

fair, and in some cases the appetite may not be interfered with. The condition may last for several days, and recovery may take place spontaneously. The symptoms subside gradually. The omentum, however, is irreducible and rolled up into a ball. After a while it will be possible again to distinguish certain lobes and strands on palpation.

Gangrene is uncommon, and when present there is usually suppuration in the hernial sac or between the individual parts of the omentum. The sac becomes ruptured and the pus reaches the surface. After incision or after spontaneous rupture, gangrenous tabs of omentum are thrown off and the abscess cavity gradually closes. Cases have been reported in which the suppuration extended to the abdominal cavity, although this is an uncommon accident. Certain cases of strangulated omentum present such severe symptoms that they are confounded with strangulation of the intestine. There may be complete obstruction to the passage of gas and fecal matter, collapse, and even fecal vomiting. In all probability a loop of intestine was strangulated in these cases besides the omentum, and slipped back of itself or during attempts at reduction, so that on operation nothing but strangulated omentum could be found. Attention is called again to strangulation shock due to irritation of the peritoneal nerves.

CLINICAL VARIETIES OF STRANGULATED HERNIA.—The character of the strangulating band, the severity of the condition, the length of time it has lasted, etc., all influence the clinical picture considerably. The above described conditions apply to an average case, although there are widely differing conditions between the most severe acute cases and the slight cases, so that it has seemed advisable for practical reasons to subdivide hernia into superacute, acute, subacute, and chronic. In the acute types that are due to elastic constriction as a rule, the general symptoms are the most marked. There will be from the onset shock, cold perspiration, pallor of the extremities, cyanosis of the face, anuria, weak pulse, and early facies Hippocratica, combined with frequent vomiting from the first. This severe general disturbance is as a rule combined with considerable damage to the strangulated gut itself. In a number of cases reported the intestine has become gangrenous within twenty-four hours. It is not uncommon for these patients to die from the first shock without there being any gangrene of the gut or any peritonitis. Certain of these acute cases present a clinical picture resembling cholera, as already mentioned. In other cases the nerve symptoms are most marked. There will be muscular spasms, convulsions, delirium, and attacks resembling uræmia.

There are, on the other hand, severe cases of strangulation that are especially dangerous to the gut itself, associated with only slight general symptoms—so slight that the general condition—a good pulse with almost complete absence of pain and vomiting—leads the surgeon to be disastrously deceived. These latent types of strangulation are noted especially with hernia of the intestinal wall, and are especially feared because the intestine becomes gangrenous within a short time in spite of the absence of alarming symptoms.

Chronic strangulation is noted especially in connection with large hernias with large openings. The symptoms appear gradually and are easily overlooked, especially if the hernia is irreducible. The loss of appetite, obstipation, slight colic, vomiting in connection with the taking of food, are the only symptoms that are noticeable for several days. Then suddenly the symptoms become worse. These types correspond to the clinical picture of obstruction with internal closure of the intestine.

Treatment.—The strangulation should be removed immediately. Time is very valuable, for there are strangulations that prove fatal within a short time, and one should never allow any time to pass just because of the dread of deciding so grave a question. There are two methods of reducing the strangulation: (1) bloodless reduction by taxis, and (2) herniotomy. All other aid is only of accessory importance.

TAXIS.—The most important thing about this method is that it should not be fractured too energetically or for too great a length of time. Many operators object to taxis in any case of acute strangulation, for this is one of the methods which consumes valuable time and frequently does not benefit the patient. There are cases, however, in which taxis is justifiable, such as those in which the strangulation is evidently not dangerous; therefore in cases in which there was no acute onset, no severe symptoms due to intestinal crushing, and in which the general symptoms due to intestinal strangulation are very slight. Then again when the hernial ring is very large, especially if previous attacks of strangulation have been successfully overcome by taxis; and finally in the cases in which the operation is bound to be very difficult and dangerous; therefore in old people with large hernias, where not only the operation itself, but the long rest in bed is a source of danger. In young children taxis is justifiable because it is difficult to keep the field of operation clean and complications in the wound are not uncommon. Certain authors claim that it is justifiable to try taxis in those cases in which one reaches the patient immediately after the appearance of symptoms.

Taxis is absolutely counterindicated in cases in which small hernias give rise to severe symptoms, especially to pronounced strangulation shocks at first, and in cases of strangulation that have existed for some time and produced disturbances of nutrition in the intestinal wall, and in cases in which there is considerable fluid in the sac. The method of treatment will depend upon the judgment of the physician in a given case; but in any case in which taxis is to be applied the patient and relatives should be told that the measure is only experimental, and that an operation may be necessary. Before endeavoring to reduce the hernia in this way the bladder should be emptied by means of a catheter if necessary. The large intestine should also be emptied by means of large enemata, and the stomach by means of a stomach-tube. This latter measure does away with the vomiting after an anæsthetic, and should never be omitted when there is fecal vomiting.

The patient should be so placed that the region of the hernia is the highest point of the abdomen, so as to relax all of the muscles in the vicinity of the hernial ring. Certain authors recommend the knee-chest position. This, however, is awkward because of the anæsthetic. In cases of inguinal and femoral hernia the thighs should always be flexed so as to relax the region. A warm bath is supposed to be of value, because it is believed to relax the muscles. This method should be repeated only in cases in which haste is not imperative or where a herniotomy is to be avoided if possible.

One of the most valuable aids to taxis is complete anæsthesia; not only because of the pain, but also because the disturbance due to the patient's moving about is done away with. Besides, the abdominal muscles are completely relaxed. There is no doubt that certain hernias are easily reducible under an anæsthetic when all other attempts prove futile. Some authors object strongly to the use of chloroform because in the absence of pain one is tempted to use too much force and do damage. Although the author as a rule condemns taxis, still there are certain concrete cases in which this method is distinctly indicated and should be applied. One should always be prepared for operation in any case, provided the hernia proves irreducible. Direct etherization of the hernia as recommended by Finkelstein may be justifiable in cases in which there is no doubt that reduction by taxis is indicated if in any way possible. The pelvis is elevated, and about every quarter of an hour a tablespoonful of ether is poured over the region of the hernia. This is kept up for about two hours. The skin should be greased so as to avoid irritation. The cold in all probability diminishes the volume of the gases contained in the intestine and stimulates peristalsis in the loop of intestine. It is therefore best to try this method at a time when it is probable that the intestine has not been severely damaged. Gussenbauer and others have applied this treatment with considerable success. In many of the cases the hernia goes back of its own accord, or after slight attempts at reduction, whereas before the application of ether all efforts were futile.

Taxis is best done by grasping the neck of the hernia with one hand and applying a slight amount of traction, while the other hand presses upon the fundus of the sac and endeavors to diminish the size of the hernia. This pressure should be done with the flat of the fingers, and not with the tips of the fingers, and only with the fingers. Any pressure of the arm is to be avoided. An attempt is made to reduce the portion of the hernia that is nearest to the ring—*i. e.*, the portion that appears last. This can usually be done best from below. The pressure should be applied rhythmically and with gradually increasing force, while the hand at the neck of the sac prevents the hernia from spreading sidewise. It is sometimes of advantage to lift the hernia off from the abdominal wall and turn it alternately to one side and the other. When gurgling noises can be produced and a portion of the intestinal contents displaced, this may be considered a favorable sign; and when a portion of the hernia has been

reduced, care should be taken that this does not come down again. No definite time can be given; neither can it be stated how much force is permissible, although generally a few moments will be sufficient to indicate whether the surgeon's efforts are to be successful or not. In large hernias it is justifiable to spend a little more time, because the constriction is not liable to be so firm. After the intestine has been reduced, a finger is pushed into the hernial opening with the overlying skin. One should be convinced that the entire hernial canal is free, and that no suspicious mass can be felt within the abdomen. It should also be determined whether the sac is still outside or not. Care should be taken to prevent the hernia from coming down again by using a truss or some special bandage, such as a spica.

There are certain dangers connected with taxis. It is evident that if the intestinal wall has become friable, it may tear, and that the decomposing contents will enter the general peritoneal cavity and produce peritonitis. It has also happened that an approximately normal intestine has been ruptured by the use of too much force, and that the mesentery has been torn from the intestine for a considerable distance, followed by hemorrhage into the abdominal cavity. The amount of pressure used was so great that the sac ruptured and the water and the loops of intestine escaped into the surrounding tissues. Aside from these disastrous results, due to lack of judgment, there remains to be mentioned the apparent reduction or the reduction *en bloc*. In these cases the manipulations are to all appearances successful. The hernia becomes smaller and recedes. In spite of this the intestine is not liberated, but is simply displaced *in toto*, and the result is only apparent.

With complicated hernial sacs, consisting of several cavities, a superficial portion of the hernia may be pushed back into one of the deeper seated cavities, a condition which makes matters still worse. The so-called inguino-interstitial hernias and the inguinoperitoneal or cruroperitoneal hernias belong to this group, as well as the diverticula of sacs. In these cases taxis is usually successful without any great amount of force, and the intestine appears movable, so that the operator comes to the conclusion that the hernia has been reduced. In other cases in which attempts at reduction are at first unsuccessful and are then increased, it may happen that the sac with its entire contents is loosened and pushed back into the abdominal cavity. Again, the parietal peritoneum is lifted off and the sac with its contents lies in the subperitoneal connective tissue. Strangulation persists and the conditions are still more unfavorable. In these cases it is to be presumed that the constriction was at the neck of the hernia itself. This accident is favored by the habit of some patients of reducing the sac after they have reduced the hernia itself. In these cases the neck of the sac may be so movable that a very slight amount of force is sufficient to produce a reduction *en bloc*, and not infrequently this accident happens to the patients themselves. The constricting ring itself is frequently small and fibrous. (Franz, Eiselsberg.) Occasionally this accident

happens by pressing upon the fundus without preventing the hernia from spreading laterally. Again it may happen that the sac ruptures in the vicinity of the ring, and that the contents escape through the tear and come to lie in the subperitoneal tissue, and in very rare cases the hernial ring will tear off entirely and the whole mass be pushed back into the abdomen. It may happen that the sac and the parietal peritoneum tear off, while the constricting ring remains and surrounds the intestine like a ligature. Hochenegg saved a case of this sort by operation. Anyone familiar with the ordinary progress of taxis will notice the variation, such as the absence of gurgling, the gradual softening of the hernia, etc. Sometimes there will be a crackling noise, such as that which accompanies the tearing of tense membranes, or the entire hernia will disappear suddenly. If a finger is introduced, one will be surprised to find in the canal itself, or immediately inside the abdomen, a firm resistance resembling the strangulated hernia. On palpating the abdomen carefully, one may be able to detect this mass as a hard, tender tumor. This is especially significant if this mass in the abdomen can be pressed down against the finger held in the canal. An examination by vagina or rectum, combined with abdominal palpation, may disclose the exact condition. By pressing over the tumor, or by coughing, it may be possible to reproduce the hernia, but the most characteristic thing is that in spite of the manipulations the patient does not experience any relief. If the individual has been anaesthetized, the condition will, of course, not be noticed until he commences to complain later. One should always remember that an accident of this sort is possible, and should always determine the conditions carefully after reduction. In accidents of this sort the only relief is in immediate operation. If it is possible to press the tumor down into the sac, a typical herniotomy may be performed; but when this is not possible, the abdominal cavity must be opened. If the tumor can be felt, it is best to open in the median line; but in the majority of cases one will be obliged to operate in the region of the hernial ring and then enlarge the opening into the peritoneal cavity. If the surgeon adheres to the general rule that only those cases of hernia in which there is no possible danger of gangrene should be subjected to taxis, then the results of operation for reduction *en bloc* will be more favorable.

Violent efforts at reduction usually result in effusion of blood, and operations after unsuccessful attempts at reduction are not classical as a rule because the tissues are infiltrated with blood. It is uncommon to find clots in the sac. The intestine itself may be injured, and there may be tears of the serosa and bloody infiltration of the intestinal wall. Injuries of this sort favor transmigration of microbes and increase the danger of gangrene. Other accidents are intestinal hemorrhage, due to laceration of the mucous membrane or to hemorrhagic infarction after thrombosis of vessels. Schnitzler and Ullmann have reported fatal cases of this sort. If taxis is tried in a case in which the hernial fluid contains pathological microbes or in which there is a

small perforation of the gut, fatal peritonitis may develop rapidly. This danger exists even in hernias that have been strangulated only a short time. The author will consider certain other disturbances that appear later in spite of successful reduction, in connection with herniotomy because these conditions develop after an open operation in the same manner. Prolonged and violent efforts at reduction are absolutely counterindicated, as is also aspiration of the hernial contents. A paralyzed loop of intestine does not close over after removal of the needle, and the chances of successfully operating are reduced. Ether sprays, as recommended by Richardson, and ice-bags may diminish the tension in large hernias that are associated with but slight symptoms of incarceration. In these cases the author does not object to the use of sand-bags or elastic pressure, as recommended of late by certain authors.

HERNIOTOMY.—The patient should always be prepared for operation before taxis is tried. The region should be shaved and scrubbed with some disinfectant after cleansing with liquids that dissolve the fat of the skin. Other things being equal, ether or chloroform will be used as an anaesthetic, but as a rule the latter is to be preferred. If it should be necessary to resect the gut, one may stop the anaesthetic at this time. When the general condition is poor—*i. e.*, with heart disease or kidney trouble—it is best to use a local anaesthetic, and some authors use local anaesthesia in all severe cases. Schleich, Mikulicz, Hofmeister, and Petersen, all recommend infiltration anaesthesia and praise its advantages. The latter author claims that the manipulations are much easier, and that if it is necessary to wash out the intestine, this can be done much more easily. Cushing¹ anaesthetizes the iliohypogastric nerve at the lower margin of the internal oblique and the ilioinguinal and genitocrural in the inguinal canal with a 0.5 to 1 per cent. solution of cocaine. Mikulicz reports inflammatory conditions of the lungs after infiltration anaesthesia, processes ordinarily claimed to be due to the use of a general anaesthetic.

Herniotomy may be subdivided as follows: 1, skin-incision; 2, exposure of the sac; 3, opening the sac; 4, relieving the constriction and inspecting the viscera; 5, reduction; 6, digital examination of the abdominal cavity; and 7, obliteration of the hernial opening and canal.

Generally speaking, the skin-incision is made over the most prominent portion of the hernia; in inguinal ruptures therefore from the region of the external ring downward over the scrotum; in femoral hernias, from about the level of Poupart's ligament downward over the large vessels to the lower margin of the hernia, and in umbilical hernias a longitudinal incision is usually made. One should be careful not to injure the sac or the intestine, an accident that may readily occur in femoral hernias, and in hernias where there is considerable cicatricial tissue because of some previous inflammation or when the patient has previously been operated for a hernia.

¹ Lilienthal, *Ann. of Surgery*; Matas, *Ibid.*

The length of the incision depends largely upon the individual operator, but as a rule one should not make a larger incision than is absolutely necessary, because the wounds do not always heal without complication. The incision at any rate should be sufficient to expose the field of operation thoroughly. It is customary when operating after Bassini's method to make the incision over the inguinal region.

If the individual layers covering the sac are dissected off one by one, there will be considerable laceration of tissue, so that it is much better to carry the dissection down to the sac in the region of the neck and then strip off all the layers together with a piece of gauze or with the handle of a scalpel. It is always easier to dissect out a sac while it is unopened and under tension. If, however, there is any suspicion that the hernia is gangrenous, or that there is pus in the sac, then the amount of laceration and dissection should be limited as much as possible. The overlying layers are of interest anatomically and in connection with the development of hernias, but are of little practical importance, and frequently cannot be found because of variations and secondary changes, such as adhesions, etc.

When the sac contains fluid, it may easily be recognized. It is somewhat more dense than the overlying layers, and frequently contains very few vessels. Sometimes the intestine or the omentum can be seen to move within. The accessory layers are sometimes enormously thickened, or are so adherent to the sac-wall that they form but a single layer. There may be no hernial fluid and the contents of the sac may be closely adherent, so that conditions vary extremely, and are sometimes difficult to recognize even by those most experienced.

The presence of cysts, which are not uncommon in the hernial region, makes things especially difficult, and one should always be prepared to find some anomalous condition. These cysts frequently resemble the hernial sac, or may be the result of an obliterated sac. While operating upon a femoral hernia the author found two small cysts and behind them a gangrenous hernia. Lipomata may also give rise to difficulty because the overlying layers may be mistaken for the sac and the fat itself may be mistaken for omentum. The higher up the sac is freed, the less the difficulty met, and the individual structures may be recognized and separated. The adhesions in the canal are not apt to be so great, and it is much easier to dissect the sac off from above downward.

Petit's operation without opening the sac has been discarded, and at the present time all surgeons open the sac and inspect the contents. The wall is lifted off in two places and a small nick made with a knife. When fluid runs out of the opening, it is easy to introduce a director and enlarge the opening; but when there is no fluid in the sac those places are avoided where the intestine is in close approximation to the wall. If no place can be found where the intestine is not in contact with the sac, then it may be better to open the sac by blunt dissection with forceps or a director. One should always remember that one may open in a place where the sac-wall consists of the attach-

ment of the large intestine, for instance. The muscular structure of the intestine will indicate the condition; but if the intestine is opened, it should be closed again immediately and an attack made upon the opposite side of the sac. The liquid contained in the sac should be received in a sterile dish and examined as to quantity and quality. One cannot draw positive conclusions as to the condition of the gut from the nature of the fluid, but a certain amount of information can be obtained. If the fluid is clear and serous, the intestine is in all probability in good condition. The presence of a little blood-pigment or of blood is not indicative of serious trouble. If the odor is bad, the conditions are apt to be more troublesome, although at times the water may be very foul and the intestine be perfectly viable. When the hernial fluid is cloudy, or there are bits of fibrin, the intestine will be gangrenous in all probability, and there will be no doubt at all when on opening the sac gas and fecal matter escape. In any case it is probably best to wash out the sac with some antiseptic solution and remove the micro-organisms mechanically as thoroughly as possible. The sac is then wiped out with considerable care so as not to push the intestine back into the abdominal cavity.

The constricted region of the intestine should be carefully examined, because there is frequently considerable damage here while the remaining portion of the gut does not show much disturbance. For the purpose of inspection, the strangulated gut should be pulled down, a step that can be taken without preliminary division of the constriction bands only in very exceptional cases. It is a distinct advance that the constriction band is no longer divided with Cooper's hernia-knife, but dissected down to the constriction layer by layer. Any method which is associated with the danger of still further damaging a loop of intestine that is already in a precarious condition is to be condemned. When a loop of intestine is pretty nearly ruptured, and is held intact only by the adhesions around the constriction bands, any additional pressure, such as that used by introducing a director into the ring or by pulling upon the loop of intestine, will be sufficient to tear the gut. The backed-up fecal matter rushes out and will almost always infect the peritoneal cavity with disastrous result. The author therefore prefers to dissect down to the constricting band layer by layer and tie off the vessels one by one, cut adhesion bands, and avoid traction upon the intestine, so that the friable loop of gut is exposed and isolated with the least amount of damage. It is sometimes advisable to make the first incision over the neck of the sac and expose this before the sac itself is opened, a method recommended by Bassini in his first publication. The skin-incision is made over the inguinal region, and the aponeurosis of the external oblique is split as far as the internal ring. The cord and the sac are lifted out of their bed, the sac separated without any traction being put upon the neck, and the constricting portion divided. Reduction of the hernia is very easy with this method, and radical operation may follow if advisable, just as if the hernia had been reducible from the start. This method

is especially to be recommended in cases in which there is marked strangulation, although the intestine is perfectly viable; but in those cases in which the intestine is already gangrenous there is danger that the liberated loop of intestine may slip back into the abdominal cavity before it has been thoroughly inspected. This method therefore should not be used in cases in which there is great probability that the gut has been severely damaged. In these it is best to open the sac and fix the suspicious loop of intestine externally, and then open up the aponeurosis of the external oblique and remove the constricting band secondarily. In some cases the incision over the sac is simply carried upward. There are no hard-and-fast rules that can be given which may be followed in recognizing the condition of the gut. In the majority of cases an experienced operator will know whether to replace the gut or not, but in doubtful cases even the most experienced will be uncertain. Generally the sense of touch will give more reliable information than inspection. A viable loop of intestine will contract distinctly or show some change after the constriction has been removed, and on palpation a viable loop of intestine gives one the tense feeling of living tissue, whereas lifeless gut is absolutely flaccid and resembles moist blotting-paper. If it is possible to palpate the mesentery, one should investigate the arterial pulsation in this region. When this is absent, the intestine is in great danger. The color of the intestine does not give accurate information. Even dark-blue intestine may be perfectly viable; but when there are dirty grayish-brown spots the intestine is in all probability gangrenous. Certain authors advise scratching with a needle; but this is not to be recommended, because it gives no reliable information. If there is any doubt as to the condition, it may at times be of value to move the intestine about in warm salt solution, when it will be soon seen whether the consistence improves or not.

If one has come to the conclusion that the intestine may be replaced, this should be done in such a way that the hernia cannot come down again on straining. The omentum is frequently in good condition even when the intestine has become gangrenous, although it frequently shows changes that lead one to consider that it is best not to replace it. One should not be too radical in this direction, because a thick omental stump may become adherent in the region of the hernial ring and later cause internal strangulation. If the omentum is inflamed and extensively adherent, either in its individual parts or rolled up and adherent to the sac, or when certain portions are thrombosed, there is no doubt that it is better to pull it down and tie it off where it is healthy. These ligatures should not be *en masse*, but should be near together, because this is the best way of avoiding secondary hemorrhage, and there is less liability to the formation of strands and adhesions between the intestine and the abdominal wall. A piece of omentum that has been pulled down for the purpose of ligating off slips back into the abdominal cavity very readily, whereas omentum that has been rolled up and inflamed is very

apt to stick in the region of the hernial ring and produce undesirable complications. Any adhesions between the sac and the omentum should always be tied off. When the intestine is adherent to the sac, it may be very difficult to separate the two because of the danger of tearing the gut. Rather than use force, it is better to resect a portion of the sac and leave it adherent to the gut that is to be replaced. In very exceptional cases the adhesions are so extensive that the gut cannot be unfolded. In these cases the intestine cannot be replaced or the whole loop may have to be resected. Eiselsberg resected 3.5 metres (11 feet) of intestine in a case of this sort.

Even when the hernial ring has been considerably enlarged there may be great difficulty in replacing the gut. The manipulations are the same as those of taxis. The portion of the gut nearest to the ring is first replaced after an attempt has been made to squeeze the contents of the gut back into the abdominal cavity before replacing the loop itself. If the surgeon does not succeed with one loop, he should try another, because not infrequently the ease with which the second loop slips back is surprising. If one piece of gut has been replaced, it is usually easy to replace the rest. Cases, however, occur, especially large inguinal hernias, in which the difficulties can be overcome only after the contents of the gut have been drawn off with a small aspirating-needle. The wound should always be closed with a stitch. If the contents are chiefly fecal, it may be necessary to use a large-sized trocar or incise the gut transversely, which is still better. It is evident that the wound must be carefully protected against infection. It should be packed with gauze and covered with a piece of rubber tissue that has been soaked in sublimate solution. This forms a smooth surface to which the fecal matter does not adhere and can be easily washed off. After the intestine has been emptied in this way it is usually easy to reduce the entire hernia. Sometimes the loop that has come down is twisted around its axis, an accident that interferes considerably with reduction. When this is untwisted, however, the gut usually slips back very readily.

After replacing the intestine a finger should be introduced through the hernial canal into the abdominal cavity, so as to ascertain whether the inner surface of the hernial ring is perfectly free, and whether the loops of intestine in the immediate vicinity are perfectly soft and movable. One should not overlook the fact that reduction *en bloc* sometimes occurs even after herniotomy. One should remember especially that the intestine may escape into the subperitoneal connective tissue through the openings that have been made while dividing the constricting ring, or that the intestine may slip into a pocket or a split formed by an adherent strand of omentum in the region of the ring.

There seems to be no uniform opinion with reference to treatment when the intestine is gangrenous. Hofmeister and Petersen are of the opinion that the gut should be resected immediately. This method of treatment corresponds also to the views of Kocher, Körte, and Mikulicz. When the intestine is gangrenous, the abdominal incision should be

enlarged, and the intestine should be carefully exposed, emptied, and the gangrenous portion resected with any portion that does not seem perfectly viable. An end-to-end suture or a Murphy button may be used. An artificial anus should be resorted to only in exceptional and desperate cases. The following rules should be obeyed, so as to diminish the danger of this operation as much as possible:

General anæsthesia should be replaced by local anæsthesia on account of the damage done to the heart by the absorption of toxins. The room should be warm, the table heated, and the abdomen and exposed intestine carefully covered so as to avoid any great loss of heat. It is absolutely necessary to make the opening in the abdominal wall sufficiently large to examine the intestine conveniently, which will also aid in avoiding infection of the abdominal cavity and facilitate an examination for the purpose of determining whether there remains any constriction in the region of the hernial ring. Sometimes the situation is very difficult: the gangrenous portion of the intestine may be so large that on opening the sac no healthy intestinal wall can be seen. In these cases one must be very careful not to let the ends of the intestine that are only loosely connected with the hernial ring by adhesions slip back into the abdominal cavity. A similar danger has to be dealt with at times in cases of hernia of the lateral wall of the intestine. Pressure from below should be avoided, and if possible the gut should be grasped and held in place while the abdominal cavity is being opened. If needs be, the hernial ring may be covered with a gauze pad on the inside after opening the abdomen, which closes the sac off from the peritoneal cavity. The examination of the freed intestine should be very careful and rapid, and the peritoneal cavity should be walled off in every direction with gauze. It is also necessary to empty the intestine of the decomposed matter, which may be done perfectly well if a little care is exercised. Hofmeister advocates dividing the distal end of the intestine transversely and drawing the proximal end out over the leg or over the edge of the table if possible. If necessary, the mesentery may be divided. Petersen recommends that the intestine be washed out with a tube. The amount of intestine to be resected does not depend so much upon the gangrenous area as upon the consistence of the proximal piece of intestine. One should never be afraid of resecting too much, and as a rule it is necessary to cut away several times as much intestine as is gangrenous. Hofmeister resected on an average about six and a half times as much intestine as was absolutely gangrenous, although many of his cases had only 4 cm. (1.6 inches) of gangrenous gut, and 5 of the cases were hernias of the lateral wall. In one case 4 cm. (1.6 inches) of the intestine were gangrenous, and 75 cm. (29 inches) had to be resected. Kocher considers that distinct pulsation is the most valuable sign of good nutrition, and that one should err on the side of resecting too much rather than operate through doubtful tissue. According to Trzebicky, 2.8 metres (9 feet) of intestine may be resected without interfering with nutrition, and Fautino resected 3.1 metres (10 feet) and Ruggi 3.3 metres (10.8

feet) without any evidence of subsequent disturbance. Kocher considers that the mesentery is best tied off in small pieces close to the intestine, after previously crushing with pressure-forceps. Hofmeister usually takes out a wedge-shaped piece. Kocher usually makes an end-to-end suture with double continuous stitches. Hofmeister insists upon a lateral anastomosis, after Frey, with an opening at least 6 cm. (2.4 inches) long. While placing the first two rows of sutures the proximal ends of the gut which is to be resected may be pulled out over the edge of the table so as to drain off the fecal contents. The conditions favoring nutrition are very good with lateral anastomosis, and the opening should be made as near as possible to the mesentery so as to have the normal function restored immediately. (Küttner.) Czerny prefers a Murphy button, and Petersen considers that his good results are largely due to the use of this appliance. The amount of time saved is considerable and the joint is perfect from the first. The button is discharged as a rule in about eleven days. After an end-to-end suture, the intestine is washed off repeatedly with warm normal salt solution and then replaced in the abdominal cavity in a position that favors passage of the intestinal contents. This is important because a piece of intestine that has been united by sutures has lost a certain amount of its power of motion. A radical operation may be done after an intestinal resection only in very favorable cases; for instance, after resection for hernia of the lateral wall of the intestine where the gut was not ruptured. In all other cases, and especially in the cases in which there is considerable fluid in the abdominal cavity, it is best to pack the wound. This packing should not plug things off, but should act as a drain. Those cases in which there is extensive perihernial suppuration or general peritonitis, and those cases in which the general condition is bad, should not be operated upon in this manner. According to Hofmeister, when one decides to make an artificial anus, it is practically synonymous with declaring the case lost.

One should never replace a loop of intestine when there is any doubt as to its condition. If the general condition is fair, and if the surgeon has operated with local anæsthesia, it may be well to follow Kuzmik's advice and split the hernial ring, place the loop of intestine in question between two moist gauze compresses, and allow warm salt solution (40° C., 104° F.) to flow over the gut for about half an hour. Sometimes the intestine will recover completely and pulsation may be restored in the vessels of the mesentery. If any doubt remains, the loop should be resected. Various authors have recommended leaving the gut exposed upon the abdominal wall and awaiting developments. The results of this method of treatment have not been especially favorable, because it is evident that the intestine is at a disadvantage, and after a certain time it is difficult to replace the loop. The passage of feces is interfered with, and the proximal piece of intestine is placed under very disadvantageous conditions. Adhesions and kinks occur frequently. In Tübingen 3 of 4 of the patients treated in this way died. After resection of any hernia, when the wound is left open,