

gap frequently found in this region. Even when the serous membranes unite there is a gap left in the muscle, known as the foramen Bochdaleki.

The diaphragm is attached to the sternum, to the ribs, and in the lumbar region, and the aponeurosis forms the dome-like central tendon, which presents an opening for the vena cava inferior, known as the foramen quadrilaterum. In the muscular portion farthest back between the crura is the opening for the aorta and thoracic duct. In front of this is the opening for the œsophagus and pneumogastric nerves. The azygos veins and splanchnic nerves pass through smaller lateral symmetrical openings. Where the different muscular portions meet, there are not infrequently small gaps closed only by peritoneum and pleura. The one in front, which is constant, is situated between the sternal and costal portions, and is known as the foramen Morgagni, while the one between the lumbar portion and costal portion is known as the foramen Bochdaleki. The hernias that develop as the result of some defect of growth have, of course, no sac. The true hernias having a double sac, consisting of pleura and peritoneum, occur most frequently in the parasternal region—*i. e.*, they reach the anterior mediastinum through the foramen Morgagni. A hernia sometimes passes through some normal opening, most frequently through that for the œsophagus, next in frequency through the opening for the splanchnic nerves, and rarely through the aortic opening. No hernia has ever been reported through the foramen quadrilaterum. The hernia may be of considerable size, but is the subject of treatment only when signs of strangulation appear.

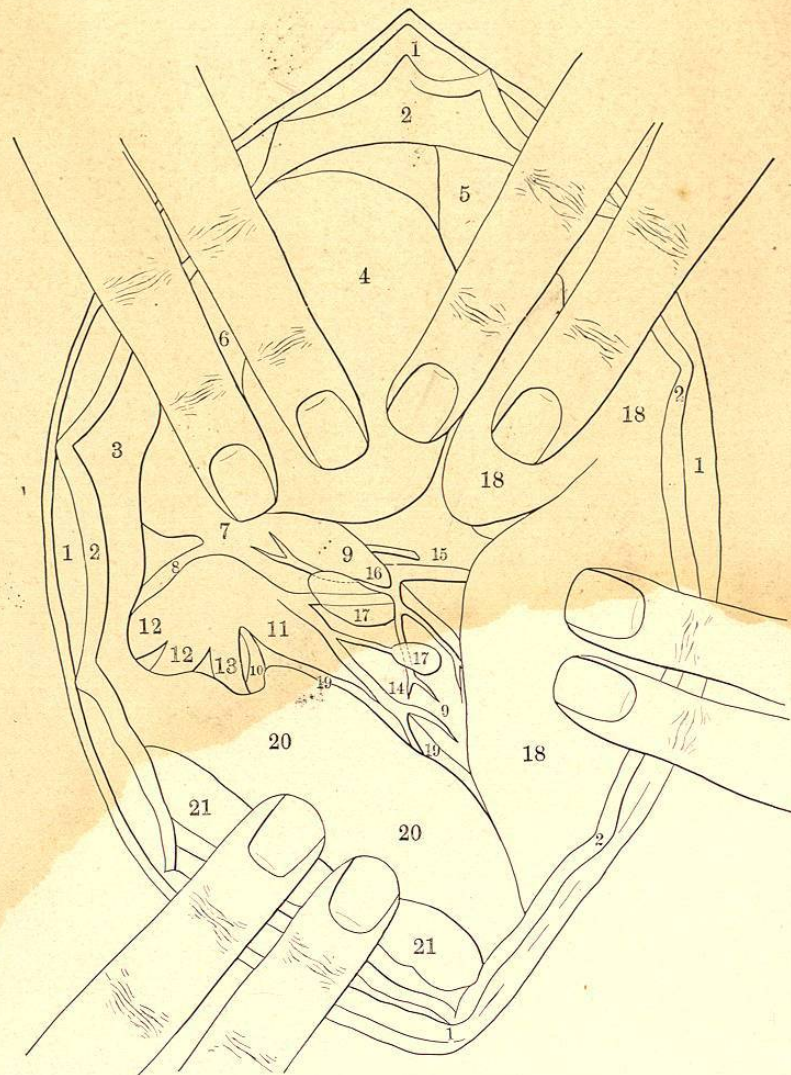
Traumatic diaphragmatic hernia is much more frequent and of more importance to the surgeon. In this group are included all of the cases produced by some injury to the diaphragm. The injury may be a blow, a stab- or gunshot-wound, or may be due to some indirect force which increases the intra-abdominal pressure to such an extent that the diaphragm becomes ruptured. Those cases in which the diaphragm is weakened is due to some disease, and ruptures following some slight increase of pressure also belong to this group (subphrenic abscess, empyema, carcinoma, etc.).

Not infrequently there is prolapse of the abdominal viscera into the thoracic cavity immediately following an injury, and strangulation occurs at once. There are, however, numerous cases in which the injury is not followed by immediate results of this sort. The wound may heal and leave a button-hole-like opening, lined with peritoneum and pleura, through which the viscera pass later because of some accidental cause. According to Lacher, of 36 cases of injury of the diaphragm that were not operated upon immediately, 5 died within one day, 10 within a month, 5 within five years, and 5 in twenty years, all of the effects of a diaphragmatic hernia. The statistics of other authors also show that symptoms of strangulation did not occur for some time after the injury, even after months or years. Almost all of these hernias are not true hernias, although in some of the cases there was a sort of sac, which, however, consisted of prolapsed omen-

tum or was the result of inflammation around the displaced organs. The acquired diaphragmatic hernias are chiefly on the left side, and generally in the fleshy portion. The liver protects the right side, although the fact that stab-wounds and gunshot-wounds are more common on the left side of the body is also of etiological importance. The traumatic variety may be subdivided into compound and subcutaneous hernia. The former will be recognized because of the characteristic position of the injury, and not infrequently by a piece of prolapsed omentum, etc. There may be no symptoms whatever in either case, and in spite of the extensive injury life may not be immediately endangered. Strangulation may develop, however, at any time, and then presents the usual symptom-complex of internal incarceration.

Diagnosis.—The chief point in the diagnosis is to remember that there is the possibility of a diaphragmatic hernia in certain cases. If abdominal viscera have entered the thoracic cavity, there will be the physical signs of displacement, referable especially to hollow viscera, and also symptoms due to pressure upon the thoracic organs. With prolapse on the left side, which is eight times as common as that on the right, the left half of the chest will be distended, and does not make any respiratory excursions. The area of cardiac dulness will be displaced to the right. Dextrocardia is so valuable a sign that when present one should always suspect a diaphragmatic hernia, provided there is not a left-sided empyema, a pneumothorax, or transposition of viscera, or some other cause. If a large quantity of the intestinal tract enters the pleural cavity, the physical signs may resemble those of pneumothorax. The differential diagnosis will be based upon the fact that the size of the air-containing cavity varies, that intestinal noises can be heard within the thorax, either spontaneously or produced artificially by carbon dioxide, that the diaphragm is high, and that the abdomen is flattened, contrary to the condition found in pneumothorax. Besides this, distinct swashing, due to fluid, can be appreciated, and recently the *x*-ray has shown that the intestines filled with gas or fluid could be recognized above the diaphragm, and that a rubber tube introduced into the stomach and filled with mercury could be seen in the thoracic cavity. The subjective symptoms of non-strangulated diaphragmatic hernia are much more complicated. The patients complain of symptoms referable to the circulatory and respiratory organs, or due to the displaced viscera and traction upon their connections to the trunk. There may be dyspnoea, due to compression of the lung or due to pressure upon the heart. This symptom is aggravated because of the reflex limitation of diaphragmatic breathing due to the injury. The symptom referable to the digestive tract is usually diffuse pain in the abdomen or under the ribs. There may be persistent dyspepsia, acid eructation of gas, vomiting which may be almost continuous, colic, and a sense of distention in the stomach. There may also be dysphagia, due to kinking of the œsophagus, and symptoms more or less typical of gastric ulcer. The abdominal symptoms are frequently aggravated by physical exertion.

KEY TO PLATE XVI.



Relations of the Biliary Passages (Fenger).

1. Wound through abdominal wall. 2. Parietal peritoneum sutured to skin. 3. Right lobe of liver, lower surface. 4. Quadrate lobe of liver. 5. Suspensory ligament of liver. 6. Gallbladder. 7. Cystic duct. 8. Hepatic duct. 9. Common duct. 10. Branch of hepatic duct to lobus Spigelii. 11. Trunk of vena porta. 12. Branches of vena porta to right lobe. 13. Branches of vena porta to lobus Spigelii. 14. Small branch of vena porta in hepatico-duodenal ligament. 15. Hepatic artery. 16. Branches of hepatic artery to hepatico-duodenal ligament. 17. Lymph glands in hepatico-duodenal ligament. 18. Duodenum. 19. Entrance to foramen of Winslow. 20. Hepatico-colic ligament. 21. Transverse colon.

PLATE XVI.

