

off, and the sac with the lipoma excised. The margins of the ring should be freshened and sewed together just as in umbilical hernia.

Hernia of the Linea Semicircularis.—This variety of hernia is found where the fascia of the transversus abdominalis becomes continuous with the posterior sheath of the rectus, therefore at the outer margin of this muscle. Cooper was first to call attention to the fact that numerous small vessels pass through the abdominal wall in this region, and that the muscles may be somewhat separated around these vessels, so that the gap in the wall is already formed. In other cases, however, the separation is secondary, and is produced by the sac extending outward along the vessels. In certain of the cases the peritoneum after penetrating the transversus spreads out between the layers of the abdominal wall and reaches the surface at some distance from the opening, through which it primarily escaped. In these cases the sac may be quite complicated and consist of a subcutaneous and a subperitoneal portion. The condition is most common in older people, especially women who have borne several children, although individual cases have been reported in children by Monroe and Macready. Schoofs reports a case in which the testicle was found in a sac of this sort.

Diagnosis.—The diagnosis may be very difficult, because the hernia is small and is covered by a thick layer of fat. The condition may be recognized because of localized pain, which becomes worse when the abdominal muscles are put under tension; for instance, during attacks of coughing, and frequently disappears entirely on lying down. In other cases the symptoms may be much more marked, resembling those of epigastric hernia. Palpation not infrequently detects a point of localized pain. A large hernia is easily recognized, but one should be careful to investigate whether or not there is a second sac into which the contents of the external sac may be pressed. It is not uncommon to have these cases strangulated. The condition is frequently severe because of the sharp fibrous margins that produce considerable constriction. All of these cases should be operated upon, especially if the exact condition cannot be detected. A hernia appearing to the outer side of the linea semicircularis is known as a lateral abdominal hernia, and is observed after some injury or suppurative process, or as the result of some congenital muscular defect or acquired muscular paralysis. (De Quervain.) As a rule they are described in connection with lumbar hernia.

Hernia in Abdominal Scars.—These are the result of some injury or suppurative process, and may occur anywhere in the abdominal wall. They may follow a stab-wound or some crush of the abdominal wall without any external wound where the muscles become destroyed either by the injury itself or because of the hæmatoma that develops. The cases that appear after some operation are much more common, and are found usually in the median line or in the appendix region. They are extremely common when the primary operation was done for some suppurative process which made it necessary to keep the abdominal

wound open for a considerable length of time. They also develop in cases in which the wound does not heal by first intention or in which for some reason or other it has been necessary to keep the wound open for the purpose of treatment.

The condition sometimes develops after wounds have healed by first intention, and at the present time the common opinion is that a simple through-and-through suture is not sufficient for closing the abdominal wall, but that the peritoneum, fascia, muscles, and skin should be sewed separately. Abel examined 586 patients some time after operation and found that 20 per cent. of the cases closed by simple through-and-through sutures presented a hernia, and that only 9 per cent. of the cases sewed layer by layer showed a similar condition. If there had been suppuration for two weeks, 40 per cent. presented a hernia; for three weeks, 54 per cent.; for four weeks, 65 per cent.; and 80 per cent. of the cases that supplicated for more than four weeks had a hernia; while 68 per cent. of the cases closed by through-and-through sutures that supplicated showed a hernia, and only 31 per cent. of the cases that were sewed layer by layer.

There are two kinds of hernia in the scar; one where the cicatricial tissue is uniformly distended and presents a condition resembling separation of the recti muscles; in the other variety the condition is more like a true hernia, because the peritoneum bulges through a hole in the fascia, which has rather sharply defined margins. In the latter variety, however, the condition is simply due to the giving way of weaker portions of the scar. Certain of these hernias into the scar become extremely large. The overlying tissues are greatly thinned, and the skin is apt to become ulcerated because of ill-fitting bandages, etc. These ulcers may eventually open up the hernia or even perforate the intestine. The omentum and intestine are commonly adherent to the sac and diverticula are not uncommon. The symptoms are generally in proportion to the size of the hernia, and cases of strangulation are uncommon.

Treatment.—The same difficulties are met with in fitting any appliance as in umbilical hernias, and a proper abdominal band is to be preferred to any truss with a spring. When the recti muscles are separated in young children, adhesive plaster bandages, as already described, may be tried. The same applies to hernia in the linea alba. Those operated upon may be instructed to use adhesive plaster bandages, and change them from time to time, as the only means of preventing a hernia into the scar, according to Fritsch.

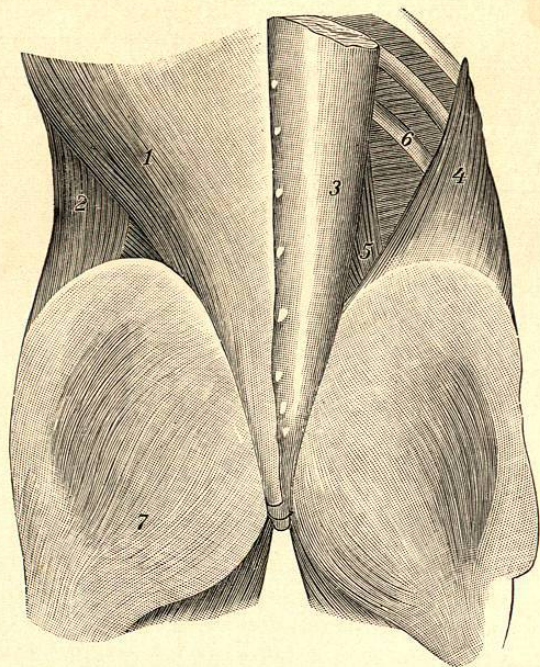
If these conservative methods do not result in improvement, then a radical operation should be advised. The technic is much the same as that of operations for umbilical hernia, and especial care should be taken to free the sac from the hernial ring completely and remove any adhesions that may be present. The abdominal wound should be closed layer by layer, and when the hernia is large it may be well to use a few silver wire sutures which include a considerable portion of the abdominal wall, and which are removed in about fourteen days.

Bumm has recently succeeded in closing certain difficult cases by placing the sutures transversely and then keeping the patients doubled up for a considerable length of time, so as to diminish as much as possible the tension on the line of suture. It is, however, not at all uncommon to have a recurrence after operations for hernia in abdominal scars.

LUMBAR HERNIA.

The abdominal cavity is closed behind first by the spinal column and laterally by the sacrospinal muscles. To the outer side of these the wall is not quite so firm, and is formed by the quadratus lumborum, the external and internal oblique, and the transversalis. The abdominal muscles arise in part from the crest of the ilium, in part from the lumbodorsal fascia. The individual layers of muscle do not

FIG. 295.

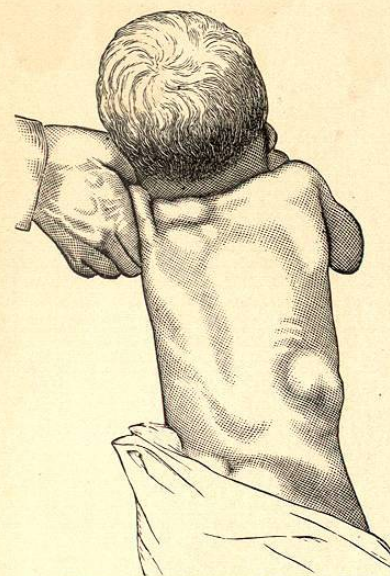


Dorsal muscles in the region of the lumbar triangles: 1, latissimus dorsi; 2, external oblique; 3, sacrospinal; 4, internal oblique; 5, quadratus lumborum; 6, twelfth rib; 7, gluteus maximus.

all reach back to the sacrospinal group, so that there are certain weak places left in the wall. The external oblique is 3.5 cm. (1.4 inches) from the erector muscle at the twelfth rib and 4.5 cm. (1.8 inches) below. The internal oblique is 5.5 cm. (2.2 inches) away from this margin above and 1.5 cm. (0.6 inch) below, while the transversus is 6.5 cm. (2.6 inches) away throughout its entire length, so that there is

quite a space left which is in part closed in by the quadratus lumborum, which arises from the posterior portion of the crest of the ilium, the fifth lumbar vertebra and the iliolumbar ligament, and is inserted into the transverse processes of the four upper lumbar vertebrae and the lower margin of the twelfth rib. In the lower portion it extends outward beyond the free margin of the sacrolumbar group, and in this region the abdominal wall is closed in partly by the lumbodorsal fascia, as shown in the accompanying diagram. There are two lumbar triangles, the larger of which has its base along the twelfth rib, while the smaller has the crest of the ilium as a base. The upper one is bounded internally by the sacrolumbar muscles, externally by

FIG. 296.



Congenital lateral ventral hernia. (Wyss.)

FIG. 297.



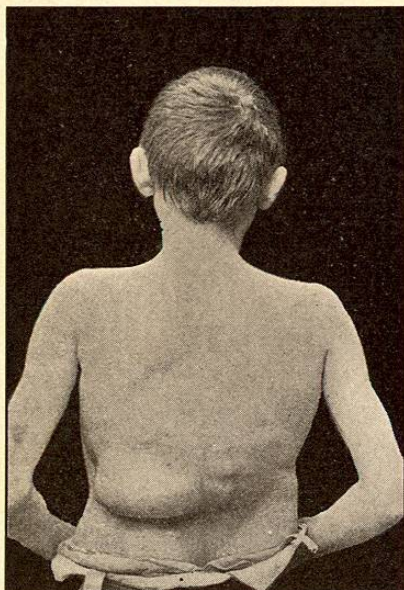
Lumbar hernia.

the posterior margin of the internal oblique, and the apex is in the region of the crest of the ilium. The lower triangle is situated between the free margin of the latissimus dorsi and the external oblique. The apex of this small triangle is formed by the margins of these muscles, and the space itself is known as the triangle of Petit. The upper larger triangle is covered in almost completely by the latissimus dorsi. This muscle, however, cannot be included as one of the layers of the abdominal wall proper.

Lumbar hernia is rarely congenital, and is usually acquired in advanced years when there is general debility, or it follows pregnancy or some other marked distention of the abdominal wall and when there is continued violent coughing. The number of cases that have

been examined anatomically is very small, so that up to the present time there is much difference of opinion as to which region belongs the term "lumbar hernial ring." Certain cases of hernia leave the upper triangle, which is known as the costolumbo-abdominal, while others appear in the region of Petit's triangle. Besides this there are cases that do not follow either of these routes, but appear at the side of the last intercostal artery or along the branches of the second and third lumbar nerves, and extend forward between the muscle layers. In the majority of cases, however, there is a distinct defect of the muscular structure. Wyss describes a case of this sort as hernia ventralis lateralis congenita. This appeared through a gap in the internal and external oblique and transversalis, which was associated with absence

FIG. 298.



Lumbar abscess from spinal caries (rear view).

FIG. 299.



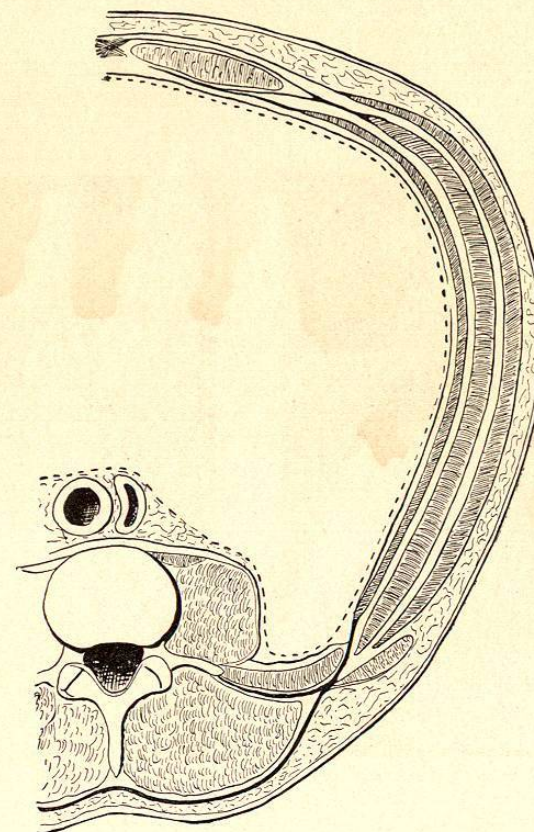
Lumbar abscess from spinal caries (side view).

of the twelfth rib. Macready reports similar cases. Grange has recently collected 45 cases, in 20 of which the anatomical conditions were accurately described; 9 of the hernias occurred in the region of Petit's triangle, 2 in the costolumbo-abdominal triangle, and 3 were associated with some congenital muscular deformity, and in 1 each there was a congenital defect of the ileum, 1 case was due to necrosis, and 1 occurred in a scar, and in 3 cases the hernia followed along vessels and nerves through the muscles; 20 of the cases were on the left side, and 16 on the right side; 2 were bilateral; 18 were in males and 5 were congenital. As a rule these hernias are covered by a layer of muscles, which, however, becomes gradually pushed back, so that

the sac lies eventually immediately beneath the skin. According to certain authors, there are cases without any sac, the hernia consisting of fat, or some abdominal viscus without any peritoneal covering, such as the ascending or descending colon.

Diagnosis.—The diagnosis is not difficult in a well-defined case, although disastrous mistakes have been made. The condition is not

FIG. 300.



Transverse section at the level of the second lumbar vertebra (lumbodorsal fascia).

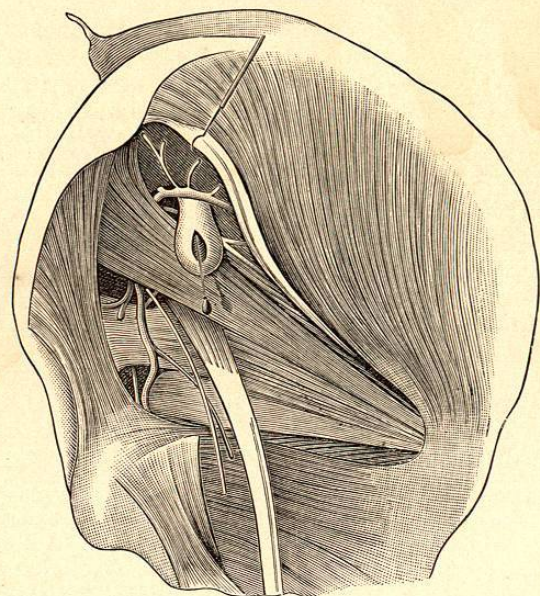
infrequently confounded with a cold abscess, and has been opened for such, whereby the intestine has been injured. The condition has also been confounded with a lipoma or a hernia of the muscles.

Treatment.—A movable hernia may be held back by some appliance. Whenever there is any strangulation, the case should be operated upon immediately and a radical operation done after the field has been liberally exposed.

GLUTEAL AND SCIATIC HERNIA.

The greater and the lesser sciatic notch are separated one from the other by the small sciatic ligament, and are bounded below by the great sciatic ligament. The great sciatic foramen is filled up largely by the piriformis. Besides this, the superior gluteal vessels and nerves leave above the muscle, the inferior gluteal, the sciatic artery and nerves, passing out below the muscle. The obturator internus leaves the pelvis through the lesser sciatic notch, and the internal pudic artery and nerve pass over this back into the pelvis. There are therefore three regions where the peritoneum may bulge: along the upper margin of the piriformis, then along the lower margin, and

FIG. 301.



Gluteal hernia. (Garrè.)

finally through the lesser sciatic foramen. All three varieties of hernia are extremely uncommon. Many of the cases formerly considered to be such were found by Garrè to be perineal hernias, for those appearing below the greater sacrosiatic ligament cannot be included as sciatic hernia.

The most common variety is that in which the hernia leaves the abdominal cavity between the upper margin of the piriformis and the border of the greater sciatic notch. As a rule the hernia follows along the course of some nerve-trunk, while the gluteal vessels do not have any stated relation, but spread upward. After leaving the notch the hernia lies beneath the gluteal fascia and the gluteus maximus. It is quite a distance to the lower margin of this muscle, and after once

reaching this region the hernia increases quite rapidly in size and forms a distinct tumor, covering in the anal region and extending more and more toward the median line. It is difficult for the surgeon to decide without an anatomical examination which variety of hernia he has to deal with. The posterior perineal hernias also appear beneath the free margin of the gluteus maximus. Garrè suggests that the two superior varieties be called superior and inferior gluteal hernia, and the inferior variety leaving the lesser sciatic foramen sciatic hernia, a suggestion that ought to be followed.

Diagnosis.—The diagnosis is extremely difficult in small hernias lying beneath the muscles, but can be made if there are signs of strangulation, localized pain, and sensitiveness to pressure, as in the case reported by Wassilieff. The condition may readily be confounded with abscesses, cystic tumors, or lipoma.

Treatment.—When the symptoms are urgent, an operation should be performed immediately and the field freely opened up so as not to operate in the dark, because of the large vessels in the vicinity.

HERNIA OF THE FLOOR OF THE PELVIS (PERINEAL HERNIA; HEDROCELE).

This variety of hernia is very uncommon, and almost all of the cases are due to a bulging downward of Douglas' pocket. In embryos and very young children Douglas' pouch extends very much farther downward than in adults, and Ebner's investigations seem to show that the majority of these hernias are the result of some error of development. The peritoneal hernial sac is covered by a layer of pelvic fascia, and after descending rests upon the muscles of the floor of the pelvis, especially on the levator ani. This muscle is in relation behind with the ischiococcygeus and the coccygeus itself, between which there are not infrequently small spaces left. Sometimes the levator shows small slits. The peritoneal diverticulum descends through these openings into the ischio-rectal fossa in the vicinity of the anus and drives the perineal fascia and skin forward. The transverse perinei muscles separate two varieties; the anterior and posterior perineal hernias. The latter are much more common. Winckel distinguishes three varieties in women, an anterior perineal hernia between the constrictor cunni and ischiocavernosus, which sometimes reaches the labia majora, and is therefore known as the hernia labialis posterior; the second variety appears between the constrictor cunni and the transversus perinei; and the third between the transversus perinei and the gluteus maximus. In man the hernia leaves through the rectovesical pouch, while in women this space is subdivided by the uterus and broad ligament into an anterior and a posterior pocket. If the hernia leaves through the anterior pocket, it almost always comes down into the labia majora and forms a posterior labial hernia. It may, however, reach the surface directly without being in any way connected with the labium. This variety of hernia might easily be confounded

with an inguinal labial hernia if the examination is not carefully made. One can distinguish the two, however, if the inguinal canal is carefully watched while the hernia is being reduced, especially if a vaginal examination is made at the same time, which will show that the hernia goes backward toward the uterus. In the anterior perineal hernias it is not uncommon to find the bladder with or without intestine. Synonyms are pudendal hernia or vaginolabial hernia. Up to the present time only 2 cases have been accurately described from an anatomical standpoint.

If the hernia comes down in the recto-uterine fossa, it will follow the same course as in males, and may descend between the vagina and rectum, but is very apt to produce bulging of the posterior wall of the vagina or of the anterior wall of the rectum. These cases have been called hernia vaginalis, or hernia rectalis, or hernia in recto.

According to Berger, there are two distinct varieties of posterior perineal hernia. In one there is no distinct separation between the sac and the large recto-uterine pouch, and the hernia appears as a uniform bulging. In the other variety the hernia is pedunculated, and is sharply separated from the general peritoneal cavity by a distinct sac neck. This latter variety may be confounded with a vaginal polyp when it is circumscribed and produces a bulging of the mucous membrane. The small ring is not infrequently the source of strangulation.

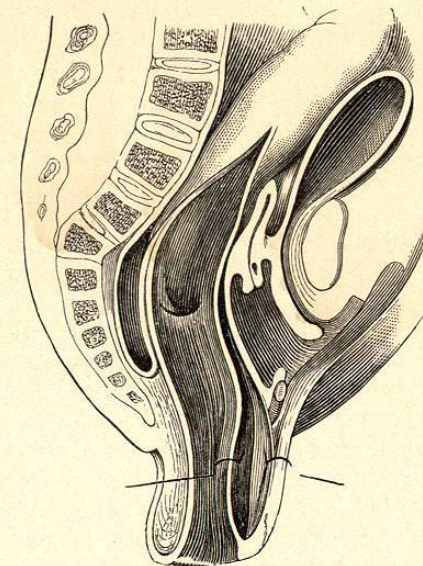
Diagnosis.—An error in diagnosis is only possible because of some careless examination or because of ignorance. The sac almost always contains intestine, is tympanitic on percussion, may readily be diminished in size, and goes back with distinct gurgling. The tumor becomes smaller and relaxes when the patient is lying down, is larger on standing up, on coughing or straining, and can usually be reduced. An error in diagnosing may be very disastrous. Michaelson and Lukin report a case in which a tumor 8 cm. (3 inches) long appeared in the labium majus. The peduncle extended upward for some distance, and a diagnosis of polyp was made and the mass amputated. Later there were violent colic and vomiting, and the patient died the next morning. On autopsy an oval opening 5 cm. (2 inches) in diameter was found in the vaginal wall, and at the side of this the os uteri. It was discovered that 23 cm. (9 inches) of omentum and 11 cm. (4 inches) of colon had been excised. Gunz reports a case in which a vaginal hernia had been confounded with an abscess, and had also been incised with a similar result.

The discomfort associated with these hernias may be very great. Various appliances have been constructed, but as a rule the relief is not great. When the hernia is large, the patient may wear some sort of a suspensory. Only those cases are favorable for operation in which there is a distinct neck to the hernial sac, because only in these is there any hope of obtaining a lasting result. When there is extreme dilatation of Douglas' pouch, the inferior wall of the abdominal cavity is usually so relaxed that the chances of radical cure are very slight.

One would have to perform a laparotomy, in all probability, and try to diminish the size of Douglas' pouch by sewing the uterus to the pelvic wall. Gaillard-Thomas inverted the sac just as the finger of a glove, then performed a laparotomy and sewed the invaginated sac to the abdominal wall. Since operations have been performed for removal of tumors of the rectum and uterus, traumatic hernia in this region has been repeatedly observed. Hochenegg reports 3 cases of sacral hernia in women, and in 1 case he performed a radical operation.

There remain to be considered the cases of rectal hernia (rectocele, hthrocele, hernia in recto) that are found in connection with prolapse

FIG. 302.



Sagittal section through the pelvis of a girl eight years of age with prolapse of the rectum. The hooks separate the layers of the anterior sac of peritoneum. (Cruveilhier.)

of the rectum. (Fig. 302.) Ludloff has observed several cases recently, and comes to the conclusion that the hernia is the primary disturbance, and that the prolapsed rectum is secondary and the result of traction. A prolapsed rectum is really a perineal hernia, the sac of which is partly formed by the anterior wall of the gut.

The rectovesical fossa, or recto-uterine fossa, offers but little resistance to any force directed from above downward and backward. Under normal conditions the amount of resistance offered by the rectum itself as a hollow muscular tube is sufficient to resist any bulging up to a certain point. If, however, the intestinal muscles are abnormal because of chronic constipation or diarrhoea, then the relaxed portion of the intestine will be pushed downward and backward into the ampulla of the gut. If this force is applied repeatedly, considerable traction will be made upon the attachments of the intestine, and once

started, more and more small intestine will come down into the pouch formed in the wall of the rectum. The depressed portion of the abdominal wall gradually involves the lateral and posterior wall. In the angle where Douglas' pouch comes in contact with the gut there is a transverse fold within the lumen, known as the *plica transversalis recti*. The superimposed intestine outside of the rectum presses down on this structure, which becomes more and more depressed until this fold forms the apex of a prolapse of the rectum outside of the anus. The anterior lip of the prolapse always contains a pouch of peritoneum (*hedrocele*), which may or may not contain some abdominal viscera.

The above remarks explain how it is that the length of this variety of rectal prolapse is fairly constant; in children rarely more than 5 cm. (2 inches), and in adults not more than 10 to 15 cm. (4 to 7 inches). The longer variety belongs to the group of *prolapsus coli invaginati*.

A prolapse of the rectum with *hedrocele* almost always develops slowly, and the fact that the size of the tumor changes on lying down or on straining and coughing, indicates the presence of a hernia. Of the 96 cases collected by Ludloff, only 11 contained observations indicating the presence of a *hedrocele*, and in 13 cases observed by the author the condition was present 8 times, while in the remaining cases it could not be excluded. It is very common to have these hernias become strangulated, although they are sometimes irreducible.

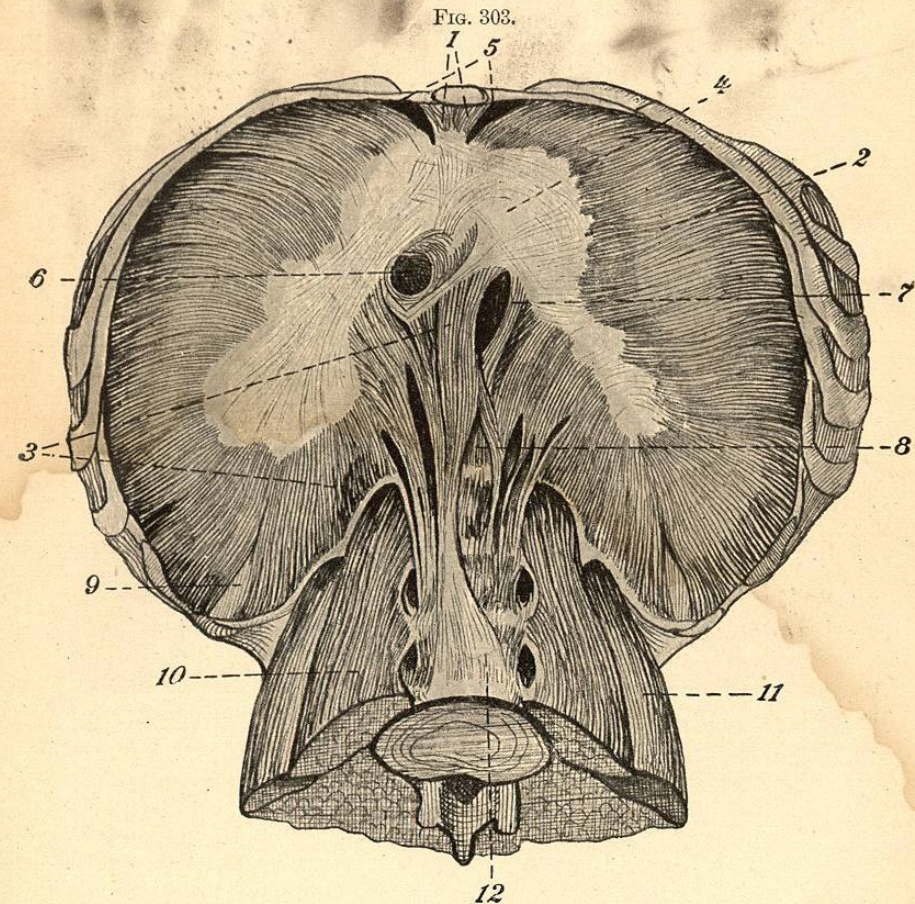
Treatment.—As far as treatment is concerned, Mikulicz's method of resecting the entire prolapse and uniting the stump of the anus with the inner layer of the cylindrical tumor covered by serosa, is generally made use of. The cases run a favorable course and the results are good, as a rule. There is considerable danger of recurrence, because the peritoneal pouch still persists and reaches down close to the anus. Besides resection, it has been endeavored to meet the condition by laparotomy and suture of the intestine to the abdominal wall higher up. Massage has also been tried. (Brandt.)

DIAPHRAGMATIC HERNIA.

If it be demanded that a peritoneal sac is essential to a hernia, then only a few of the cases described as diaphragmatic hernia can be considered as a hernia proper. The term hernia is used in a broader sense in this region, and includes all of the cases in which there is any displacement of abdominal viscera into the thoracic cavity. Displacements with peritoneal sac are known as true hernia, those without a sac as false diaphragmatic hernia, while both may be acquired or congenital. Certain of the cases should be considered defects of development, and many cases belong properly to the displacements following injury. Finally there is a group of cases in which there is an abnormal relaxed condition of the diaphragm, so that the vault is not

ruptured, but bulges upward, a condition described by Thoma as *eventratio diaphragmatica*.

According to Waldeyer, the diaphragm develops from an anterior and a posterior portion that unite in a median line, while a lateral communication exists on either side between the small thoracic cavity and the very large peritoneal cavity. The portion along the ribs



1, sternal portion; 2, costal portion; 3, lumbar portion; 4, central tendon; 5, foramen Morgagni; 6, foramen for the inferior vena cava; 7, foramen for oesophagus; 8, opening for aorta; 9, foramen Bochdaleki; 10, psoas magnus; 11, quadratus lumborum; 12, fourth lumbar vertebra.

behind and the external lumbar part unite last. If there is any disturbance of development, it is perfectly possible to have some displacement of the abdominal viscera, on the left side the stomach and on the right side the liver, which latter develops early to considerable size, and is rarely passed around. Even when the defect is very great the anterior portion of the diaphragm is usually present. The fact that the costal and lumbar portions unite late is important, because of the