Doyen facilitate the operation considerably, as they control the fecal current and also enable the operator to manipulate the bowel with the least possible traumatism. I have never used the Magraw suture, but those who have speak well of it. Most surgeons have now become convinced that the large intestine is no place for the Murphy button, and no one has tried to impress this upon the profession as much as Murphy himself. He states ("Year Book of Surgery, 1908") that for years he has advised against the use of the button in large intestine anastomoses excepting possibly in lateral anastomoses high up in the colon, and in these cases the oblong button should be used. This advice probably answers the question as to the utility of the button in these cases—and my own experience confirms it. Numerous cases have been reported in which the button has either become blocked by a mass of fecal matter, or in which pressure from it has produced necrosis and leakage. This is well illustrated in my second case.

5. Should drainage be used if the peritoneum is not already infected? This question is not so easily answered. Given a case in which there is no obstruction, no peritonitis, the bowel wall healthy at the lines of resection, and the intestinal tract well emptied before operation, I should use no drainage. This proposition, however, presumes an early diagnosis, which is by no means a rule in cancer of the colon, and a thorough preparation of the patient before the operation. In but two of my cases did I close the abdomen without a drain; one got well in spite of a leak, and is well to-day, four years after operation; the other died on the fourteenth day with leakage due to sloughing of the bowel at the line of approximation. This was Case X, and I believe that it might have been saved had a Paul's operation been performed instead of an immediate anastomosis. In the

eight other cases I used drainage and had a fecal leak in but three; one was the case in which the Murphy button was employed, and who died on the twenty-third day; another recovered in spite of the leak, and the third died on the fifth day. I believe that leakage does not depend so much on drainage or no drainage as on the character of the intestine and the accuracy of the suture. My own greatest error in this series was in doing resections without first draining the bowel thoroughly, the result of which was that the proximal portion of the bowel was in poor condition and the anastomosis put to the severe test of having to stand at once the strain of the passage of hard masses of fecal matter and a quantity of irritating and septic intestinal contents. I believe on the whole that drainage is better than no drainage in large intestinal anastomoses. The drain should be a small one and should not rest directly upon the line of suture, as this only invites a leak.

6. To what is the operative mortality due? One of the surprising lessons learned from the study of my own cases and from those of others is that the immediate operative mortality is remarkably small, and that the late operative mortality is large. In my ten cases I have had five operative deaths. Case I died eight hours after his operation, when he was suddenly taken ill with cardiac symptoms. At the autopsy in this case the patient was found to be suffering from a marked endocarditis; he also had a large aneurism of the thoracic aorta. Dr. Longcope thought that the cardiac condition alone was enough to account for the sudden death. There was peritonitis at the time of operation in this case, and even if the patient had not died of his cardiac condition I think that he might have died of the peritonitis. Case II died on the twenty-third day after operation, from infection due to necrosis of the bowel with fecal leakage. Case VI died on the sixth day after operation, apparently from septic intoxication. Case VIII died on the twenty-fifth day after operation, from a low grade infection and fecal fistula. Case X died on the fourteenth day from the same cause. It will be observed that there was but one prompt death after the

operation, and that from a cardiac condition, and that there were but two deaths within the first week. It is apparent, then, that the operative mortality is due to conditions which do not produce death under a number of days. In other words, the shock in spite of the prolonged operation, the age of the patient and even his bad condition, is not a significant factor in the mortality. The deaths result most frequently from necrosis of the bowel and leakage, and this necrosis in most instances is due not to a faulty method of suture but to the fact that the proximal portion of the bowel is in bad condition from either complete or incomplete obstruction. I am convinced that if the bowel was drained more frequently before the anastomosis was done the operative mortality would decrease considerably. The best operative results have been obtained where this primary drainage was employed. Moynihan has collected 100 cases of resection for malignant disease of the colon from recent literature, the results of which are particularly interesting. In 68 cases a primary resection was done with 22 deaths, a mortality of 32.3 per cent.; in 12 Paul's operation (resection and drainage followed later by anastomosis) was done with one death, a mortality of 8.3 per cent.; in 17 colostomy was done first and resection later, with 3 deaths, 17.6 per cent.; in 3 ileocolostomy followed by excision, one death, 33.3 per cent. The ultimate results in these cases are given in answer to the last question.

7. Is the ultimate mortality due to too limited excision of the growth? I do not believe that it is. Most of the recurrences that have taken place have not developed at the site of the previous resection. It is well known that glandular involvement in carcinoma of the colon takes place very late as compared with malignant disease elsewhere. In fact, obstruction often occurs before any extensive glandular involvement has taken place. Again, we all realize the importance of going well above the seat of disease, and many times we are compelled to make wide excisions because of the poor circulation of the proximal portion or because of the inaccessibility of the colon near the growth. In cancer of the cæcum the entire ascending colon should be removed, if for no other

reason than because an anastomosis between the ileum and transverse colon is better than an anastomosis between the ileum and the ascending colon. In cancer of the hepatic flexure the ascending colon and cæcum should be removed for the reason that ileocolostomy is of easier performance and produces better results than an anastomosis between the ascending and transverse colon. William J. Mayo reminds us that in 4 cases out of 5 the middle colic is the sole blood supply of the transverse colon, and unless these vessels are involved they should be preserved, else the whole transverse colon will become necrotic. In my series of 8 resections for cancer 3 recurred and one died one year after operation from recurrence without obstruction. Case IV died nearly two years after the excision of the cæcum for tuberculosis and 20 days after a second excision of the transverse colon for the same condition. Three patients are well at the present time. Case III, one of carcinoma, is well four years and two months after operation; Case VIII, one of carcinoma, is well fourteen months after operation, and Case IX, one of tuberculosis of the cæcum, is well four months after operation.

In close accord with my own results are those reported by Völcker (*Presse Médicale*, Oct. 10, 1908; "Year Book," Murphy, 1909) from the Heidelberg Clinic. He gives a study of 101 cases of cancer of large and small intestine, and concludes his paper with the statement that resection of the cancerous intestine is a very serious operation (50 per cent. mortality), but the patients surviving have a good chance of permanent cure (10 out of 17 survivors, 58.8 per cent.). In Moynihan's table of 100 cases he referred to the after history as given in 64 of the 73 cases which recovered from the operation: 17 were well at the end of six months; 15 at the end of one year; 15 at the end of two and a half years; 4 at the end of three years; 2 at the end of four years; one at the end of five years and 2 at the end of seven years. It will appear, then, that if we can improve our operative mortality our ultimate mortality will compare favorably with that following operations for carcinoma elsewhere.

SURGICAL ASPECTS OF CHRONIC HYPERTROPHIC ARTHRITIS.

BY GEORGE P. MULLER, M.D.,

OF PHILADELPHIA.

Associate in Surgery in the University of Pennsylvania; Assistant Surgeon to the University Hospital; Consulting Surgeon to the Chester County Hospital.

THE study of chronic disease of the joints has become enhanced in interest in recent years by the special attention given to those forms generally called rheumatoid arthritis or arthritis deformans. A perusal of the recent literature gives one the impression that the study of this disease is of comparatively recent date and that heretofore all chronic joint disease, not of distinctly infectious origin, was generally classed under the heading of chronic rheumatism. But although the use of the X-ray has made many of the symptoms and signs of the bony lesions more easily comprehended we have made but little advance in the study of the etiology of the affection nor have we learned to check the deformities with certainty. We have simply supplied new names for old conditions and the writings of Charcot, Garrod, Heberden, etc., are nearly as accurate as more recent and therefore better known writers.

The great variety of the lesions, the lack of unifomity in the symptoms, and especially the uncertainty of the etiologic factors are responsible for the existing confusion in nomenclature, there being almost as many classifications as there are monographs on the subject. Broadly, chronic joint disease can be divided into those of infectious origin and those which are supposedly non-infectious; the latter embrace those caused by a distinct trauma, by some dyscrasia such as hæmophilia, by some purely functional cause, and those types associated with anatomic change and deformity.

A deforming arthritis may arise as an apparent primary affection, may be secondary (reactive) to disturbed nutrition of the joint, or may be neuropathic, as in tabes or syringo-

myelia. By a process of exclusion we may arrive at a classification embracing a variety of chronic joint affections which at first seems all sufficient to comprise the clinical material. Actually, in a given series of cases, we may see similar lesions and symptoms due in one patient to a trauma, in another to a well-established previous attack of acute articular rheumatism, in a third to some metabolic disorder, and in a fourth without discoverable cause. An attempt was made a few years ago in England to study rheumatoid arthritis by means of a small hospital where patients could be received for a short time and studied. Bulletins were issued under the leadership of Dr. T. S. P. Strangeways and valuable information gained, but the work was discontinued for lack of funds.

Hypertrophic arthritis, sometimes called osteo-arthritis, is that form of chronic joint disease characterized by a hypertrophy of the cartilage and bone and the formation of osseous spurs at the margins of the articular cartilages or at the attachments of the ligaments. Males of about 45 years of age are most liable to be attacked, and cold, exposure, strains, and various forms of trauma are considered as factors in the etiology. Rimann in a recent paper found 25 knee-joints affected in 100 post-mortem subjects, the disease being in various stages, and in 17 the cause of death was arteriosclerosis in some of its manifestations, in 4 tuberculosis, and in 4 carcinoma. As to the exact cause nothing but speculation has so far been indulged in, the most generally accepted theory being that an autoinfection from defective metabolism causes a fibrous metaplasia of the cartilage, capsule, and ligaments, a thickening from osteosclerosis of the ends of the bones and a proliferation of the bony tissue from the diseased cartilage which is not subjected to pressure.

The cartilage and bone seem to bear the brunt of the disease, as the synovial membrane is not much thickened; there is little villous hypertrophy nor is there much fluid present unless there has been a recent sprain. The cartilage is thickened, glistening, and dense in appearance and at its margin, *i.e.*, at the junction with the synovial membrane, is congested,

often bluish and elevated into ridges and nodules. The latter are most apt to occur at the lateral margins of the knee-joint, along the epiphyseal line and superior lip of the acetabulum in the hip and extending into the lateral ligaments of the fingers, in which case the term Heberden's nodes is often used. If erosion of the cartilage occurs it takes place at points where pressure is brought to bear and is of the nature of decubitus erosions. Detached pieces of cartilage are but rarely observed. The bone is thickened and the cartilaginous masses referred to become ossified and form the characteristic spurs. If erosion of the cartilage takes place the bone may become eburnated, with a polished surface and usually white in appearance, although discoloration with blood pigment may give a reddish color. Ankylosis does not appear to supervene, as a rule, probably from the lack of deposited fibrin. Microscopically the cartilage is thickened and fibrous, the bony trabeculæ are large and thick but there is no evidence of endarteritis nor of a cellular infiltration. Without digressing further I wish to present the following case observed on the service of Dr. C. H. Frazier in the Hospital of the University of Pennsylvania and to whom I am indebted for the privilege of operating upon the patient:

C. W. B. (No. 914); age 69; male. Was first admitted to the University Hospital March 29, 1905, with the following history: Has always been exposed to cold and wet, first as a seaman and later as a locomotive engineer. Had several attacks of gonorrhœa and twenty-five years ago contracted syphilis. Five years ago (August 10, 1900) an enlarged bursa was removed by Dr. Frazier from his right popliteal space and he dates the present trouble from about the same time, although not to the effects of the operation nor to the bursa itself. He suffered from severe pain in the knee when the right leg was extended which, radiating up the thigh, was increased by use. The leg never became locked in flexion or extension. It was believed that he was suffering from some hypertrophy of the synovial membrane with "pinching" of the fringes. On March 30, 1905, Dr. Frazier explored the joint and found the lipping characteristic of a hypertrophic arthritis without displacement of the semilunar cartilages. He

was discharged April 12, 1905, with the instruction to rest the knee as much as possible and to wear an elastic support. He returned several times during the next three years but was merely examined and various forms of local applications prescribed, including the use of the baking apparatus. He was able to work as an engineer until September, 1907, without much pain or serious inconvenience, although he noted that the joint was increasing in size. From this time on the knee began to pain considerably and he was forced to give up working, but could get around with the aid of a cane. He returned to the University Hospital April 11, 1908, and was anxious to have an amputation done if the pain could not be otherwise relieved. The right knee was visibly enlarged but was not very tender nor were there any signs of effusion, the hypertrophy to the touch and to the X-ray being due to bony overgrowth. His joints were generally prominent and some of the metatarsophalangeal joints were also the seat of bony hypertrophy, but they caused no annoyance. The feet were flat and the legs showed varicose veins. He had no prostatic, cardiac, or renal troubles. On April 13, 1908, I opened the joint by a transverse elliptical incision below the patella which disclosed the typical appearance of the disease. The bony outgrowths not only involved the edges of the joint but extended upwards on the anterior surface of the femur for 2 inches. The posterior surface of the patella was similarly involved. The semilunar cartilages were small and narrow, the synovia thickened and slightly congested, there was merely a glairy fluid in the joint, and the internal articulating surfaces showed sufficient erosion of the cartilage to bare the bone. It was thus seen that the creaking and pain were evidently produced by the grinding of the bared bony surfaces and the enlargement and thickening were due to the bony outgrowths. Removal of the latter did not seem to offer any prospect of relief from pain and accordingly I performed a formal excision of the knee-joint. As an arthroplasty was also not deemed advisable the femur was sawed so that its diameter would approximate that of the tibia and allow of fixation in a slightly flexed position. The exostoses were chiselled from the shaft of the femur and from the under surface of the patella. The lateral ligaments were sutured and the patella drilled and fastened over the line of excision by catgut sutures. The skin was closed without drainage and the limb placed on a posterior splint. Healing by first intention resulted and a week

after operation a plaster-of-Paris cast was applied. The patient was discharged June 10, 1908, on crutches with apparent bony union. He returned, however, on July 28, 1908, with pain in the knee and a slight degree of motion, the pain being sufficient to prevent him from working. An X-ray picture showed a distinct line between the ends of the bones and after a week in bed I again operated (August 8, 1908) upon the limb. After dividing the hamstring tendons, a transverse incision was made over the line of excision and the bones pried apart with a chisel. The ends were well curetted and a groove chiselled on either side of the femur one inch above the line of union and from which the bones were fastened together by two silvered steel screws two inches long. The grooves had the effect of countersinking the heads of the screws and enabled them to be driven almost downwards. The wound was again closed without drainage and the leg placed immediately in a cast. It once more healed perfectly and on October 22, 1908, the patient was discharged with bony union, the leg being protected by a light steel brace at the knee owing to the spring of the long lever from hip to ankle. I heard from him in December and he was walking on the limb with but little disability and no pain.*

The treatment of the various manifestations of hypertrophic arthritis will seldom be surgical. Pain, swelling, stiffness, and deformity are the symptoms calling for relief, and an earnest attempt should be made to determine the etiology of the case. Any form of chronic infection, whether from the tonsil, intestine, prostate, etc., must be eradicated, the diet carefully regulated, general massage ordered, and rest of the limb enjoined, preferably by extension if the hip or knee is involved or affected. In hypertrophic arthritis it is obvious that incision and drainage of infected fluid is never indicated, as the disease has never been shown to be due to the presence of bacteria in the joint, nor is there any effusion. The swelling is essentially due to thickening of the bones and the presence of bony outgrowths upon the tibia and femur at the edge of

* After reporting this case to the Academy of Surgery I saw this patient in June, 1909. He had discarded his brace, had been drinking heavily and was in wretched physical condition. The knee pained him considerably at the site of the screws. I advised their removal but he has not returned.

their articular cartilages and which in most cases does not require operative interference. The performance of excision as a primary operation is not generally countenanced although in Germany a number of surgeons have performed this operation in the hope of arresting the disease in other joints. But it is probable that they have confused the acute stage of hypertrophic arthritis with an infectious polyarthritis in which disease prompt operative interference must soon be considered as the treatment of choice.

Pain due to the grinding together of the swollen and eroded cartilages can usually be relieved by rest and extension. When the acute stage has passed, active hyperæmia tends to prevent recurrence of pain, but occasionally, as in the case reported, every attempt made by the patient to resume his occupation is followed by a recurrence. This is especially true in the knee- and hip-joints, and for such cases I would urge the performance of excision, provided that a careful trial of other methods has been practised.

Stiffness or limitation of motion is due to the presence of thickened bone and of the bony outgrowths from the margins of the cartilages, and while the latter can be removed to some extent it will be apparent that in most cases such an operation would have to be very extensive to effect complete removal. When the hip is involved Goldthwait advises the removal of the entire head of the femur in preference to an attempt to remove the individual nodes, and recently Albee has reported 5 cases of partial excision of the articulating surfaces of the femur and acetabulum by a new method, with relief of the pain in every case and the ability to walk without crutches. Sometimes the spurs project into the joint and produce a hypertrophy of the synovial membrane. In occasional instances they may become detached and form loose bodies in the joint, in which case arthrotomy may be necessary.

Deformity is best treated by prevention during the acute stage which if properly managed will be found on subsidence to have resulted in but little change in the relation of the bones. If ankylosis in bad position does occur, especially in the knee or hip, osteotomy must be considered.

INSTRUMENTS FOR OPENING THE SKULL.

Dr. William W. Keen exhibited an apparatus, consisting of a brace with four bits, devised by Dr. W. H. Hudson of Montgomery, Alabama. The peculiarity of the first two (the smaller) bits is that one can penetrate through either a thick or thin skull as far as the dura and the bit will go no farther. The others are globular bits and they will penetrate, but they are provided with a slight button on the end so that when the entire thickness of the skull is penetrated, even if the middle meningeal be directly under the drill, it will be pushed off, provided it is not in either a narrow groove or in a foramen. If it is, of course any drill would cut it just exactly as the ordinary saw or chisel would. The advantage of these bits is that one can very quickly make four openings and then can add three more, intermediate openings if desired, and introduce from one to the other a Gigli saw or bite the bone between them by Devilbiss' or other forceps as desired, turning down a flap in a very few minutes.

In Dr. Keen's opinion these bits provide the best means yet devised for opening the skull, having the safety of the chisel and the speed of the saw.

STATED MEETING, HELD OCTOBER 4, 1909.

The President, Dr. William J. Taylor, in the Chair.

STRANGULATED INGUINAL HERNIA IN A TWO-WEEKS' OLD INFANT.

Dr. John H. Jopson reported the case of a two-weeks' old infant seen by him June 24, 1909, with a history indicating that a hernia had been down about 24 hours. Under taxis, reduction seemed to be effected, and a wool truss was applied. On the following morning the infant was brought to the Presbyterian Hospital with the hernia again protruding and fecal vomiting. Under chloroform, herniotomy was done. The edges of the sac were sutured with the edges of the canal and the external ring, a typical Bassini operation not being possible. Uncomplicated recovery. Dr. Jopson remarked that the strangulation of a hernia while not a very common accident in children, was proportionately more common in early infancy than in older children. It has been his experience that an operation is less frequently required to reduce a strangulation in infancy than is the case with adults. Hence taxis should always be given a trial in cases seen early, unless there is some distinct contra-indication. With regard to the frequency with which operation is required, it would seem that there has been a tendency to underestimate rather than to overestimate the number of cases that have called for operations. Coley quotes the statistics of Estor in this connection. Estor was able to collect 225 cases of strangulated hernia in children under two years of age, but found that in nine of the largest of the largest clinics of Europe the records showed not a single case. At the Hospital for Ruptured and Crippled only 17 had been operated upon in children, and of these 12 were under two years of age. Telford, as quoted by Ashhurst, collected 224 cases under four years that had been operated, and of these 112 were infants under six months, and 13 were given by Ashhurst as one month old. Fifteen cases were added by Ashhurst, the youngest 14 days, and the oldest 14 months. Dowd analyzed 125 cases under one year. It will thus be seen that the number of cases available for study is quite respectable. Mortality has been quite