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ADDRESS IN SURGERY.

THE PRESENT STATUS OF ABDOMINAL SURGERY.

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The frequency with which grave complications followed even the most trivial operations before the introduction of the modern treatment of wounds, undoubtedly induced the great Hunter to remark: "The necessity for operation is in truth the defect of surgery." To-day, with an improved technique and the means at our disposal which, if properly applied, will furnish almost absolute protection against wound infective diseases, the surgeon can, with a just source of pride and gratification, confirm the correctness of the assertion made centuries ago by Celsus, "*quæ manu potissimum curat.*"

No one who is familiar with the medical literature of the last two decades can arrive at any other conclusion than that the legitimate sphere of the physician has been gradually growing smaller, or, if this statement be objected to, that the practice of medicine has become more and more surgical. In accordance with the spirit of the times, uncertainty and doubt in the diagnosis and treatment of disease must give way to positive knowledge and actual demonstration. Surgery has gained the supremacy over medicine because the principles upon which modern surgery rests have been made the subject of accurate investigation and positive demonstration in the chemical, physiological and pathological laboratories.

The science of surgery is rapidly assuming a degree of accuracy approaching in perfection any of the exact sciences. During the last few years surgery has assumed a decidedly progressive and aggressive character. Operations which a few years ago would have been deemed impossible or unjustifiable, have become established, legitimate surgical procedures. In obscure doubtful cases the scalpel is now frequently resorted to, without fear of causing additional complications, for the purpose of making *intra vitam* an anatomical diagnosis. Modern surgery has achieved its greatest triumphs in enlarging the field for the direct local treatment of disease, thus enabling the surgeon to treat with success injuries

and lesions beyond the reach of medicinal agents. The surgical literature of the day bears abundant evidence that the remotest organs are now approached by the surgeon with comparative immunity, and that incalculable benefit has been derived from direct operative treatment. The affections of abdominal organs have received the well-merited attention of surgeons since the improved wound treatment has been introduced. Numerous maladies which heretofore have been considered incurable are now successfully treated by the surgeon by operative measures. Experimental research and clinical experience have demonstrated that organs and parts of organs which were heretofore regarded as indispensable and essential, can be successfully extirpated when they are the seat of injury or disease. With a view of directing your attention to a few of the most brilliant achievements of modern surgery, I have selected as the subject of my address, "The Present Status of Abdominal Surgery." A condensed brief account of the more recent advances made in the surgical treatment of injuries and diseases of the abdominal organs must interest equally the physician and the surgeon.

It is not my intention to trespass upon the legitimate field occupied by the ovariologist or the gynecologist. I shall therefore limit my remarks to a consideration of such injuries and lesions of the abdominal organs as they present themselves to the physician and general surgeon. It will be my special aim to point out the limitation of abdominal operations, and to draw a distinct line between the feasibility and justifiability of such operations.

I. *Penetrating Wounds of the Abdomen.*—During the last year the literature on this subject has been enriched by two valuable papers by Drs. Dennis and Bryant, of New York. These contributions, made in such rapid succession, may be considered as sufficient evidence of the deep interest which has been awakened among American surgeons on this practical and important subject.

Dennis has well said, "It is a source of National pride that laparotomy in penetrating wounds and visceral injuries of the abdomen was conceived, developed and perfected in America."

The propriety of resorting to abdominal section in every case of penetrating wound of the abdomen is urged by many, but it cannot be said that this practice is sanctioned by the majority of the profession at the present time. The great difficulty that presents itself to the surgeon in the absence of positive symptoms, is to differentiate between a penetrating

and a visceral wound. Clinical experience and statistics have demonstrated the importance of making a distinction between punctured wounds and gunshot wounds of the abdomen both in reference to diagnosis and treatment. It is well known that penetrating stab wounds are less likely to be complicated by visceral injury than bullet wounds, consequently this class of injuries offers a more favorable prognosis and does not call so uniformly for treatment by abdominal section. As in stab wounds, there is a greater tendency to prolapse of the intestine, exploratory laparotomy for diagnostic purposes is also less frequently called for. The numberless recoveries after stab wounds of the abdomen, without resorting to heroic treatment, must induce every thoughtful surgeon to abstain from subjecting the patient to the additional risks of laparotomy, unless the symptoms are such that the existence of visceral injury can be assumed with a reasonable degree of certainty. It must, however, be remembered in arriving at conclusions concerning the nature of the injury, that the symptoms do not always correspond to the gravity of the visceral lesion, hence if any doubt remains in the mind of the surgeon, it is justifiable and proper, now that exploratory laparotomy can be made with such comparative immunity, to resort to it and give the patient the only chance of recovery by ascertaining the exact nature of the injury, which can be the only proper and safe guide to rational and successful surgical treatment. Dr. Dennis has called special attention to volvulus as another complication of stab wounds of the abdomen, a condition which, when present, would in itself always indicate an abdominal section for its relief. In doubtful cases exploratory laparotomy can be done by enlarging the wound, which, when required, can be followed by the usual incision in the median line when operative treatment of the visceral lesion is required.

In gunshot wounds of the abdomen the course of treatment to be pursued is more definitely settled by accumulated knowledge resulting from careful experimental research and an immense clinical material. These injuries are so uniformly fatal that the slightest suspicion of injury of the intestine calls for treatment by laparotomy as affording the only chance of recovery for the patient. The statement by Otis that gunshot injuries of the small intestines are always fatal if treated upon conservative principles, is practically well established, and is a sufficient argument in favor of treatment by abdominal section. In penetrating gunshot wounds it is highly probable that visceral injury exists, and this fact constitutes a potent argument in favor of surgical interference, which alone is adequate to prevent an inevitable fatal termination. The brilliant results which have been obtained by Bull, Hamilton, and others in desperate cases of multiple perforations of intestines, by operative treatment, afford abundant encouragement for imitation of their practice.

It can be justly said that the surgeon who allows a patient to die from the effect of a visceral injury of the abdomen produced by a stab wound or a bullet wound, without at least a proposition to resort to abdominal section, has failed to discharge the duties

imposed by the teachings of modern surgery. Difficulties may be encountered by the medico-legal bearing of a case, but when called upon to treat an otherwise fatal injury, this should not deter the surgeon to resort to the only measure which might save a human life. The first indication that presents itself in the treatment of an open wound of the peritoneal cavity is to prevent infection by covering the wound with an antiseptic compress, until ample preparations can be made for more effective treatment. Whenever practical, the necessary dressing or operation should be done with the least possible delay and at or as near as possible the place where the injury was inflicted. Procrastination and transportation are dangerous factors in the treatment of this class of injuries, as both augment the gravity of the case by increasing the danger arising from the two most dangerous conditions—hæmorrhage and fæcal extravasation.

The preparation for an abdominal section should be made with the same care as in opening the abdomen for the removal of an ovarian tumor. If the operation has to be performed we can never rely on an aseptic atmosphere, hence the minutest details of antiseptic surgery must be followed. The wound and especially the prolapsed viscera must be kept protected as much as possible against the air by avoiding unnecessary exposure.

As a disinfectant solution corrosive sublimate should be preferred to carbolic acid. The temperature of the room should be kept at 80–90° F. Until the abdominal cavity is opened the field of operation must be frequently irrigated. The intestines when brought out of the wound should be carefully protected with a warm aseptic compress kept moist with a weak solution of corrosive sublimate with a view of preventing abstraction of heat and guarding against infection.

The abdominal section has for its object: 1. Positive diagnosis. 2. Arrest of hæmorrhage. 3. Restoration of a breach of continuity. 4. Removal of extravasation. Exploration of a penetrating wound either with the finger or a probe is never justifiable as it increases the danger from extravasation and hæmorrhage without furnishing any information of a diagnostic value. The direction of the wound canal and the anatomical location of the different viscera must be carefully considered before resorting to operative measures.

When it becomes necessary to make an exploratory incision of sufficient size to enable the operator to introduce his hand it is preferable to select the median line, as an incision at this point inflicts less additional traumatism, is attended by little or no hæmorrhage, and can be utilized at once for the necessary operative treatment of the visceral lesions, if they exist. It is a source of comfort to the surgeon to know that the different operators experienced but little difficulty in detecting the seat of lesion in the bowel, and that usually all the perforations were found in multiple wounds of the intestines. It is unnecessary to urge upon you the importance of a careful search for additional injury when one perforation is found, as a failure to detect all of the openings in the intestine would frustrate the object for which the patient was subjected to such a grave procedure.

Great stress has been placed upon the importance of carefully arresting all hæmorrhage. From the peculiar anatomical relations of the blood-vessels in the abdominal cavity it has been found that even very small vessels will continue to bleed unless permanent hæmostatic measures are employed. If many bleeding points are encountered a number of hæmostatic forceps can be applied before tying the vessels. If any of the large venous trunks have been injured, peripheral venous compression will facilitate the difficult task of securing the bleeding vessel. If the wound in the bowel can be approximated without producing too much narrowing of its lumen it should be closed with a Lembert's or a Czerny-Lembert's suture.

If enterectomy becomes necessary the two ends of the bowel should always be united with a Czerny-Lembert's suture, as this suture secures accurate approximation of an extensive serous surface, and thus furnishes the most favorable condition for rapid union which affords the best possible protection against the danger of subsequent extravasation. If fecal extravasation has taken place it becomes necessary to resort to a careful toilet of the peritoneum, which can be accomplished most efficiently with large flat aseptic sponges wrung out in a weak solution of sublimate. When extensive soiling of the peritoneal cavity has taken place it would appear most expedient to resort to thorough irrigation with warm sterilized water, with a view of effecting mechanical removal of all foreign substances. When this has been accomplished the peritoneal cavity should be further cleansed and dried with a sponge wrung out of a $\frac{1}{2}$ per cent. solution of corrosive sublimate. The abdominal incision is closed in the same manner as after abdominal section for other purposes, in all cases where we have reasonable cause to believe that we have succeeded in securing an aseptic condition of the peritoneal cavity; if any doubt remains upon this point, drainage is indicated.

The subsequent treatment must be conducted on general principles, rest, absolute diet, and the administration of opium being the most essential conditions in favoring rapid healing of the the intestinal wound. In the future shock will not be mentioned as frequently as heretofore as a cause of death in penetrating wounds of the abdomen, as it has only too frequently been mistaken for the symptoms due to acute anæmic from hæmorrhage into the peritoneal cavity. Further, when life is threatened from this cause, a fatal termination can often be prevented by resorting promptly to transfusion of blood, or infusion of a saline solution, after the bleeding points have been secured. I am satisfied that no modern surgeon would hesitate to endorse the treatment of visceral wounds of the intestines by abdominal section; the opposition to the operation can only be entertained in cases where it is impossible without an exploratory incision to differentiate between a penetrating wound and a visceral wound.

It is to be regretted that in perforating wounds of the intestines symptoms are often deceptive, and cannot always be relied upon as an unerring guide in diagnosis. Grave symptoms may be almost entirely absent, and yet many perforations exist, while in

other instances severe symptoms may be present without visceral injury. Until we shall be able to make a differential diagnosis by the simple interpretation of symptoms, we must insist upon the justifiability of explorative laparotomy for diagnostic purposes in all doubtful cases, and upon the importance of treating all visceral wounds of the intestines by abdominal section, as affording the only chance of preventing an otherwise almost certain fatal termination.

II. Laparo-Colotomy.—In cases of rectal cancer not amenable to extirpation, Madelung advises that the colon should be divided completely across low down, and the peripheral end should be permanently closed by inverting the margins deeply and applying two rows of sutures. A preternatural anus is established by stitching the proximal end to the margins of the wound in the same manner as in forming an intestinal fistula in any other locality. The advantages of this operation over the ordinary method are twofold: 1. The disease in the lower end of the bowel is not aggravated by the coming in contact with the intestinal contents. 2. No fecal accumulation takes place below the artificial opening as is so often the case after the ordinary methods of colotomy. Pollsson and Letievant advise the same operation.

III. Subcutaneous Laceration of Intestines.—One of the darkest chapters in abdominal surgery pertains to subcutaneous traumatic rupture of the intestines. That this accident occurs more frequently than has been generally supposed is well substantiated by recent investigations, and as the majority of cases have proved fatal on the expectant treatment, it is proper and important to consider the propriety of abdominal section in all cases where we have reason to suspect its existence.

Muguier has called attention to the fact that in some instances, the laceration may be incomplete and give rise to no serious symptoms for days or weeks, until perforation takes place. A contusion of the abdomen is received and the patient and surgeon are in the belief that no serious injury has been sustained until symptoms indicative of perforation, and fecal extravasation announce the gravity of the primary lesion. He reports three cases of this kind which came under his own observation, only one of which terminated favorably, and in this case the perforation produced a suppurative perityphlitis. He cites four additional cases, of which two terminated in recovery after the formation of a fecal abscess. These cases should at least put us upon our guard to exercise proper care in the treatment of abdominal contusions, so as to prevent, if possible, the disastrous consequences incident to perforation. Regulation of diet, rest, and the use of opiates may do a great deal towards the restoration of a partial loss of continuity of the injured bowel.

Chavasse observed two cases of laceration of the intestine from contusion of the abdomen which induced him to compile all cases of rupture of the intestines due to the same cause. He found a record of 149 such cases. A careful study of this material led him to the conclusion, that in almost every case laceration or crushing of the intestine takes place at

a point between the place where the external violence is applied and the unyielding resistance offered by the posterior abdominal wall. Of these cases only six recovered, while the remaining number usually died within twenty-four hours with symptoms of perforative peritonitis. He is in favor of treatment by abdominal section, with a view of suturing the torn intestine or making an artificial anus.

Berger insists that laparotomy should be performed in all cases where a diagnosis of intestinal rupture can be made. In the differential diagnosis injury to the kidney becomes apparent from the character of the urine. Injury to the gall-bladder can be excluded if the patient throws up large quantities of bile. The direction and amount of force which produced the injury as well as the extent of surface which was exposed to the violence, must also enter into consideration in determining the location and extent of the visceral injury. In contra-distinction to injury of the liver and spleen, rupture of the intestine must be suspected in case the force is applied over the median line, anteriorly, forcing the intestines directly against the spinal column. Berger and Verneuil speak against primary resection and suturing in these cases, and advise the formation of an artificial anus. The great difficulty which presents itself to the surgeon is the absence of positive diagnostic symptoms.

In a recent paper on this subject Dr. Weir enumerates as the most prominent symptoms: collapse, rapid respiration, frequent wiry pulse, vomiting, thoracic respiration, emphysema, and absence of hepatic dulness. The last symptom, when present is one of the most certain signs indicative of the existence of perforation, but it is also necessarily absent in all cases where the liver has become fixed and immovable by inflammatory adhesions prior to the accident. Emphysema and collapse are the two most constant and reliable symptoms upon which to base a probable diagnosis soon after the accident has occurred. Extensive extravasation usually does not take place, as the experiments of Jobert upon dogs have shown, that if the intestine is completely divided, the ends may contract by their circular fibres, and thus prevent escape of the intestinal contents. Of all the cases so far reported, the rupture was found almost uniformly in the small intestines and in preference in the first portion of the tract, the duodenum and the jejunum, an important hint in searching for the seat of laceration on making abdominal section. The shock attendant upon this accident is more apparent than real, and is in no ratio to the gravity of the injury. It must also be remembered that hæmorrhage is an important element of danger, and, when considerable, it may simulate the existence of shock. So far the only case on record where laparotomy was performed for traumatic laceration of intestines is reported by Mr. Owens, of London, who found the laceration, sutured and returned the bowel. Unfortunately the patient died. Duplay affirms that the rupture, as a rule, is complete, and as such an accident must be uniformly fatal, abdominal section affords the only chance for the recovery of the patient and should always be resorted to whenever the history of the case and the symptoms presented indi-

cate the presence of this lesion. As the intestinal coats have undergone no pathological alterations, typical circular resection and suturing of the bowel should be practised in preference to the advice given by Chavasse, Berger, and Verneuil of establishing an intestinal fistula.

IV. *Intestinal Obstruction*.—The treatment of intestinal obstruction by abdominal section is, still in its infancy, but in view of the almost hopeless condition of patients suffering from obstruction due to permanent organic changes, the results which have been obtained by operative procedures should stimulate us to abandon the expectant treatment for more positive measures. Schramm has collected 190 cases of intestinal strangulation treated by laparotomy, including three cases observed by himself in the practice of Mikulicz. He alludes to the difficulties encountered in the diagnosis of these cases and pleads in favor of early operative interference. Of this number 64.2 per cent. died, the mortality before the antiseptic treatment of wounds being 73 per cent., and since that time 58 per cent. The cause of strangulation and mortality attending each kind may be gleaned from the following table:

27	times, Invagination,	8	cured, 19	died.
49	" Bands or intestinal diverticulum,	13	" 36	"
16	" Adhesions,	7	" 9	"
11	" Reduction <i>en masse</i> ,	6	" 5	"
10	" Torsions,	1	" 9	"
12	" Knotting of bowel,	4	" 8	"
12	" Internal strangulation,	4	" 8	"
7	" Foreign bodies,	4	" 3	"
38	" Neoplasms,	16	" 22	"
8	" Unknown causes,	5	" 3	"

The results of operations for internal strangulation will improve as soon as the physician will recognize the inefficiency of the expectant plan of treatment and will resort to timely operative measures, before the strength of the patient has been exhausted, or the cause of strangulation has led to extensive secondary pathological changes in the tissues about the seat of strangulation. Recently Kussmaul has introduced irrigation of the stomach as a means of treating intestinal obstruction. While this measure does not exert any positive curative effect upon the cause of obstruction, it serves as an efficient palliative by diminishing hydrostatic pressure and subduing increased peristaltic action, conditions which necessarily aggravate the symptoms due to obstruction.

a. *Intussusception*.—Until recently the operative treatment of invagination has been considered by the majority of the profession almost in the light of a criminal procedure. At present the indications are that most surgeons would resort to it in all cases where severe symptoms are present which would indicate the existence of acute or chronic obstruction from this cause and not remediable by medical treatment or local measures. In cases where no adhesions have taken place between the *intussusceptum* and the *intussusciptions*, reposition can frequently be effected by the administration of an anæsthetic for the purpose of relieving abdominal tension, manual or instrumental attempts at reduction, inversion of the patient, forcible rectal injection of water, and massage over the invaginated bowel. The injection

should be made slowly and uninterruptedly until resistance is overcome, but also with sufficient care to prevent rupture of the bowel.

If these measures fail to effect a reduction no time should be lost in resorting to abdominal section with a view to facilitate disinvagination by direct manipulation. If by traction, direct compression, dilatation of neck of *intussusciens*, separation of adhesions, etc., reduction is not accomplished, circular resection of the invaginated bowel, or the formation of an artificial anus above the invagination present themselves as the only means to save life within the range of operative surgery. The formation of a preternatural anus is preferable in cases where a large portion of the bowel has become invaginated, and again where the general condition of the patient is so grave that the more severe operation of enterectomy is contraindicated. In fifty-one cases where laparotomy was done, reduction was successful in twenty-six—eighteen children with four recoveries, and eight adults with five recoveries. So far no child less than six months old has recovered after operation. In the twenty-five cases where reduction failed to be accomplished or where no attempt was made, in four the abdomen was closed without any further attempt being made; in all of them the result was fatal. Of eleven cases of resection only one recovered, and this was Czerny's case where the disinvaginated bowel was resected on account of malignant disease. In nine cases enterotomy was performed, as reduction was found impossible, and circular resection was deemed impracticable; in all, except one, death occurred a few hours after the operation. In the latter case life was prolonged for two and one-half days, the patient being an adult female.

So far success has attended abdominal section for invagination in cases where disinvagination by direct manipulation was accomplished, an experience which argues strongly in favor of an early operation before reduction is rendered impossible by additional pathological conditions. It may be stated as a rule that temporizing measures should not be relied upon for more than two days.

In the case of adults when chronic symptoms of obstruction precede an acute attack, the invagination is often due to the presence of a tumor upon the inner surface of the intestine, a condition so well illustrated by Czerny's cases reported by Fleiner. The first patient was 45 years of age where an adenocarcinoma of the ileo-cæcal valve produced invagination of the lower portion of the ileum into the colon. The stenosis was partial and chronic, but when invagination occurred the symptoms of obstruction became sufficiently urgent to justify a resort to laparotomy, which was performed in the median line. The seat of obstruction was readily found and the invagination was corrected, but the patient died on the following day of peritonitis.

In the second case, a man 52 years of age, the symptoms of obstruction appeared suddenly. He recovered partially from this attack and came under Czerny's care six weeks after the acute attack. A tumor, freely movable, was found close under the right costal arch. The diagnosis was narrowed down

to either a floating kidney with symptoms of strangulation or intussusception produced by a tumor of the intestine, with the probability in favor of the latter. Abdominal section revealed the correctness of the latter supposition. The ileum had slipped into the colon and had ascended as high as the right flexure of the colon. The invagination was reduced without difficulty. At the apex of the invaginated portion a carcinomatous tumor was found. The growth was excised with a broad healthy strip of the intestinal wall, and the wound sutured. The patient was discharged on the twenty-eighth day, and presented himself four months later in excellent health. That the prognosis would be more favorable if the invagination is caused by a benign tumor of the intestinal wall is apparent. If in such cases disinvagination is possible an incision into the bowel will enable the surgeon to remove the tumor either without or only with partial resection of the intestine, and the operation is finished by closing the wound with a Lember's or Czerny-Lember's suture.

b. Enterolithiasis.—The subject of intestinal obstruction by an enterolith has been prominently brought to the attention of the profession by two cases reported during the last year by Dr. Lange and Dr. Beam. Dr. Lange's patient was a woman 60 years of age who had for a year suffered at times from colicky pains which were attributed at the time to the passage of gall-stones. She was suddenly attacked with symptoms of acute intestinal obstruction, and when visited by the doctor four days later she was in a condition of collapse. As an operation offered the only possible chance of recovery median laparotomy was performed. On opening the peritoneal cavity a considerable quantity of turbid flocculent serum escaped, and after the omentum had been lifted the small intestine presented itself, moderately distended and matted together by recent adhesions. Tracing the distended bowel, in a few seconds a hard lump was felt in the interior of the intestine, below which the bowel was entirely collapsed. It was evident that the obstruction was caused by this foreign body, which was removed through a longitudinal incision in the bowel. The intestinal wound was closed with a double row of sutures and the abdominal incision united in the usual way. The patient died eight hours after the operation. The mass removed was sufficiently large to occupy the entire lumen of the intestine, and on section showed in its centre a crystalline round nucleus of cholesterol, about the size of a small walnut, around which, in concentric layers, was a brownish crust varying in thickness from one-fourth to one-half centimetre. The concretion had undoubtedly formed during the passage of the gall-stone.

An enterolith of similar size and structure has been recently shown me by Dr. Ira Manley, of Markesan, Wisconsin, which he removed post-mortem from the lower portion of the small intestine in a woman who had suffered a long time from intestinal obstruction which finally proved fatal.

In Dr. Beam's case the enterolith had become arrested in the ileum just above the ileo-cæcal valve, where it gave rise to acute obstruction. Laparo-

enterotomy was performed and the patient recovered. The foreign body was as large as an English walnut and contained a nucleus as large as a buckshot.

As in most specimens heretofore examined the nucleus of the enterolith was composed of a gall-stone, the previous history of gall-stones should be remembered in considering the nature of the cause of the obstruction, and when a probable diagnosis can be made an operation should not be delayed, as the foreign body may also give rise to perforation.

c. Entero-stenosis.—Non-malignant cicatricial stenosis of the intestine as a cause of intestinal obstruction, if circumscribed and not multiple, offers one of the most favorable conditions for operative interference. In cases of this kind the intestine on the proximal side of the stricture will be found enormously dilated, and this condition will greatly facilitate the detection of the seat of obstruction. Typical circular resection should be performed, as it is the only measure which promises a permanent recovery. Intestinal stenosis due to malignant disease calls for enterectomy or enterotomy according to the extent of the disease, the condition of the adjacent organs, and the general condition of the patient.

d. Internal Strangulation.—The remaining causes of obstruction, included under the common term "internal strangulation," comprising volvulus, torsion, internal hernia, and strangulation by bands of cicatricial tissue, are the cases which have yielded such a large mortality after abdominal section simply because the operation was delayed for too long a time. These cases, when treated by timely interference, ought to furnish the most favorable conditions for abdominal section, as many post-mortem examinations have shown that a slight interference might have saved the patients' lives. The existence of intestinal obstruction, acute and chronic, is characterized by a familiar complexus of symptoms, so that the condition is readily recognized, but the location of the obstruction is frequently surrounded by many difficulties. As pain is not always referred to the seat of obstruction, it constitutes an unimportant symptom in localizing the lesion. Meteorism begins on the proximal side of the obstruction, consequently when the obstruction is located below the sigmoid flexure it is first observed over the descending colon; when in the transverse colon, over the ascending colon; and when in the small intestines, over the umbilical region. Vomiting of intestinal contents will take place early if the obstruction is located high up, if low down it is a late symptom. True stercoraceous vomiting indicates that the obstruction is located somewhere in the large intestines. Careful palpation of the abdomen and in doubtful cases manual rectal exploration will constitute important aids in determining the location and nature of the obstructing cause. Peritonitis is no contraindication to abdominal section, but the operation should be done, if possible, before this complication appears. If after a most thorough and careful examination we are unable to ascertain the seat of the obstruction, the abdomen should be opened in the median line for manual exploration. A dilated intestine would indicate that the cause of the obstruction is lower down,

while a collapsed bowel can only be expected on the peripheral side of the obstruction. If the cause of the obstruction is not found by the usual methods of examination, a systematic search should be made by searching for the ilio-cæcal region, and exploring the intestine, inch by inch, in both directions. When the patient is still in good condition, and the abdomen is sufficiently soft and yielding for making the examination, localization of the obstruction can usually be made without great difficulty. When opposite conditions are presented, when the patient is in a condition of collapse, and the abdomen tympanitic and tense, and the seat of the obstruction cannot be readily located, Nélaton's laparo-ileotomy should be performed in the right iliac region, as affording the best chance for the relief of the most urgent and dangerous symptoms. When gangrene of the bowel is found, typical circular resection should give way to the formation of a faecal fistula, if the obstruction is situated sufficiently low down so that such a procedure would not interfere with the maintenance of nutrition should the patient recover from the operation. Roser has made the observation that after correcting a volvulus of the sigmoid flexure the torsion of the bowel is liable to return. To prevent such an accident he advises that the loop of intestine, when placed in proper position, should be stitched to the abdominal wall by passing a few sutures through the mesentery of the bowel and the parietal peritoneum of the left abdominal wall. After disinvagination the same precaution is suggested to prevent reinvagination; the sutures in this instance must fix the lower portion of the *intussusceptum*. In conclusion it is appropriate to allude to the following concise and practical rules laid down by J. Grey Smith for treating intestinal obstruction by abdominal section:

1. Make the incision in the middle line below the umbilicus.
2. Fix upon the most dilated or the most congested part of the bowel that lies near the surface, and follow it with the finger as a guide to the seat of obstruction.
3. If this fail, draw the intestine out of the wound, carefully covering it, until increase of distension or congestion or both in one of the coils gives an indication that the stricture lies near.
4. If there be considerable distension of the intestines, evacuate their contents by incision, and suture the wound. Never consider an operation for intestinal obstruction inside the abdomen complete until the bowels are relieved from over-distension.
5. Be expeditious, for such cases suffer seriously from shock. The whole operation ought to be concluded in half an hour.

V. Enterectomy.—Circular resection of the intestine has been on trial for a number of years and has been performed for different pathological conditions. The results obtained thus far have shown that success depends largely upon the condition of the tissues through which the incisions are made. It may be stated as a rule that the healing process progresses most favorably when the resected ends have not undergone inflammatory changes by extension of the pathological conditions which have necessitated the

operation. Thus Jaffe has collected 121 cases of enterectomy reported since 1876; of this number thirty-six were done for gangrene of the bowel, with 70 per cent. of deaths or formation of faecal fistula, while of the remaining cases done for intestinal wounds, artificial anus, stenosis and tumors, only 44 per cent. terminated unfavorably. A study of these cases induced him to decide against the advisability of primary enterectomy for gangrene of the intestines. The same opinion is entertained by von Bergmann. The experience of Billroth also corroborates the opinion, which is now generally accepted, that primary typical enterectomy and enterorrhaphy should not be performed in cases of gangrene resulting from strangulated hernia and internal strangulation.

Of six cases of enterectomy for gangrene operated upon by Billroth only one recovered, and in this case a faecal fistula formed, which, however, closed without further interference in three weeks. In contrast with these cases were five enterectomies combined with extirpation of tumors affecting the bowel primarily or by extension; of this number three recovered. Clinical experience appears to have definitely settled the course to pursue in cases of gangrene of the bowel, viz.: to establish a preternatural anus, and, if this fails to close by more conservative means, to resort to circular resection and suturing after the intestine has been restored to its normal condition. That resection of a large portion of the intestinal canal is not always compatible with health is well illustrated by a case reported by Baum in which he removed 137 cm. of the small intestines in a woman 40 years of age. The patient was suffering from strangulated femoral hernia. Taxis was only partially successful. On opening the sac an offensive fluid escaped, and a portion of the omentum was removed. Peritonitis followed and a swelling formed in the abdomen above the crural ring, which broke and a faecal fistula was established. Rapid emaciation ensued; symptoms of strangulation made a laparotomy necessary. A mass of intestines was found twisted into a bunch which could not be unravelled, and as it was surrounded by an abscess it was resected and the ends of the intestine were united with sutures. Patient recovered from operation and improved for several weeks. Six months later progressive emaciation resulted in death.

At the autopsy the seat of resection could not be found, showing how completely and perfectly the intestinal wound had healed. The reporter was of the opinion that death was caused by the great shortening of the intestinal tract.

In 1881 Koeberlé resected 2.05 m. of the small intestines in a girl 22 years of age on account of multiple stenoses of the bowel. The patient made a favorable recovery. Kocher has quite recently removed by resection 160 cm. of small intestine for gangrene in a case of strangulated hernia. The patient recovered and at the time the report was made remained in good health.

Notwithstanding the favorable results obtained by Koeberlé and Kocher, Baum's case should indicate to us that there must be a limit to the extent with which resection can be practised with immunity, and

that in multiple lesions of the intestines with intervening healthy portions of the bowel it would be preferable to make multiple resections rather than to include a too extensive tract of healthy intestine with the injured or diseased portions. Nearly all operators emphasize the importance of not interfering unnecessarily with the vascular supply of the bowel for fear of causing gangrene of the resected ends. Lauenstein is so strongly convinced of the importance of this precaution that he claims the portion of intestine deprived of its mesentery always becomes gangrenous; consequently in such cases he advises resection of that portion of the intestine rather than trust to the doubtful restoration of the vascular supply by collateral circulation. That it is important to interfere as little as possible with the blood-supply of the resected ends of the bowel no one will doubt; but that in the case of the small intestines this fear has been overestimated, I am convinced. During my experiments on the pancreas last year I often detached the mesentery from the duodenum and upper portion of jejunum in dogs and cats to the extent of from two to twelve inches, and yet gangrene of the bowel occurred only in exceptional cases. The vascular supply was restored either by the denuded surface of the bowel coming in contact and forming adhesions, the detached portion of the intestine assuming the shape of a horse shoe, the open portion corresponding to the cicatrix between the denuded surfaces, or the circulation was restored by the growth of new vessels of large size along the detached portion of the bowel, thus restoring to perfection the mesenteric circulation.

The apprehension of causing gangrene by even a slight interruption of the circulation appears to be well founded in resection of the large intestine. Czerny lost two cases of resection of the colon from gangrene produced by this cause. Lauenstein has found three similar cases recorded where, during operations on the stomach, the transverse colon was detached more or less from the meso-colon. We should *a priori* expect a greater liability of gangrene to occur from a limited interruption of the circulation in operations upon the large intestines, from the larger size of the tube, the more scanty blood-supply, and more particularly from the greater difficulties encountered with in the formation of the collateral circulation.

Appended to the report of a successful case of resection of the large intestine for malignant disease, Weir gives the statistics of thirty-five cases in which excision of a cancerous intestine was resorted to, and in all cases save one (Schede's) the disease had involved the large intestine. Of this number it is to be noted that of the five cases in which the operation was done during the exhaustion attendant upon the acute obstruction of the bowel, all died from the shock of the operation; hence this condition is considered by Schede to contra indicate the operation. Of these thirty-three cases there was a mortality of seventeen, or 51.5 per cent., only a little greater than that which results from resection of the large intestine from other causes, and which is given by Maydl as 50 per cent. Aside from the shock, ten

died within forty-eight hours; in a number of cases the progress was complicated by perforative peritonitis and intestinal fistula. When the latter occurred in the course of an otherwise favorably progressing case, it, as a rule, closed later spontaneously. The perforation was due either to faulty suturing or gangrene of the margin of the wound from detachment of the meso-colon. In cases in which the disease returned it took place in three cases in less than one year, in four others between one and two years, in one case over two years, and in Gussenbauer-Martini's case the patient was free from the disease four years after the operation.

The propriety of excision of the colon for malignant disease can therefore not be questioned, the more so if it is found on exploration that the diseased tissue cannot be removed an artificial anus can be established at once with or without excision, which will at any rate remove the symptoms due to obstruction. In two of Billroth's cases, in which the cancer affected the descending colon in one instance, and the sigmoid flexure in the other, so much of the bowel was removed that the ends could not be united; an artificial anus was established, but in both instances a fatal termination followed, in one from collapse, and in the other from septic peritonitis.

VI. *Rupture of Diaphragm.*—Rupture of the diaphragm with escape of the abdominal organs into the cavity of the chest, is a rare accident, but when it does occur it is so uniformly fatal when treated on the expectant plan that in these days of heroic surgery it would appear only reasonable to make an effort to save life by abdominal section, or by an opening into the chest. Either procedure would enable the surgeon to replace the dislocated organs and to close the rupture by suturing. A number of traumatic ruptures of the diaphragm, with protrusion of the abdominal organs into the cavity of the chest, have been reported where, during life, at least a probable diagnosis could be made. All of the cases reported by Butlin and Brinton occurred on the left side. The physical signs on which the diagnosis was based consisted of tympanitic resonance over the side of the chest which contained the prolapsed intestines, with diminution of vocal fremitus and respiratory sounds over an area corresponding to the displacement of the lung. In pneumothorax respiration is abdominal; in traumatic diaphragmatic hernia the respiratory movements are costal, and the abdomen is flattened; conditions which are suggestive of the escape of gas-containing intestines into the cavity of the chest. Symptoms of intestinal obstruction indicate strangulation of the protruded bowel. Guttman regards displacement of the heart, in the absence of other causes, the most reliable diagnostic symptom.

An interesting case of traumatic diaphragmatic hernia which came into Albert's Clinic has been described by von Horoch. The patient received a stab wound immediately under the left scapula. He died two days later with symptoms of asphyxia. The post mortem examination showed that the left lung and diaphragm were punctured by the knife. Through the wound in the diaphragm a portion of the stomach,

which had also been opened, had escaped into the left pleural cavity. The reporter found three similar cases in literature. He suggested that, in a diaphragmatic hernia, new or old, presenting symptoms of strangulation the chest should be opened sufficiently by rib resection to permit reduction, and to close the wound in the diaphragm in such a manner that the sutures should embrace the serous coat of the stomach. That the recognition of a diaphragmatic hernia is not always an easy task, even after opening the abdominal cavity, is illustrated by Ferran's case. This surgeon performed laparotomy on a young woman who had suffered from symptoms of intestinal obstruction for seven days. The small intestines having been turned out from the abdominal cavity, a careful examination of their whole length and of the cæcum, sigmoid flexure, and rectum was made without the discovery of any cause for the obstruction. The wound was closed and the patient rallied well and showed signs of improvement until next morning, when sudden collapse manifested itself, with speedy death. Post mortem examination showed the existence of a diaphragmatic hernia from laceration; almost the entire transverse colon had escaped into the left pleural cavity, the distended loop of the intestine displacing the heart and the left lung. In the space near the diaphragmatic ring it was noticed that the constriction of the bowel was such as to hardly admit the tip of the index finger. Upon trying to reduce the hernia the ascending gut slipped back into the abdominal cavity without offering any resistance.

The establishment of a route to the diaphragm through the chest is not practicable on account of the frequency with which pleuritic adhesions are found and the greater amount of additional traumatism as compared with abdominal section; hence the latter should be preferred for the relief of diaphragmatic hernia in all cases where a probable diagnosis can be made, and where symptoms of strangulation dictate the propriety and justifiability of the operation. If the injury is produced by a penetrating wound of the chest, the method of operation suggested by von Horoch would be applicable, and in case the symptoms pointed also to visceral injury of the abdominal organs it should be combined with abdominal section.

VII. *The Treatment of Peritonitis by Abdominal Section and Drainage.*—The great fatality of acute diffuse peritonitis under the old or expectant method of treatment gives some support to the recently proposed treatment by incision and drainage. This now common and general surgical procedure has been already applied with great success for the relief of inflammatory lesions of all of the other serous cavities. The first record of an operation performed deliberately on account of acute peritonitis was proposed and executed by Dr. Wiltshire in 1868. About thirteen years ago Mr. Lawson Tait followed Wiltshire's example. Since that time he affirms he has never allowed a patient to die of peritonitis without opening the abdomen whenever he was permitted to perform the operation. He has performed abdominal section forty-four times on account of the presence of peri-

tonitis and the operation has been completely successful in forty-one cases.

As peritonitis is usually only a secondary manifestation of an antecedent primary cause, it appears plain that the treatment by surgical interference will be most successful in cases where the disease has not become diffuse, and where the original cause can be removed. Cases of this kind are represented by:

1. *Perforative Peritonitis*.—In order to recognize this condition early when most amenable to surgical treatment, it is important to allude to some of the most prominent early symptoms. Observation of a number of cases of peritonitis following perforation has satisfied Ebstein that the abdominal walls usually remain tense and rigid without distension; the abdomen may be flat and even depressed. The contracted condition of the abdominal muscles remains for a variable length of time, when it is followed by distension with or without rigidity. The contraction of the muscles diminish as the paralytic symptoms increase. Ebstein asserts that the absence of the normal liver dulness cannot be depended upon as a pathognomonic symptom of perforative peritonitis. He mentions a case of perforation of the stomach in which no gas had escaped into the peritoneal cavity to produce displacement of the liver. The liver also remains in its normal position in cases where fluid escapes into the peritoneal cavity, and where the organ has formed adhesions by previous attacks of perihepatitis. The absence of vomiting in a case of peritonitis or its sudden cessation in the beginning of an acute attack indicates, when the patient is conscious, that either perforation of the stomach has followed peritonitis. Vomiting is not present when perforation has taken place into the peritoneal cavity or the bursa omentalis.

A case reported by Ebstein appears to prove that vomiting again may take place in cases of perforation of the stomach as soon as the opening in the stomach has become closed by adhesions to neighboring organs. Perforation of the appendix vermiformis, bursting of a pyo-salpinx or pelvic abscess furnish familiar illustrations of perforative peritonitis, where a timely laparotomy would hold out encouraging prospects for a favorable recovery by operative treatment. Mr. Treves has also shown that nearly all abscesses about the cæcum are in reality intraperitoneal, so that in opening these abscesses the surgeon always has to deal with the peritoneal cavity. As these abscesses are generally circumscribed by adhesions, a failure to open them in time may result again in perforation and secondary diffuse peritonitis.

Mr. Howard Marsh relates a successful case of abdominal section for suppurative peritonitis produced by the bursting of an abscess in the mesentery around old tubercular glands into the peritoneal cavity. The patient was a young man 19 years of age, who had suffered some time with symptoms of diffuse peritonitis. The abdomen was found exceedingly tender and distended. The incision was made over the most prominent portion of the swelling on the outside of the linea semilunaris and gave exit to two or three pints of foetid pus. The distended coils of small intestines could be felt through the wound. The cavity

was washed out with a weak solution of carbolic acid and drained. The patient made a slow but good recovery.

J. W. Taylor reports an interesting case of acute hydronephrosis where rupture of the cyst into the peritoneal cavity produced great collapse, and where a timely laparotomy prevented a fatal peritonitis. The patient was a girl 15 years of age, who was attacked suddenly with pain in the left lumbar region, and vomiting, followed by the appearance of a fluctuating tumor in the same side, which was at the time diagnosed as acute hydrops of the left kidney. She suddenly became collapsed, which with other grave symptoms indicated rupture of the cyst and extravasation of its contents into the peritoneal cavity. The abdomen was opened at once through the median line. The abdominal cavity was thoroughly cleansed and the remaining portions of the cyst contents were removed by puncturing with the trocar. The cyst wall was sewed to the abdominal wound, and against all expectations the patient rallied and improved. In a few days the cyst refilled, which necessitated a second incision and drainage by means of a glass drain. Urine was discharged through the wound, but the patient improved. As no calculus could be found by an exploration of the interior of the cyst, it was believed that the left ureter had become completely obliterated, which would necessitate a nephrectomy at some future time.

That even perforation of a large pelvic abscess into the peritoneal cavity may terminate in recovery by timely and well applied surgical treatment is well illustrated by a case reported by Mr. Treves, in a paper read before the Royal Medico-Chirurgical Society, March 10, 1885. The patient was a female 21 years of age, who had suffered for three months from chronic pelvic peritonitis, following severe gonorrhœa. During this time a large purulent collection, containing very offensive matter, had formed near the pelvic brim. The acute symptoms were due to the bursting of the abscess and extravasation of its contents into the general peritoneal cavity. On the following day the abdomen was opened under antiseptic precautions, the patient at the time being in a very critical condition. The peritoneum and intestines showed signs of diffuse recent inflammation. The peritoneal cavity contained a quantity of semi-opaque fluid, mixed with flakes of lymph and pus. The whole peritoneal cavity was washed out with many quarts of water, and a drain introduced. The symptoms improved promptly, and the patient recovered.

These cases furnish abundant proof that in cases of perforative peritonitis, irrespective of the nature of the material which has been extravasated, our only resource which affords any encouragement whatever, is abdominal section. In cases of this kind it is important to search for the cause of the peritonitis, and to treat the conditions, if necessary, by operative measures; the toilet of the peritoneal cavity can be most effectively accomplished by copiously flushing with warm sterilized water rendered slightly alkaline by the addition of chloride of sodium. As in these cases we can never be certain that the peritoneal cavity has been rendered perfectly aseptic, it is always

advisable to resort to drainage. We have every reason to hope that in the future perforation of the stomach or intestines will be treated by abdominal section, as it holds out the only possibility of preventing death from the consecutive peritonitis by removing the extravasation and preventing further escape by closing the rupture. In such instances it is essential to search for the perforation, which must be treated in the same manner as intestinal wounds, after which the peritoneal cavity is cleansed, drained, and the wound closed.

The successful local treatment of tuberculosis has recently been extended to:

2. *Tubercular Peritonitis*.—Koenig has called attention to the difficulty met with in the diagnosis of circumscribed ascites following tuberculosis of the peritoneum, and other fluctuating tumors of the abdominal cavity. He refers particularly to the peculiar kind of fluctuation found in these cases as an almost pathognomonic evidence. The fluctuating waves are large and are conveyed from one wall to the other, and the undulations are imparted to the abdominal wall.

Von Holst reports a case of tuberculosis of the peritoneum which was remarkable from the fact that on palpation over the abdomen dulness and fluctuation were felt as distinctly as in ascites, which on post-mortem was not found to exist. The deception was due to firm adhesions which had formed between the omentum and intestines.

Not infrequently one or more smaller swellings are felt in the vicinity of the large one. Clinically it has been shown that the swelling may decrease in size for a time or that it may remain stationary for a considerable length of time. Tuberculosis of the peritoneum is most frequently found as a complication of tuberculosis of other organs, but sometimes it occurs as a primary lesion in persons without any hereditary taint.

Bucquoy observed a case which had its origin in a cheesy tubercular degeneration of the ovaries. Koenig reports four cases of abdominal section performed for tuberculosis of the peritoneum. The patients were all females. One of them remained well two years after the operation. The exudation was usually found immediately beneath the anterior abdominal wall, the intestines, uterus and ovaries being pushed backward. The cyst wall was always found lined with a thick fibrinous wall which presented all the microscopical appearances characteristic of tuberculosis. After incision the fluid was evacuated, the sac washed out with carbolyzed water, and the inner surface of the cyst wall dusted with iodoform. In the case which remained well after two years the cavity was drained, and the patient left the hospital with the drainage-tube. The fistulous opening healed subsequently. Koenig is of the opinion that in some cases of primary tuberculosis of the peritoneum a radical cure can be effected by laparotomy and local treatment.

3. *Chronic Peritonitis with effusion*.—The most favorable pathological condition of the peritoneum for surgical treatment is chronic inflammation with serous effusion. Abdominal section with drainage

relieves the pressure promptly, and thus favors reabsorption and the restoration of the physiological balance between secretion and absorption. Savage reports that he has performed laparotomy in six cases of subacute peritonitis attended by more or less effusion, and all of his patients recovered.

4. *Ascites*.—Dr. A. G. Caillé, of New York, has recently called the attention of the Academy of Medicine to the value of permanent drainage in ascites. He related two cases of cirrhosis of the liver with marked ascites, in which he had inserted a drainage tube into the peritoneal cavity at the linea alba, with the result of affording great relief of all the distressing and dangerous symptoms, and probably prolonging life for a considerable period. In one case an autopsy could not be secured, but in the other one was made, when it was found that there was not the slightest indication of peritonitis at the point where the fistula was made. If permanent drainage of the peritoneal cavity is possible without causing inflammation, it is obvious that the treatment of ascites by drastic cathartics, diuretics, and other debilitating measures should be abandoned in favor of this surgical procedure.

(To be concluded.)

MEDICAL PROGRESS.

A HYPODERMIC SOLUTION OF CAFFEINE.—TANRET (*Répert. de Pharm.*, March, 1886), recommends this formula:

Caffeine.....	37 grains.
Sodium benzoate.....	45 "
Distilled water.....	10 c. c.

Mix the benzoate and the caffeine in a mortar, add the water, and filter.

—*Am. Journ. of Pharm.*, May, 1886.

THE INCOMPATIBILITY OF CALOMEL AND BROMIDE OF POTASSIUM.—VIGIER (*Gaz. Hebdom. de Méd. et de Chir.*, May 6, 1886), remarks that calomel is decomposed on the addition of potassium bromide, although more slowly than when the iodide is added. Nobody he thinks, would give the two drugs within five or six hours of each other, but it might happen, for example, in a case of infantile convulsions, that two practitioners being called in quick succession, the second one might order one of these drugs after the other had been given by the advice of the first one. He gives the caution, therefore, that in such cases their incompatibility should be borne in mind. —*New York Medical Journal*, May 22, 1886.

THE INJECTION OF ANATOMICAL PREPARATIONS.—A. K. BJELOUSSOW recommends (*Archiv f. Anatomie*, November, 1885) for this purpose a mixture of borax and gum arabic. The mass is injected cold, and is then fixed by immersion in spirits. By treating the preparation with glycerine the injection is rendered transparent; and it can be removed at any time by acting upon it with dilute acetic acid.—*The American Journal of the Medical Sciences*, April, 1886.