CASE 50.—Herbert T., aged fourteen years. September 26, 1911. Episcopal Hospital. Right, middle third. Dressed in full supination. Examined January 21, 1912. Some callus palpable. Right forearm: supination, —10 degrees; pronation, 155 degrees. Left forearm: supination, —10 degrees; pronation, 140 degrees. Class I.

CASE 51.—John D., aged eighteen years. October 10, 1911. Episcopal Hospital. Right, junction of middle and upper third. Full supination. Some projection of upper fragment of radius on flexor surface. Examined January 28, 1912. Slight callus of radius. Right forearm: supination, 40 degrees; pronation, 135 degrees. Left forearm: supination, —5 degrees; pronation, 120 degrees. Class III. (This patient was under the care of the writers only seventeen days.)

CASE 52.—Stanley C., aged fourteen years. October 10, 1911. Episcopal Hospital. Left, lower third of radius, and through lower epiphysis of ulna. Full supination. Examined January 27, 1912. Left forearm: supination —15 degrees; pronation, 160 degrees. Right forearm: supination, —5 degrees; pronation, 160 degrees. Class I.

STATED MEETING, HELD FEBRUARY 6, 1911

DR. GWILYM G. DAVIS in the chair.

DISJUNCTION OF UPPER EPIPHYSIS OF ULNA.

DR. PENN G. SKILLERN related the history of a boy aged 9 years who presented himself at the surgical dispensary of the Children's Hospital September 10, 1909, with the history of a fall from a height of 10 feet onto his left elbow. In the absence of Dr. Ashhurst he was examined by Dr. Skillern, who discovered moderate pain, moderate swelling about the elbow, and localized tenderness at the upper extremity of the ulna. At this point a small fragment corresponding to the olecranon tip could be grasped and moved from side to side. Between this fragment and the triangular subcutaneous surface of the olecranon was a depression admitting the tip of the little finger, which was rendered more distinct on flexing the forearm and diminished by extending it. Approximation of the fragments in complete extension elicited muffled crepitus. The arm was splinted in complete extension and the epiphysis held in juxtaposition with the bone by an adhesive strip. A skiagram revealed disjunction with slight mesial displacement of the upper epiphysis. (Figs. 1 and 2.)

Dr. Skillern said that this injury is not mentioned in the text-books or in the literature of surgery. It is, however, referred to in Piersol's "Anatomy" (p. 285), and receives full consideration in Poland's work on "Traumatic Separation of the Epiphyses" (p. 457), in which it is stated that: "the olecranon epiphysis is but a small process, occupying little more than a third of the whole olecranon at about the tenth year. In this cartilage ossification appears at the summit of the olecranon as a single nucleus usually at this period—in rare cases a year or two sooner—and rapidly invades the whole. In the fully ossified state, at the fifteenth year, the epiphysis comprises the upper aspect of the olecranon with the insertion of the triceps, part of the attachment of the posterior ligament of the elbow-joint, and a small portion of the upper part of the triangular subcutaneous surface posteriorly; on the inner side it is above the tubercle for the flexor

carpi ulnaris. The epiphyseal line slopes obliquely downward and backward from the articular surface in front, viz., the upper part of the sigmoid cavity. The epiphysis unites with the shaft at the seventeenth year.

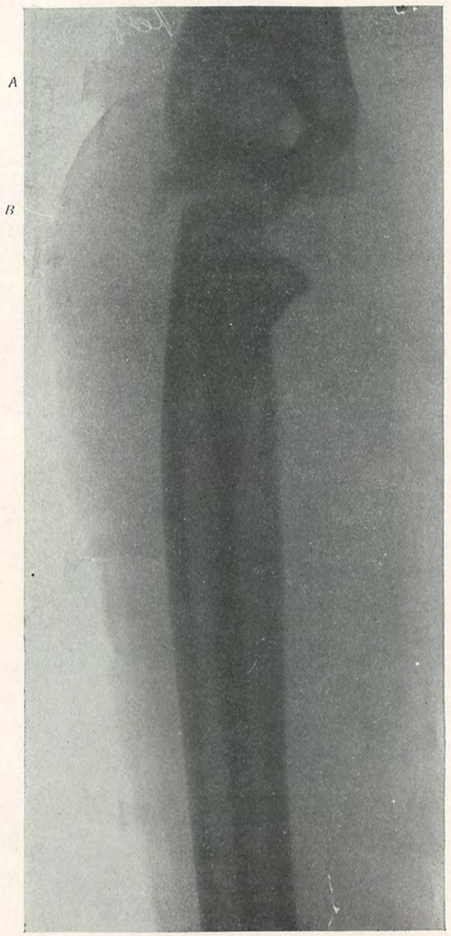
"In regard to age, separation of the whole cartilaginous upper end of the ulna is possible only before the eight year or thereabouts, and pure separation of the olecranon epiphysis can only occur from about the tenth year to the seventeenth or eighteenth, the time of junction with the epiphysis. The rarity of this injury in children, as compared with fractures of the olecranon process in adults, may be accounted for to some extent by the small size and less prominent projection of this process in the former. The posterior aspect of this epiphysis in children before the fourteenth year is on a plane anterior to that of the epicondyles and posterior aspect of the diaphysis of the humerus when the elbow is at a right angle. Consequently, in falls upon the elbow and in other injuries, the force of the blow is much more likely to be received by the epicondyles than by the olecranon.

"The injury is commonly caused by a fall upon the back of the elbow while the elbow is in a flexed position, or by some other direct blow. From indirect violence, either extreme flexion or hyperextension of the elbow may cause disjunction. As for muscular action, it is questionable whether in children violent contraction of the triceps brachii is sufficiently powerful to detach this process, unless it be combined with one or other of the causes mentioned above."

The symptoms, prognosis, and treatment of this disjunction do not differ essentially from those of fracture of the olecranon.

Even fractures of the olecranon before the fifteenth year are rare. Thus, in the table of 2705 fractures treated at the Middlesex Hospital during sixteen years inserted by Flower and Hulke in Holmes's "System of Surgery" (1881, vol. i, p. 845), 76 of the 2705 were fractures of olecranon, and of these 76, 10 occurred before the fifteenth year. The diagnosis of disjunction in this case was suggested by the fact that the patient was in the epiphyseal age,—an important consideration, since, as Poland states, the annual surgical reports of several of the London hospitals mention in their statistics numerous cases of fracture of the olecranon before adolescence, many of which were probably

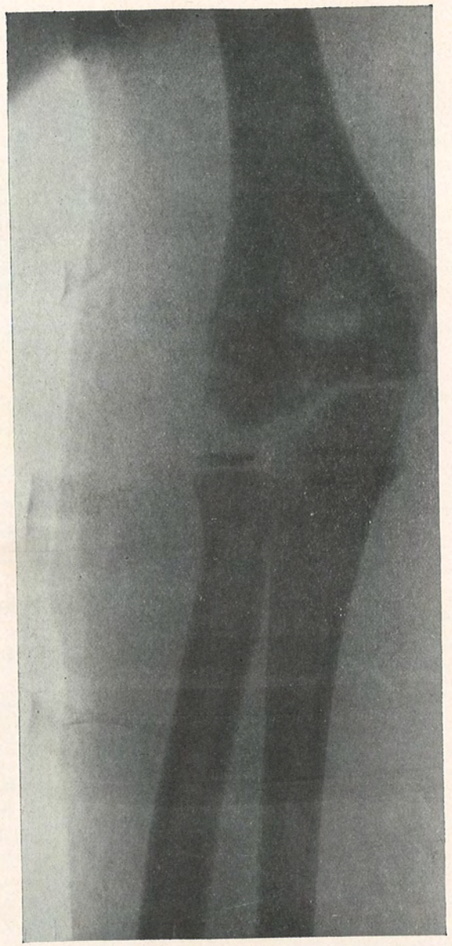
FIG. 1.



Skiagram of ulna showing separation of upper epiphysis.

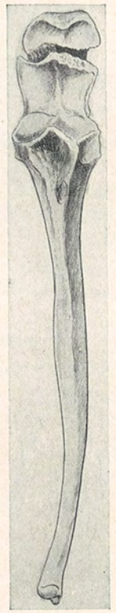
(*a*) Adhesive strip applied over epiphysis.
(*b*) Disjuncted epiphysis.

FIG. 2.



Skiagram of ulna, showing separation of upper epiphysis.

FIG. 3.



Sketch of an ulna from a lad fourteen years of age. Shows extent of olecranon formed by upper epiphysis.

examples of epiphyseal separation. The point may be raised that here, in the case of the olecranon, it is rather an affair more of academic interest than of practical import whether disjunction or fracture has occurred, since in disjunction the growth of the ulna is not interfered with. Yet the speaker thought that many epiphyseal disjunctions in children, especially where no skiagram is made, are mistaken for fractures, and that on the whole it is far better to recognize disjunctions than to stop short of further investigation and diagnose and treat as a fracture. His own working rule in this respect is that since all minors are in the epiphyseal age, severe injuries about the joints should be considered epiphyseal disjunctions until proven otherwise. It is well known that epiphyseal disjunction is more apt to occur than dislocation in childhood, because the epiphyseal unions are weaker than the articular. He believes that in the future epiphyseal disjunctions should be accorded a more prominent place in the text-books than at present. The accompanying sketch (Fig. 3), made by Mr. Erwin Faber, of an ulna from a child aged fourteen, shows just how much of the olecranon is formed by the upper epiphysis.

Examination of the patient at the present time, eighteen months after the injury, reveals perfect function of the elbow-joint.

LAMINECTOMY FOR INJURY AND TUMOR OF THE SPINAL CORD.

WITH A REPORT OF SIX CASES.

BY GEORGE P. MULLER, M.D.,

OF PHILADELPHIA,

Associate in Surgery in the University of Pennsylvania; Surgeon to St. Agnes Hospital; Assistant Surgeon to the University and Philadelphia Hospitals.

PROGRESS in the surgical treatment of injury and disease of the spinal cord seems to make haste slowly and to be the subject of considerable argument and disagreement among those whom we may consider as authorities. At one extreme is the opinion recently given by Estes:[1] "Early operation offers the only chance for life in a case of complete transverse lesion high up in the cord; it may not only preserve life, but also in a few cases restore some degree of usefulness to paralyzed parts when the lesion is from the middorsal region downwards." On the other hand Spiller and Allen believe that a study of spinal cords removed in cases of fracture will induce a very skeptical attitude and doubt as to whether operation is of much advantage and as to whether the chances would not be greater for the patient without it. They believe that the only effect secondary degenerations could possibly have, would be to *prevent* recovery. They do not believe that hemorrhages or œdema are imperative causes for operation. Starr, however, believes that, "if the cord is only partially injured, an operation may do good when it is evident that the symptoms are kept up by a permanent compression." But he believes that, in the majority of cases, it is necessary to refuse operation because without evidence of pressure an operation can have no result, as the nervous symptoms are due to actual permanent destruction of spinal cord tissues *incapable of repair*. Murphy also states that, "in fractures with division of the true cord, operation with suture of the cord is

[1] Amer. Jour. Surg., 1910, vol. xxiv, p. 341.

absolutely worthless, as functional regeneration of the column of gray matter never takes place."

All theoretical reasoning, all experimental evidences, however, seem to be set at naught by the reported instances of recovery of more or less power after complete severance of the cord, in Harte and Stewart's celebrated case, in those of Fowler, Briggs, and Sherris, and in two others recently reported by Estes. Also in the cases of perforation by bullet reported by Pilcher, Pegram, and Haynes.

In the first case reported by Estes he made "a complete section of a disintegrated cord, at the first lumbar vertebra, removed about three-quarters of an inch of the cord, squared the ends, and brought them together with sutures. The man was considerably improved as regards trophic and sensory disturbances, but never regained the use of his lower limbs."

In the second case he resected more than half the thickness of the cord in the lower dorsal region at the level of the ninth and tenth dorsal, leaving the anterior column only intact, and drew the ends of the lateral and posterior columns together by suture. Sensory and trophic paralysis improved almost immediately. The patient finally recovered the use of the left lower extremity, the use of the flexors of the right extremity, and almost entirely the use of the sphincters. By the aid of a brace he can walk with comparative ease.

Such evidence is, of course, impossible to refute, but taking all the evidence bearing upon cord suture, it seems highly improbable that such a procedure can be of any value. Operations for conditions depending simply upon compression of the cord, however, seem to offer sufficient encouragement to warrant operative interference in practically all cases.

Another phase of spinal cord injury is equally as interesting, namely, concussion, a term accepted by some and rejected by others. Stacks of literature have been written about it, and many an expert witness has been paid a fee for testifying to its existence, but "to the impartial observer the conviction must be inevitable that the weight of evidence is against the existence of the condition" (Bailey). Many of the state-

ments in favor of the state of concussion have been derived from the finding by the surgeon at operation of an apparently normal cord, but we now know that tremendous damage may be done to the cord, the white and gray matter being shaken up together and indistinguishable, or one driven like a wedge into the other, and yet no visible external change is discernible. The comparison with a numbed and tingling nerve or with concussion of the brain is not a true one, as the surroundings of the cord are entirely different and the symptoms of its injury never transitory.

With this brief and fragmentary introduction I wish to report the following cases. I will greatly abridge the histories:

Case I.—A man, aged twenty-five, was hit by a locomotive engine on July 4, 1910. He was picked up unconscious, and was sent to the Chester County Hospital. In a few hours he regained consciousness, and it was noted that there was complete sensory and motor paralysis below the tenth dorsal segment. The sphincters were paralyzed, but priapism was absent. As no improvement was noted in 48 hours, the attending surgeon, Dr. Woodward, asked me to assist in the performance of laminectomy. I found the conditions as described and a depression in the back over the tenth dorsal vertebra. We were afraid to attempt to elicit crepitus. There were no tests for heat and cold sensation made. The reflexes were absent.

Laminectomy was performed on July 6, 1910, under ether anæsthesia. I found the posterior spinous process of the tenth dorsal vertebra fractured at its base, and the laminæ of the same vertebra also fractured and the fragments driven in to the neural canal. They were removed and some hemorrhage encountered external to the dura, which membrane seemed œdematous and thickened.

The posterior portion of the ninth vertebra was next removed and the dura opened. The spinal fluid was under tension, and the cord appeared congested at the site of injury, but no other abnormality was noted. There was no hemorrachis. The dura was sutured with fine chromic catgut, the muscles and fascia with chromic catgut, and the skin with silk. A small

cigarette drain was placed between the muscles and removed in 48 hours. Two days after the operation sensation began to improve and four days after operation motion began to appear. On the fifth day control of the bladder was regained. A bedsore developed at the end of the first week and gave considerable trouble owing to the fear of infecting the wound. He was sent to the County House at Embryville in the fall and I saw him on December 7, 1910. He had perfect restoration of sensation as far as I could determine, could walk with ease although a little stiffly, could rise from a chair without using the hands, and had perfect sphincteric control. His back was strong, and he would not wear the brace we had procured.

Case II.—A man, aged thirty, was injured in December, 1909, by a large rock falling on his back. He experienced loss of motion and sensation in the lower limbs and loss of sphincteric control. He remained in a hospital three weeks and at his home seven months without improvement. He was admitted to Dr. Frazier's service in the University Hospital, August 6, 1910.

On August 10, 1910, the patient was examined by Dr. McConnell, who reported as follows: "The patient shows a complete paralysis of both lower extremities, no movement being made by either the thigh or leg muscles. There is very marked toe-drop, with contracture of the flexor tendon and tendo achillis. The palsy of the thigh muscles is flaccid with contraction of the extensors. All reflex in the lower extremities is lost. There is very marked atrophy, relatively more in the thighs than in the legs. He has complete loss of sensation for touch and pain in both legs up to the head of the tibia on the inner side of the leg and in the thighs corresponding very closely to a line drawn from the great trochanter to the inner side of the knee and from here to the pubic spine. This leaves an irregular triangular area in which sensation to touch and pain is preserved. The posterior surface of the thigh between these two lines shows analgesia and anæsthesia, which extend over both buttocks as high as a line drawn from one great trochanter to the other. This area of analgesia and anæsthesia involves the scrotum and the perineum, also the penis. The cremasteric reflex is present on both sides."

Laminectomy, August 15, 1910, under gas-ether anæsthesia. A longitudinal incision was made over the last thoracic and the

first three lumbar vertebræ. The first lumbar vertebra was distorted and evidently the seat of an old fracture. It projected into the neural canal. The posterior portions of the first and second lumbar vertebræ were removed, the dura was opened, and a cystic condition found about the cord extending about one and one-half inches in length and immediately under the first vertebra. The dura was adherent to the vertebra and the cord adherent to the dura. After loosening the intraneural adhesions, the spinal fluid began to flow freely from the upper portion of the canal. The cord seemed to be intact, but was grayish in color, rather hard at its lowest portion, and the roots of the cauda equina were adherent. Several of the roots were freed from adhesions to each (combed out) but this was not extensively undertaken, as it was feared that they might be torn in the process. The dura was then sutured with a continuous catgut suture and the muscle closed with chromic catgut. A small rubber tube was inserted between the edges of the closed muscles and brought out on the back through a separate stab wound. The skin was closed with silk.

Forty-eight hours later the drainage was removed, and at the end of a week the stitches were taken out of the skin; the wound had healed by first intention. Seven days after the operation the patient's condition seemed improved, there was no return of motor power, but the area of sensation had widened. At the end of the second week the patient claimed that sensation had returned in a very slight degree over most of the foot and leg. He was discharged from the hospital two weeks later in the same condition.

If there is such a thing as concussion of the cord, then my first case represents such a condition, and perhaps the man would have recovered just as well without the operation. If such does not exist, a simple contusion or the results of œdema were responsible for the paraplegia, and the removal of the compressing bone must have helped in the recovery. In the second case, immediate operation was not performed, the arch of the vertebra continued to press on the cord, and who knows but what the hopeless result was caused or exaggerated by the organization of a cellular infiltrate caused by the compressing bone? The neurologists who refer to the injury to

the cord as having been done in the twinkling of an eye, and as beyond regeneration or help from the surgeon, speak from the experience of the fatal cases. The literature contains many instances of more or less complete recovery after operation, especially those cases in which the compression is caused by fragments which have been driven forward into the neural canal.

A few years ago C. E. Black reported a collection of 552 cases taken from the literature. Of the cases operated on, 49.2 per cent. recovered and 40 per cent. died; of those not operated on, 25 per cent. recovered and 65 per cent. died. The fracture cases gave the following figures: the mortality of operation in the cervical region was 71 per cent., without operation, 85 per cent.; in the dorsal region 48 per cent., without operation, 64 per cent.; in the lumbar region, 26 per cent., without, 50 per cent. Many of these cases are old and before the technic of aseptic surgery reached its present perfection.

Even as long ago as 1898 Prewit tabulated 49 cases of gunshot wounds of the spine treated since the aseptic era. Of this number 24 were operated on with 13 deaths, and 25 were not operated on with 17 deaths. Haynes collected the cases of gunshot injury from the date of Prewit's paper up to 1906 and found a mortality of 42.5 per cent. in the operated cases and 69.25 per cent. in those not operated on.

I believe that Bailey finds the true solution when he states that "somewhere between the two extreme positions the wisest course lies." In fractures and dislocations of the cervical and high dorsal regions operation should rarely be undertaken, unless there is evidence to show that comminution of the bones has occurred. The X-ray should be employed, as palpation for crepitus is too dangerous. In the lower dorsal, and especially in the dorsolumbar region, early operation offers a better chance for the restoration of function than the expectant plan. The mortality of laminectomy at the present time should be less than 10 per cent. in fractures below the middorsal region.

It may be of interest to recall that Steinmann has recently

collected 20 cases of forcible reduction of cervical dislocations without laminectomy, with 12 recoveries.

Tumors of the Cord.—Some 20 years ago the first successful extirpation of a spinal cord tumor was performed by Horsley.

In 1895 Starr analyzed 123 cases of spinal cord tumor, in 22 of which laminectomy was performed, with 50 per cent. mortality and 6 recoveries. In 1902 Collins collected 70 cases recorded since Starr's paper, with 30 operations and 12 successful results. In 1907 Oppenheim states that recovery takes place in about 50 per cent. of the cases presenting a typical clinical picture of extramedullary growth. Last year Bailey reported 6 cases in which extirpation was attempted, with 3 recoveries, 1 doubtful case and 1 death; Hunt and Woolsey record 11 laminectomies with 1 operative death and 4 successful cases out of 6 where the growth was extramedullary. In 1909 Oppenheim reported that he had obtained cures in 13 out of 25 patients with tumors in the spinal canal.

As soon as the diagnosis of tumor can be made with reasonable certainty an operation is indicated. I am not sure but that if I had symptoms even *suggestive* of spinal cord tumor I would have an exploratory laminectomy performed. In a case reported recently by Inglis, Klingman, and Ballin, an extramedullary glioma was removed quite early from a patient whose only symptom was sharp, circumscribed pain in the area supplied by the seventh thoracic nerve. A complete recovery resulted. Another interesting case with a fine result is reported by Moffitt and Sherman. It is generally impossible to differentiate positively between the intramedullary and extramedullary growths clinically, as pain may be absent and dissociated anæsthesia present in extramedullary growths; the patient should be given the benefit of the doubt. Bailey believes that the absence of anæsthesia contraindicates operation. The operation is supposed to be hazardous, and the statistics of Krause are now being quoted in support of this statement. He operated on 26 patients with 8 deaths. But if we compare Hunt and Woolsey's cases with only 10 per cent. mortality, the results seem better. Elsberg believes that operations for tumors of the spinal cord in the cervical region should be done in two stages, a small incision being made in the dura at the first operation through which the growth will extrude, thereby making it more easy of removal at a second operation.

Case III.—A woman, aged fifty-six, was admitted to the University Hospital August 18, 1910, complaining of weakness in the right hand and right leg. She was referred to me by Dr. D. J. McCarthy, and a more detailed report of the case will be made later.

More than two years ago the patient began to drag the lower limb, and shortly afterwards to weaken in the right upper limb. After a period of rest and treatment, the weakness of the right upper and lower limbs seemed to entirely disappear. In August, 1909, the condition returned and had been gradually increasing until the present time. In January, 1910, severe shooting pain was experienced, shooting from the right shoulder into the finger, which would feel as if drawn at times and the hand was numb. The right hand and arm were slightly swollen and cyanotic and extremely weak.

All of the movements of the right arm were weak and the shoulder motion much impaired. Passive motion was painful. The right lower limb was also weak, especially of the ankle and toes, where the power was slight. Patella reflex was prompt and exaggerated on the right side, but absent on the left. Clonus absent, Babinski typical on the right and uncertain on the left. The patient recognized the movements of the toes upwards and downwards on either side but made mistakes in locating the toe on either the right or left foot.

The sensation of heat and cold was normal in the right lower limb, in the right upper limb, and also in the left upper limb, with the exception that heat and cold were perceived more distinctly in the right hand. Ice water was felt as warmth in the entire left lower limb and left side of trunk, back and front, as far as about the third interspace. Pin prick was normal in the right upper and lower limbs, was greatly impaired in left side of trunk, back and front, as high as the third interspace. Pin

prick was not so acute in left hand as in the right. Tactile sensation was about normal everywhere.

Laminectomy, August 22, 1910, under gas-ether anæsthesia. The incision was made over the fourth, fifth, and sixth cervical vertebræ to the bony surfaces of the posterior spines. After cleaning off the muscles the laminæ of the fifth vertebra were removed and the dura exposed. The bones were extremely thin. The dura appeared normal, but pulsation was extremely faint. It was opened and the cord found normal in appearance and free from adhesions. Upon insinuating the Horsley separator upwards, a mass was felt just above the opening. Accordingly, the fourth and fifth spines were removed and the laminæ of the fourth vertebra rongeured away. After opening the dura still further, a tumor was found on the anterolateral aspect of the cord, oval in shape, and about 1.5 cm. in diameter. The anterior and posterior roots of the fourth segment were tightly stretched over the tumor, and the roots of the fifth were pushed upon. The cord itself was compressed and deviated to the left. The tumor seemed to grow from the pia arachnoid and not from the dura. The fourth root was gently pulled upwards on a blunt hook, and a slight incision made at the junction of the tumor with the cord, and the growth easily shelled out with the handle of a teaspoon. Comparatively little bleeding was encountered and it was soon checked. The dura, muscles, and skin were closed in the usual manner. Microscopic examination of the tumor revealed the appearance typical of endothelioma. The patient made a good operative recovery, and at the present time, six months' after the operation, is alive and well and rapidly improving as regards function.

The following two cases are reported to complete the series:

Case IV.—A Chinaman, aged forty, was referred by Dr. McCarthy from his ward in the Philadelphia Hospital to Dr. Frazier's service, with symptoms of compression of the cord referable to the twelfth dorsal and first lumbar regions. August 14, 1908, I performed a laminectomy of the first, second, and third lumbar vertebræ and found no tumor. September 4, 1908, I again operated and removed the eleventh and twelfth dorsal laminæ, and between these there was considerable connective

tissue, dense in consistency, and seeming to press upon or constrict the cord. It seemed to take origin from the intervertebral disc but was not cartilaginous. It was cut away with scissors and the wound closed. The patient recovered control of the bladder, and somewhat of sensation after operation, but never recovered the power to move the legs. He died in the Philadelphia Hospital one year later. Microscopic examination of the tissue removed showed no evidence of neoplasms, tuberculosis, nor syphilis.

Case V.—A colored man, aged forty-five, also referred from Dr. McCarthy's ward in the Philadelphia Hospital to Dr. Frazier's service, had been operated upon previously in another hospital and his prostate removed. It was said to have been carcinomatous. He was suffering from a paraplegia and intense pain due to compression of the lower portion of the cord and roots. I performed laminectomy, September, 1908, at the Philadelphia Hospital, and found much softening and disease of the third and fourth lumbar vertebræ, but was not able exactly to ascertain whether there was pressure on the cord or not. The muscles and the bones bled considerably during the operation, and twenty-four hours later the patient died from shock.

Cysts.—Circumscribed spinal serous meningitis as a distinct disease has been recognized since 1903, and a number of cases have been reported since then. Last November, in association with Dr. T. H. Weisenberg, I reported [2] a case successfully operated on and discussed the condition. This patient (Case VI) had the laminectomy performed on March 16, 1910, at which time a cyst was found at the level of the tenth dorsal vertebra. At the present time the patient has entirely recovered from the symptoms of compression, is able to work as a stenographer, and to attend dances. At the end of the day her back often feels tired and often aches, but relief is afforded by adhesive plaster stripping.

[2] Amer. Jour. Med. Sciences, November, 1910.

THE RATIONAL TREATMENT OF ACUTE APPENDICITIS.

BY JOHN B. DEAVER, M.D.,

OF PHILADELPHIA.

APPENDICITIS is a disease with which the medical profession has been familiar for many years. It has been carefully studied by many observers. Large series of cases have been gathered, and there is no lack of material for a comparative study of various methods of treatment. In spite of these facts, it must be admitted that there exists among surgeons and medical practitioners a great divergence of opinion as to the proper method of procedure in certain cases and at different stages of the same case.

The appendix in its anatomical relation differs from every other abdominal organ with which we have to deal. It is usually easily accessible. It can be completely removed, unless extensive surrounding disease be present, apparently without in any way interfering with the bodily functions. While we need not consider it a vestigial structure or a functionless organ, nevertheless its removal has in my experience never been followed by bad functional results of any kind. Its removal also is not usually a matter of great technical difficulty, unless complicating conditions place obstacles in the way of the surgeon.

Situated as the appendix is, more or less separate from other structures, it can yet give rise to most extensive inflammatory conditions within the abdomen. It is well known to be the most frequent causative factor in acute abdominal conditions requiring surgical intervention. Appendicitis is by far more frequent, in this country at least, than any other condition within the abdomen, acute or chronic, which is met with in surgical practice.

It seems strange then that since appendicitis is except in

but comparatively few cases easily diagnosed, the organ so often accessible, and its removal, when no complications are present, so easy, that there should still be such a considerable mortality in dealing with acute appendicitis.

This mortality remains more than it should be for four reasons: (1) failure to diagnose the disease sufficiently early; (2) failure to recognize its gravity; (3) postponement of prompt surgical intervention; (4) incorrect treatment in the later stages of the disease.

The diagnosis of acute appendicitis has been sufficiently dwelt upon in many articles within the past twenty years. It is usually easy if a careful history has been taken and a careful examination of the patient made. I am convinced that most errors in the diagnosis of this, as well as of all other of the commoner surgical conditions of the abdomen, depend not so much upon any great obscurity of the symptoms as upon the failure of the medical attendant to carefully construct the clinical picture. Many of us have seen instances in which acute appendicitis has been treated under the impression that the pain was caused simply by gastritis or colic. The examination in such cases is most superficial, and indeed I have seen numerous instances in which a careful abdominal examination had not been made until two or three days had elapsed, or not at all. It is but rarely that the sequence of pain, vomiting, and tenderness, with localization of pain in the right iliac fossa, is not observed, and practically never are local signs absent. The only excusable way in which the physician or surgeon might fail to make a diagnosis, a few cases excepted, is in children too young to state their subjective symptoms or accurately to locate the pain and tenderness.

But while a diagnosis of acute appendicitis can and should be promptly made in practically every case, it is a false refinement of diagnostic methods to attempt to give a definite prognosis early in the disease. We may of course gauge the comparative severity of the lesion by the severity of the onset, the patient's condition, and the rate of progress of the

disease. Yet it must be remembered that often cases in which the symptoms are most severe do not show lesions more grave than those in which the disease apparently had started as a mild process. This leads us to the consideration of the second factor influencing the mortality of the disease, *i.e.*, a failure to recognize its gravity.

It has always been, and still is, my contention that every case of acute appendicitis seen early should have prompt surgical attention—operation, provided, of course, that no absolute general contraindication to operation is present, such as pneumonia or uncompensated heart lesion. There is no one who can say which case of acute appendicitis may progress to recovery and which go on to abscess formation or general peritonitis and death. This has been proved so often that we have no right to postpone operation in any case. It is true that a certain number of cases of acute appendicitis will recover spontaneously under proper non-operative treatment, only to have subsequent attacks. It is equally true that some unoperated cases will die. Could we but differentiate the two classes clinically, our line of procedure would be easy to establish, but, as has already been stated, such a differentiation is impossible. The only safe and proper course, therefore, is to resort to prompt operation when a case of acute appendicitis is seen early. The reason for referring all cases of appendicitis at once to the surgeon has been stated by no one better than by our well-known internist, Dr. M. H. Fussell, who speaks as follows: "I thoroughly believe that at least three-fourths of the cases of appendicitis would recover if not operated upon, but I know there are no symptoms that will tell when a case is approaching the danger line until it is extremely dangerous either to interfere or to wait."

The results justify such a statement. My mortality in acute appendicitis seen early, when the inflammation has been confined to the appendix, has been very small. I believe it to be but little if any greater than that which is incident to an opening of the abdominal cavity whether a lesion be present or not. In 100 consecutive cases of this nature in 1910, from

January 1 to December 31 inclusive, the mortality was nil. Surely such a result (and like ones are being obtained by many operators) justifies itself and puts beyond a doubt the fact that immediate operation is the only proper method of treatment to adopt in early appendicitis.

The third reason for our mortality arises from our failure to recognize and act upon this proved fact in every instance. Delay in operation is the most important causative factor in the mortality of acute appendicitis. The reasons for this are so well known and evident that I need not mention them. If the disease is attacked sufficiently early, the destructive and inflammatory processes are more likely to be limited to the appendix itself, and easily removed. When operation is delayed the infectious organisms have time to penetrate or extend beyond the walls of the appendix, enter the peritoneal cavity, and give rise to the grave conditions accompanying a peritonitis either diffusing or localizing. Could these cases be seen, diagnosed, and *early* sent to the operating table, acute appendicitis would be almost robbed of its dangers and become in the hands of competent surgeons one of the least formidable of abdominal diseases.

The fourth great cause for our mortality in acute appendicitis is the incorrect treatment in cases in which, for some reason or other, the disease has been allowed to progress beyond the confines of the appendix and we have to deal with an acute appendicitis complicated by a more or less severe inflammatory lesion of the peritoneum.

The treatment of the appendicitis becomes then not a question of the lesion in that organ, since this is entirely overshadowed by the secondary conditions to which it has given rise.

A correct understanding of the problem of peritonitis may be facilitated by the recognition of the fact that all cases of peritonitis belong, as Federmann so well states, to one of two great groups—the progressing and the localizing. The former is that in which the tendency of the process is to rapidly spread until it has involved most or all of the peritoneal sur-

face. The localizing type is that in which the process tends to the formation of a localized peritonitis or a localized abscess. The latter is peculiarly apt to occur in connection with appendicitis. We know, for instance, that all cases of peritonitis of the upper abdomen due to acute perforation of viscera are of the progressing type, whereas many cases of peritonitis following appendicitis are not.

But at the outset of any peritonitis, within the first 24 to 40 hours, it has been shown that the process is unconfined, that is to say, lying free between the coils of the intestine. The formation of a limiting wall of fibrin occurs only at a later stage.

Experience also has proved that any peritonitis at this stage is, with few exceptions, amenable to prompt surgical treatment. The results after operation, with modern post-operative treatment are excellent. Indeed the mortality in my hands has been lower than that of any other form of peritonitis with which I have had to deal, unless it be a strictly localized pelvic peritonitis from disease of the adnexa.

In the five years ending with 1909 I operated upon 63 cases of diffuse peritonitis within 40 hours after onset, with but one death in the series. Since then, in 42 consecutive cases of appendiceal peritonitis operated upon at the German Hospital within 40 hours of the onset of the peritonitis, I have had one death, making in all 105 cases with two deaths, mortality 1.9 per cent. While I feel that this is a low death-rate when the desperate character of the disease is taken into consideration, yet it is noteworthy that an extension of the time limit for immediate operation has been accompanied by a rise in mortality. This expresses a fact which I have definitely determined from my own experience, namely, that the mortality rises with amazing rapidity if diffuse peritonitis of whatever origin, when present for more than 40 hours, is treated by immediate operation. It is, no doubt, difficult to say exactly when an appendicitis passes over into a peritonitis. Our guide must be an exacerbation of pain and tenderness in the right iliac fossa, followed by extension of tenderness

to adjacent areas. In fulminating appendicitis it may be taken for granted that the peritonitis has taken its origin very shortly after the onset of the disease itself. I dread early perforations near the base of the appendix which give rise to a rapidly diffusing and severe form of peritonitis. In view of the importance which we place upon the duration of the peritonitis itself, it is necessary to hold clearly in mind that this time may be very different from the duration of the disease. In some cases when a temporizing policy has been adopted, a low grade appendicitis may smoulder for several days or longer before it lights up a diffusing process within the general cavity. The 40-hour limit also is somewhat arbitrary as demarcating the early period of relative safety in immediate operation. One case will be found almost overwhelmingly septic, while in another the march of the peritonitis and the increase in severity of systemic symptoms may be slow. This, however, in general may be taken as the period within which experience has shown that in practically all cases operation may be done and should be done in full expectation of success. I would not feel content if I did not qualify this statement by saying that occasionally in cases of even this short duration there will be found one who exhibits extreme prostration, with capillary stasis perhaps amounting to cyanosis, with a low leucocytosis or none at all, in short with all general and local symptoms pointing to a virulent septic process and low bodily resistance. It is not proper to operate upon such a patient. Mere anæsthesia may tip the scale against him. That these cases are not numerous can be seen from the figures which I have given above and the determination of the pros and cons of operation in such a case should be left entirely to the surgeon, preferably one of large experience in abdominal work. I cannot too strongly insist that these are refinements to be considered only by experts in this class of work, and affect in no way my general position in respect to the necessity for operation in appendicitis. It deals only with the determination of the most favorable moment for operation, not with the advisability of operative treatment. I am thus explicit because

it has been my misfortune recently to be placed in a false light before the public by reportorial garbling of technical statements of this sort which were not intended for the laity and are indeed impossible for them to comprehend in their true light.

It is a matter of agreement amongst surgeons, I believe, that early cases of appendiceal peritonitis, with the possible exception just mentioned, should be promptly operated upon.

When we come to consider an appendiceal peritonitis of more than 40 hours' duration, a different problem confronts us. While it has been the experience of all surgeons that early cases of peritonitis as a rule recover, such, unfortunately, have not been the results in peritonitis of a longer duration. Indeed, peritonitis, diffuse or general, has so far been the one great failure in abdominal surgery. Several conditions must be met under this head.

There may be found a peritonitis of the localizing or second form which frankly is making progress towards or has already reached the stage of local peritonitis or localized abscess. The condition of the patient in such an instance as to temperature, pulse and leucocytosis and general appearance always indicates that the organism is successfully combating the toxins resulting from the peritoneal infection. The temperature is but fairly high, 100° to 102°, the pulse strong though at times somewhat accelerated. The leucocyte count is always high and in most favorable cases over 20,000.

In such an instance immediate operation is indicated unless localization and subsidence of the general symptoms have been rapid, marked, and unmistakable. In the latter condition slight further delay would give the surgeon a still more favorable condition for operation. When improvement has reached a stand-still, operation should be done at once.

Again, we may encounter a peritonitis which, by the general condition of the patient and its favorable course, if it may be so called, is evidently of a localizing type but does not as yet show the distinct signs of local abscess. In these cases we have two factors to guide us—the patient's general condition and the signs of an abdominal mass, even though not of a distinct local abscess. If the patient's condition be good, temperature, pulse, and high leucocytosis as indicative of high resisting power, operation is indicated if we have in addition some signs of a more localized process than is shown by the symptoms only of a diffuse peritonitis, that is to say, if in addition to general abdominal rigidity and tenderness localized in the right lower abdominal quadrant, we have in this area any portion which on careful examination gives the signs of an abdominal mass, however diffuse and indefinite.

When, again, in a localizing peritonitis the local signs are favorable but the general condition of the patient not good, our best course is to delay operation until the latter improves, treating the patient meanwhile under the methods later to be described.

The progressing form of peritonitis presents an entirely different clinical picture. We have in this form of the process also, two clinical aspects, *i.e.*, that one in which the patient's condition and resistance seem satisfactory, and that in which the reverse is true.

Concerning the treatment of this form of peritonitis,—one peculiar to appendiceal and occasionally other forms of pelvic peritonitis,—there has been a wide difference of opinion. We have stated that it is advisable to operate upon practically all cases of less than 40 hours' duration, and have indicated those cases of localizing peritonitis in which immediate operation seems the best form of procedure.

In progressing peritonitis with no signs of the limitation of the process, when the case is seen later than the first 40 hours delay is usually the best policy. This does not apply to other than appendiceal or pelvic peritonitis—in perforation of the upper abdominal viscera into the general abdominal cavity such a lapse of time practically always has brought the case to a hopeless condition.

Particularly must delay be insisted upon in those cases in which the patient's condition is evidently desperate. There can be no doubt that many such cases of appendicitis have been

lost as a consequence of hasty operation. Those that will not improve upon proper treatment during delay and progress to an unfavorable termination do so even more quickly when hastily operated upon.

The question arises when to consider the condition sufficiently localized for operation. Delay until there is absolutely a sharply defined and outlined abscess is not necessary. The patient's general as well as the local condition must be our guide. Operation should be postponed until the temperature and pulse strike an equable level, the leucocytosis is consistently high,—showing good resistance to toxæmia,—and peristalsis is known to be re-established as evidenced by free passage of flatus. Then if we are able to discover the signs of a deep-seated mass or resistance in the right iliac fossa, operation will disclose as a rule a limited peritoneal inflammation.

Finally, when we have the symptoms of a diffusing peritonitis following appendicitis, the decision whether or not to operate must always depend upon the patient's general condition and upon a careful study of the case. It can be taken for granted, however, that when we have the classical symptoms of such a form of diffusing peritonitis,—rapid running pulses, abdominal distention, cyanosis, and the facies Hippocratica,—operation will be almost inevitably fatal and delay may save the patient.

A fact of importance in the consideration of localized collections of pus within the peritoneum is the possibility of leakage into the general peritoneal cavity from the wall of a previously well-localized abscess. The general or diffuse peritonitis which results from this occurrence is often of a particularly virulent type, and in many instances has a most rapid onset, occurring with great suddenness when the symptoms previously have been entirely favorable. The avoidance of this complication is possible only by prompt operation.

To this mode of treatment there could be but two objections. The first and most easily set aside is that from the theoretical point of view. It has been repeatedly stated that it is best to operate upon every case of peritonitis of the acute variety as soon as possible. No one indeed is more positive in

the opinion that every case of acute appendicitis *per se* should be operated upon immediately than I am. But when a peritonitis has set in it becomes in reality a different disease. Appendicitis confined to the appendix is one thing—peritonitis following an appendicitis offers us an entirely different problem.

The statement is often made that a peritonitis is but a form of abscess and that it has been the universal experience that the best treatment for abscess or local suppuration is prompt evacuation and drainage. Pus within the peritoneum, when not seen early and when not sharply localized, differs somewhat from abscess or pus formation in every other portion of the body. Here our experience has often been that the evacuation, even by means of a small incision or puncture, of the enclosed pus is often followed by the rapid diffusion of toxins throughout the body and the death of the patient.

Buxton and Torrey, on the basis of animal experimentation, have concluded that the sudden so-called shock so often rapidly fatal after operations in fulminant peritonitis may be due to the explosive destruction of the bacteria by the immune substances of the body serum and liberation of their toxic contents into the circulation in large quantities. In other words, the too sudden destruction of virulent material within the peritoneal cavity may have even graver results than their activity while living.

From the practical point of view we can estimate the value of any one method of treatment only by the results. Personally, while I am cognizant of the great strides in post-operative treatment which have been made within the past few years, I am convinced that the more favorable results have been largely due to the selection of cases at the proper time for operation, and their proper pre-operative as well as post-operative treatment.

In the treatment of peritonitis both before and after operation, I have followed largely the method brought into prominence by Ochsner, with the addition of the Murphy method of enteroclysis.

When I see a patient suffering from a peritonitis as a

result of appendicitis, the matter first to be considered is operation. If it be decided to postpone this, then the patient is treated in a way which we believe most often tends to conserve his strength and to bring about localization of the peritonitis.

One of the most important causes of the mortality in appendicitis, even among those who are believers in operation, is faulty pre-operative treatment. This is the true field of medical treatment in this disease, and I am certain that the procedures in common use among practitioners are responsible for a goodly percentage of deaths. It is a wellnigh universal custom to administer a purge in the early stage, and if recovery is not prompt to continue more or less drastic purging in the belief that it will favorably influence the disease. I must own that years ago I advocated this method, but I have long since been convinced that it not only does no good but does positive harm in many cases. The physician sees so many cases of colic or enteritis which respond readily to a simple purge that a false analogy has been drawn in respect to its efficacy in appendicitis. Except in those milder cases of catarrhal appendicitis which are only a part of an enteritis or colitis, it is difficult to see any great value in emptying the contents of the bowel, but it is easy to see that in the severe cases, to set up active peristalsis may mean to precipitate a perforation, to inhibit the formation of defensive adhesions, and to spread infective material throughout the peritoneal cavity. In the initial stage, before the diagnosis is readily made between simple colic and appendicitis and before the advent of local pain indicates that the inflammation has reached the peritoneal covering, it is inadmissible to give a rapidly acting purge, such as castor-oil or a saline. After the pain is localized and Nature is endeavoring by stiffening the surrounding muscles to secure rest for the inflamed member, it is irrational to nullify her efforts from within, and every surgeon who has watched this point has observed that in general those cases that have been purged in this stage are likely to be more severe. If it is desired to move the bowels, enemata should be employed,

but given gently, for a forced enema can be as objectionable as a purge. Quiet for the inflamed focus should be furthered by withholding all food and liquid by mouth, and all in this connection must mean all. An ice-bag over the right iliac fossa will cause the patient to lie more quietly in one position, will relieve the pain, and discourage too many examinations. The prevalent idea that it has any specific influence in abating the disease should be abandoned. It is wise to raise the head of the bed or better place the patient in a sitting posture in order to encourage the gravitation of fluid exudates or extravasations into the pelvis. Fluid for the body should be supplied by the rectal instillation of saline solution in intermittent or continuous form.

No morphia should be used, as the pain is rarely too great to be endured, and by its use the patient and physician are too often lulled into a false sense of security until peritonitis is too firmly established for any method of cure. An exception may be made to this rule when operation has been decided upon and the patient is suffering to an unusual degree from nervousness or pain. Then $^1/_{16}$ gr. to $^1/_{20}$ gr. morphia may be given and repeated once if necessary. If a little tact be used it is surprising how seldom anodynes are needed. Extreme degrees of suffering are not common in appendicitis.

Finally, all cases should be treated in the above manner, whether the medical attendant believes them to be serious or not. There is no way of differentiating the case that will get well from the one that will not. If equal care be used in all cases, the surgeon will rarely be requested to act in the capacity of Lord High Executioner upon patients moribund with peritonitis, and deaths in appendicitis will become rare.

Lavage to control vomiting and not medicine such as small doses of calomel, or calomel combined with cocaine, oxalate of cerium or small doses of carbolic acid or dilute hydrocyanic acid, etc., any or all of which are not only useless but likely to aggravate and make the irritable stomach still more irritable. Medicines in this disease are out of place. If anything in medicine has been clearly proven, it is that appendicitis is a

surgical disease, in fact the medical professor or internist, so called, should not be permitted to teach students the treatment of this disease unless he do so along the lines indicated in this paper.

The patient is given absolutely nothing by mouth until peristalsis is established; for it is a well-known fact that the smallest amount of food or even water introduced into the stomach gives rise to peristalsis, and peristalsis, however slight, must tend to prevent localization of the peritonitis. It is sufficient for the patient's comfort to keep the mouth moistened with a cloth. The patient's bodily strength is kept up by the use of continuous saline enteroclysis, continued as long as it is well borne, and at times interrupted for longer or shorter periods. I have found this to be of greater value than the use of saline enemata at stated intervals, even when they contain supposedly more highly nutritious substances in solution. The false, erroneous, absurd idea that patients with acute abdominal inflammation must be given nourishment by mouth has long since been disproven.

Continuous enteroclysis has been most largely used as a method of post-operative treatment, but I have found it of equal value in peritonitis prior to operation.

When vomiting occurs, it can be controlled by prompt and thorough lavage, repeated as often as may be necessary. This is a most essential part of the treatment, for putrefying food within the stomach or regurgitated into it gives rise to virulent toxins and ptomaines, having a profound depressant action upon the bodily economy as a whole. Lavage is also to be employed when there is *great* distention of the stomach, hiccough, or nausea, or the spitting up of small amounts of dark fluid. These as well as frank vomiting are the evidences of retention and regurgitation of putrefying material in the alimentary tract, and call for the prompt use of the stomach tube until the condition is relieved. This also is most useful as a preventive of a possible acute gastric dilatation which I believe to be infectious or toxic.

In addition the use of the ice-bags externally allays pain and seems in a degree to inhibit active peristalsis.

Opium and opiates I use most sparingly in the treatment of peritonitis. While opium and its derivatives stop peristalsis, they do so in a manner which soon produces complete paralytic ileus, with its accompanying obstruction, retention of toxins, etc. The relief of pain also is not to be considered as a prime factor in comparison to saving the patient's life. Moreover, this complete dulling of pain produced by morphine is most deceptive and often makes it impossible to determine correctly the stage of the disease under treatment or its progress. When the patient is in extreme pain or so restless that he cannot be controlled by other means, which is rarely the case, I employ morphine in doses of $^1/_{20}$ to $^1/_{16}$ hypodermically, repeated once if necessary.

The operative technic which I employ in cases of peritonitis associated with appendicitis is that of any other peritonitis. The use of protective pads is most important to prevent the spread of infection. The appendix is always removed except when a circumscribed abscess is present and its removal would be attended by too great danger of diffusing septic material. Lavage of the peritoneum I consider not only useless but harmful. It is my practice to remove the pus by the gentlest means and with special care not to disturb the coating of plastic and protective lymph which is often found on the bowel serosa. It is not this lymph which causes subsequent adhesions. These can most often be attributed to rough handling of the bowel during operation, or the trauma of pads or instruments.

Drainage should be by tube whenever possible. I have found split rubber tubes with a gauze wick serviceable, if the tube be sufficiently rigid to preserve its calibre. Cigarette drains are useful only when there is but little need for drainage. I would call your attention to the importance of pelvic drainage in cases of peritonitis. By this I mean drainage by means of a glass tube introduced into the pelvis through the

incision, or through a stab wound over the pelvis. When, after operation, the patient is placed in the sitting posture, all fluid in the abdominal cavity will gravitate to the pelvic area, and it is this even more than the operative field that we want to drain.

After operation the patient is placed in the sitting position, and the treatment is practically as before operation.

In conclusion I would say that if there is one fact in the field of medicine which has been demonstrated conclusively, it is that the rational treatment of acute appendicitis is in operation, early and immediate if possible; late, postponed, or absolutely contraindicated only by the presence of other conditions which may be complications of the disease itself or entirely independent of it, mere coincidences which render the performance of any operation too hazardous. Advice other than this no man has a right to give.

The following table illustrates the results obtained by this method of treatment during the year 1910 in the German Hospital and in the Children's Hospital of the Mary J. Drexel Home.

		Deaths	Mortality
Number of cases of acute appendicitis	315	9	2.85
German Hospital	235	7	2.97
Mary J. Drexel Home (Children)	80	2	2.5
Number of cases acute appendicitis, no peritonitis	100	0	0
German Hospital	80		
Mary J. Drexel Home	20		
Number of cases appendicitis with peritonitis	215	9	4.13
German Hospital	155	7	4.51
Mary J. Drexel Home	60	2	3.33
Number of cases with diffuse peritonitis	74	6	8.1
Number of cases with localized peritonitis	66	1	1.51
Number of cases with serous fluid	39	0	0.00
Number of cases indeterminate at operation	16	1	6.25

Dr. John H. Gibbon said that the figures of Dr. Deaver point to the value of the Ochsner method of treatment after peritonitis is established. In only a limited number of cases had he himself pursued this policy. It may be of interest in this

connection to take the cases of acute appendicitis (all chronic cases being excluded) occurring in the Pennsylvania Hospital during the past two years, and see what results were obtained there. As a general rule all cases were operated on within a few hours, excepting abscess cases. In considering the mortality of this class of cases it is necessary to include the mortality of cases dying without operation.

These cases had been tabulated by Dr. Billings. These operations have probably been performed by eight different surgeons, comprising the surgical staff of the hospital.

There were 40 acute cases with acute symptoms; nothing outside; no pus. All recovered, being operated upon in an average time of 1¾ hours after admission. These all come within the 36-hour period. Next, serious acute cases, suppurative, without definite abscess wall; 33 of these operated on; average time after onset 2⅓ days; all recovered. Thirty-five cases of appendiceal abscess with well-defined wall and cavity, but no diffuse peritonitis; average time after onset 5 days; all recovered. Of the acute gangrenous cases, there were 39 of these, average time after onset of disease being 2 days. All were operated on within 2 or 3 hours after admission, and all recovered. Of the acute gangrenous cases with perforation of the appendix and general peritonitis, the mortality was high. There were 56 such cases with 43 recoveries and 13 deaths; average time after onset of condition was a little over 3 days. Only two patients died of intestinal obstruction, an important point.

Dr. Gibbon hesitated from these figures to take the ground that the Ochsner treatment ought not to be employed; in fact he did employ it, though not so extensively as has Dr. Deaver. His feeling was that all acute cases of appendicitis should be operated on practically at once. Where there is a diffuse peritonitis, evidenced by clinical symptoms, these cases should be operated upon if within 36 to 48 hours of onset. Of course, the patient's condition must be taken into consideration. Murphy's statistics are striking, he reporting 40 cases of acute perforative peritonitis with but one death, but these were all operated upon within the first 24 or 36 hours of onset. The crux of the matter with hospital surgeons is, what should be done with cases two or three days old? Here a selection must be made which must be the result of individual surgical experience. There is no

question that the mortality to-day is nothing like it was four or five years ago, largely due to the fact that the profession is now beginning to learn that purgation is unwarranted, and that surgeons are realizing that the less traumatism they make, the sooner they get out of the abdominal cavity and establish drainage and enteroclysis, the more chance will their patients have of recovery.

Dr. Edward Martin said that Dr. Deaver implied by his remarks that the diagnosis of appendicitis can always be made. There are exceptions to this which he had seen on the part of most careful practitioners and also on the part of careful surgeons.

He had never seen a case of appendicitis so ill that operation was postponed or foregone because it was a desperate chance. That these cases of acute toxæmia occasionally will recover without operation, he acknowledged, but his experience had been that they recover more speedily after surgical intervention. Surgeons learned years ago from Dr. Deaver to operate the first minute, or the first hour, or the first day that the diagnosis was made, the single therapeutic indication in appendicitis always being operation. A good many lives have been saved by pursuing this policy, and the one which he advocates now constitutes a complicating and confusing addendum to a teaching which admitted of no misunderstanding.

With regard to the use of morphine, he heartily agreed with Dr. Deaver that it is to be avoided if possible, but he has the great bulk of surgeons, especially those who have had their abdomens opened, against him. All of them, even the most rabid antimorphinists, have become converted, when they themselves were suffering from post-operative pangs, and because of the good results from its use many surgeons have become adherents to its routine employment.

Dr. John H. Jopson recalled a former pamphlet by Dr. Deaver entitled "Walled Off," in which he called attention to the danger of allowing appendiceal cases to reach the abscess stage. His early observations of patients treated by this method were made in Dr. Deaver's wards at the German Hospital.

Later in his own service at the Presbyterian Hospital, he was accustomed to seeing one of his colleagues treating patients

on the Ochsner plan, and he saw many recoveries with and without operation, some patients, indeed, refusing operation and leaving the hospital apparently well. He therefore had been adopting this plan of late in cases similar to those mentioned by Dr. Deaver, and with most satisfactory results.

Dr. George G. Ross commented upon Dr. Deaver's claim that peritonitis and appendicitis should be treated as separate conditions, no matter whether the peritonitis follows a perforated appendix or not. Dr. Deaver has always, and does to-day advocate, the taking out of the appendix. He believes that every appendix that has once been inflamed should come out, but also believes that judgment should be exercised as to the proper time at which to remove such an appendix. In peritonitis there is a different problem. Some cases never need operation, and do not come to it. For instance, consider the number of cases of pelvic peritonitis with more or less diffusion of fluid above the ileopectineal line, due to pyosalpinx when both the peritonitis and the tubal infection subside. He knew of one case which had a violent diffuse peritonitis in which the tubes discharged themselves through the uterus. The woman subsequently became pregnant and bore a child at full term. Perforative peritonitis sooner or later will come to operation. There are some cases of appendicitis where the perforation occurs at the base of the appendix, or where the appendix is behind the cæcum with the tip in the pre-kidney fossa, when the infection is into the retroperitoneal space and directly into the lymphatic system; very few if any such cases recover. This space cannot be drained and the poison is taken up so readily and so rapidly that the patient has practically no chance of recovery. He felt more apprehension with an abscess behind the cæcum causing pressure necrosis than he did with the general peritoneal cases.

Dr. John H. Gibbon recalled a case seen by him some months ago. The patient was a girl 14 years of age, who was taken sick in Brooklyn and had been ill for three days before she was brought to the Jefferson Hospital. She had an abdomen tender, not distended, but rigid. She had been vomiting; had a very high leucocyte count, and fever. Appendicitis with general peritonitis seemed the more likely diagnosis, and appendicitis

had been the original diagnosis made in Brooklyn. When he opened her abdomen he found a lot of bloody exudate and a gangrenous ovarian tumor with a twisted pedicle.

If he were to see another such case now, he did not believe he could differentiate it from one of acute appendicitis. Now had he pursued the plan of waiting for a few days in this case, he felt confident the patient would have died. After the operation she made a good recovery.

Dr. Gwilym G. Davis remarked, with regard to the difficulty in diagnosis, that attention should be called to those cases in which the appendix lies in the pelvis, and as it becomes inflamed the pus passes up underneath the small intestines, works over the bladder, and up the left side; there is then an inflamed mass covered with small intestine; such a condition obscures the diagnosis and renders the treatment very difficult.

Dr. George P. Muller thought that in the consideration of the indications for this method of treatment too much attention is paid to the pathology of the disease. Some who had spoken had referred to the dangers of the posterior position, to the fact that perforations near the base are more dangerous than those near the tip, etc. It is impossible to diagnose the pathology of appendicitis with any degree of certainty until the abdomen has been opened, nor did he think that surgeons should accept a certain number of hours as the time limit indicating postponement of operation. What is needed is to find some method by which the resistance of the particular patient can be estimated, so as to determine whether his abdomen should be opened at once or whether delay would enable him to recover from the infection. Mikulicz was engaged upon this subject at the time of his death, and some effort has been made by the use of the so-called "vaccines" to increase resistance, but nothing promising has as yet been brought forward.

Dr. John B. Deaver, in closing, said that the best working rule is that which gives the best results in the majority of cases. He did not wish for one instant for any one to believe that every case of appendicitis operated upon by him was diagnosed as such before operation. He had committed Dr. Gibbon's error in children as well as in adults, and there are other conditions to which he could also call attention, but his paper was not on the diagnosis but on the treatment of acute appendicitis.

In the first edition of his book on appendicitis he urged that every case of appendicitis, whether or not complicated by peritonitis, should be operated upon. He had now learned better. The mortality at the German Hospital under his present treatment as compared with that under former methods is exceedingly gratifying, and he attributed the better results to the present method of treatment and to the better diagnostic powers gained through experience.

He quite agreed that the decision regarding whether or not to wait in cases of acute appendicitis should be made only by the surgeon.

With regard to Dr. Muller's remarks, he considered his suggestion an important one, for the resistance of the patient is the whole secret of this treatment. If he is not in a condition to withstand the toxæmia, then waiting will do no good, but harm. The bulk of patients, on the other hand, who get well without operation, assuming that the diagnosis is correct, may not have withstood the ordeal had surgical interference been instituted.

The question of the time of appearance of the peritonitis can only be calculated from the character of the pain. His rule is not to calculate the peritonitis from the onset of the disease, but from the onset of the most severe pain. In the majority of cases of acute appendicitis during the first hours the pain is general, then there is a history of sharp pain immediately followed by diffuse soreness of abdomen, etc., although this is not absolute.

Dr. Gibbon referred to the question of intestinal obstruction. Formerly the average number of cases of this condition at the German Hospital was about one in 50 or 60; one year they had 13 obstructions. Now in 1910 there were only two cases of intestinal obstruction, so that would refute the belief that the line of treatment recommended predisposes to obstruction.