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DIAPHRAGM. See *Thorax*, and *Calom*.

**DIAPHRAGM, DISEASES AND INJURIES OF THE.**—Since the diaphragm is composed of tendons and muscles and enervated by a nervous apparatus, not materially differing from similar tissues found in other parts of the body, it is subject to the diseases common to such tissues in all parts of the organism. Few of its affections are limited to its own tissues, and frequently its symptoms are merely a part of a general symptom complex which has its origin in a diseased organ more or less remote from the diaphragm.

**DISPLACEMENTS** and impairment of the movements of the diaphragm may be due to loss of tone and elasticity of the musculo-tendinous structure, but by far the most frequent agent in producing such conditions is a change in the balancing of the intra-thoracic and intra-abdominal pressures. Increased intra-thoracic pressure frequently depresses the diaphragm; this may be unilateral or bilateral. It is produced by tumors of the lung, pleura, or mediastinum, by collections of fluid or gas in the pleura, and by loss of lung elasticity as in pneumonia, emphysema, etc. Increased intra-abdominal pressure often raises the elevation of the diaphragm; this is usually bilateral, rarely unilateral. This may arise from pregnancy, cysts, and tumors of the abdominal viscera, from ascites and inflammatory exudates as in peritonitis, subphrenic abscess, etc., and from accumulations of gas, intra-peritoneal or intra-intestinal. Displacement may be produced by pleuritic, peritoneal, or pericardial adhesions, by a kyphosis of the spine, or by the pull of an enlarged liver. With the change in position there is usually associated a diminution in motion which may be so great as to be entirely lost. In upward displacements there are frequently signs of compression of the lungs at the base; breathing is embarrassed and tends to become costal. Downward displacement is evidenced by a protrusion of the abdominal wall and by the low position of the spleen and liver. Litten's "diaphragm phenomenon" is most useful in determining changes in position and movements of the diaphragm. It is thus described: When "the patient is made to lie on his back, his head but slightly supported, opposite the window to which his head is turned, while at a distance of three or four feet the observer, with his back toward the window, scans his chest at an angle of 45°," the height and movements of the diaphragm are marked on the thoracic wall by a shadowy line, lying at an acute angle to the ribs, denoting its momentary position. The excursion of the shadow under normal conditions should average two and one half inches in forced respiration; less than this shows an abnormally impeded movement. In unilateral changes the contrast of the shadows of the two sides is very evident. The prognosis and treatment depend upon the cause and its removal.

**TRAUMATISMS** to the diaphragm rarely occur without concurrent injuries to adjacent organs, and the symptom complex afforded by the latter often masks those of the former. Blows and falls causing rupture or strain of the musculo-tendinous tissue may occur without evidence of injury to the external parts. Rupture is frequently the result of blows and wounds to the lower chest, stab wounds intended for the heart and fractured ribs being especially in evidence. Men, as they are especially exposed to trauma, are more commonly the subjects of this lesion. On account of loss of elasticity of muscle the aged are more liable to rupture. The left is the side most frequently affected, probably because wounds are more frequently directed toward this side, and the liver, on the right side, prevents the development of complications calling attention to the injury to the diaphragm. The symptoms of diaphragmatic injury are usually secondary

in importance to those of other organs coincidentally injured. There is considerable shock, at times passing into collapse. The face is drawn (risus sardonicus), nose pinched. The respiration is embarrassed and there is pain at the site of diaphragmatic attachment. Not infrequently there is a resulting hernia. The diagnosis is often overlooked in considering the trauma to other organs. The prognosis is usually grave. Treatment is as a rule necessarily first directed to the coincident injuries to adjacent organs and to meeting shock by the usual methods. The edges of the wound may be closed either by suture to each other or, as in a case reported by Frey, by suturing one edge also to the chest wall. It should be borne in mind that hemorrhage from a wound of the chest may be from the diaphragm as well as from the lung and the thoracic wall.

**HERNIA.**—Hernia of the diaphragm are not very rare. Leichtenstein has collected 252 cases and Lacher 276 cases. By hernia is understood any escape of the organs, normally lying below the diaphragm, through the diaphragm into the chest cavity, whether the escaped organs are enclosed in a true hernial sac or not. In 276 cases there was a sac in 28 instances, and of these 25 were congenital hernia. Hernia may be either congenital or acquired; of 267 cases 117 were congenital.

**Congenital Hernia** are due to an arrest of fetal development and occur usually on the left side, since congenital defects of the diaphragm are more frequent on the left side, and the muscle congenitally deficient is protected on the right side by the liver. In 117 congenital cases Lacher found 98 of the left side against 19 of the right. The opening is more frequently in the muscular than in the tendinous structure, and more often in its posterior portion. The size of the aperture varies from a small hole to one involving one-half of the diaphragm. Often these defects of the diaphragm are associated with other congenital defects (hemisphera, anencephalia, defective fingers, toes, etc.). These cases are at times still-born or at best they live a few hours, although there are rare cases on record of the patient's reaching maturity and even old age. Living babies suffering from this condition are very cyanotic, and after a longer or shorter period of labored breathing reach the fatal termination. If the diagnosis is made the little patient may be held erect in the hope that gravity may assist in bringing about a reduction of the hernia; water pressure by rectal injection has been advocated. No case of operative interference is on record.

**Acquired Hernia** are usually the result of a traumatic rupture of the diaphragm, but there are also records of rare cases of hernia through a weak point in the diaphragm (sometimes coincident with one of the natural openings, e.g., the aperture for the œsophagus), following the excessive intra-abdominal pressure of labor, vomiting, and the like. They are mostly found in men, who are more liable to injury than women. In looking over the literature I have found only one case following pathological perforation. Lacher reports 150 cases following traumatism; the hernia occurred on the left side in 127 cases, only 3 cases being provided with a sac. The greater frequency of left-sided hernia is explained by the greater number of injuries to the left side of the chest and the absence of protection by the liver. Through the ruptured or defective diaphragm any of the abdominal organs may find their way into the chest cavity. The following is a list of the organs (in order of frequency) thus found displaced: stomach, omentum, colon, small intestine, liver, duodenum, pancreas, cæcum, and kidney. If the opening in the diaphragm has existed for any considerable period the edge is found smooth, thickened, and rounded. Adhesions between the displaced organs and between these and the diaphragm are of exceedingly rare occurrence. An organ at one time a part of the hernial protrusion may find its way back to its normal abdominal position, thus materially affecting the clinical picture.

In traumatic hernia, injuries to other organs may completely mask the symptoms of the hernia proper, but as the early symptoms pass away the evidences of the hernia

usually make themselves apparent. The physical signs vary considerably according to the viscus which is displaced, its volume, and its position. The lower chest appears full, the abdomen hollow; respiration is costal, the respiratory movements of the abdominal wall being absent or greatly reduced. Litten's "diaphragm phenomenon" indicates movements diminished, absent, or unequal on the two sides. Dyspnea is usually an early and prominent symptom. Palpation shows diminished movements of the liver, spleen, and stomach in inspiration, or a displacement of these organs from their normal position. The heart is frequently displaced, usually backward and to the right. The hand placed on the chest may often detect the movements of the displaced intestine. Percussion shows a compressed or collapsed lung replaced by signs of a viscus solid or containing fluid or gas. By auscultation, in addition to the change in the lung and the embarrassed condition of the heart, one may hear the movements of the stomach and intestines and the splashing of their contents within the chest, often with succussion and metallic tinkle, while the deglutition sounds may show a wide variation from the normal. Abnormal friction sounds may be present. Subjective symptoms are liable to extreme variations with the change in the volume and the position of the hernia. The dyspnea may be continuous or paroxysmal and attended by extreme cyanosis. The pain may be considerable and is increased by movement; it is usually referred to the site of the attachment of the diaphragm to the body wall. Cough, hicough, and vague gastric disturbances may exist. If strangulation of the bowel supervenes, the symptoms of acute intestinal obstruction may be added to the picture.

A number of cases are on record in which the hernia existed for years, some with very mild and others with severe symptoms, only to be revealed on autopsy. One patient lived fifty-two years after the occurrence of the hernia. Doubtless many patients recover without a discovery of the lesion. In general, however, the prognosis is bad. In 33 cases following stab wounds there was a mortality of 88 per cent. It should be borne in mind that the gravity is greatly augmented by trauma to some of the organs involved and the resulting complications, prominent among which are perforation of the stomach and empyema. Strangulation is always to be dreaded, and may occur years after the original injury, being induced by some unusual effort, as an attack of vomiting, coughing, straining, etc. Death from strangulation of the stomach or intestines occurs, according to Leichtenstein, in fifteen per cent. of the cases. Another frequent cause of death is the compression of the lungs and heart by the distention of the displaced viscera by gas or the sudden passage of additional organs through the hernial opening.

**Diagnosis.**—That the diagnosis is difficult may be inferred from the fact that in a collection of 300 cases only 7 were diagnosed during life. Among the more important diagnostic points may be mentioned: fulness in the chest associated with a hollowed abdomen, evidence of movements of the intestine and its contents in the chest, and the displacement of the heart. Hernia is most often mistaken for pneumothorax. The latter usually occupies the entire half of the thorax, is about equally frequent on both sides of the chest, is absorbed gradually; the physical signs are fairly constant, and there is frequently an antecedent history of disease of the lung or pleura. Hernia usually occurs on the left side, occupies an irregular portion of the thorax; its volume and position change from day to day, affording great variation in physical signs, and the subjective symptoms are subject to greater variation.

On account of the frequency with which hernia results from stab wounds of the lower chest, Paget recommends that every such wound should be thoroughly explored as soon as it comes under observation so as to exclude positively every case of hernia.

**Treatment.**—All adjacent organs should be carefully examined and their injuries cared for. The reduction of the hernia can be accomplished much more easily from

the chest cavity than from the abdomen, and since the diaphragm is also far more accessible from above, the avenue of approach should be through the chest wall. Access should be obtained by resecting several ribs, thus allowing a large flap of chest wall to be raised. The prolapsed organs, after being cared for, are reduced and the diaphragm closed by strong sutures; the reduction may necessitate an increase in the size of the diaphragmatic opening. Through such an opening it has been possible to close a perforation of the stomach and cleanse a large portion of the viscera, the case resulting in recovery. The chest wall is replaced, a sufficient opening being left to permit of a small drain reaching to the site of injury. Successful cases which have been operated on are reported by Posternski, Llobet, Dalton, Humbert, Mikulicz, and others.

**DIAPHRAGMITIS.**—Primary inflammation of the diaphragm is an extremely rare condition and its existence is denied by several writers. Primary localized inflammation of its serous coverings is not uncommon. Waldeyer has reported a case of diaphragmitis following puerperal sepsis in which the lymphatics of the diaphragm were swarming with micro-organisms. The process may result in a fatty degeneration of the muscle fibres. There are usually a sense of constriction in the epigastrium; pain at the line of insertion of the muscle, increased by pressure on the epigastrium and by the movements of respiration; embarrassed breathing, cough, singultus, and fever. A differentiation between this and localized pleurisy or peritonitis is difficult and is rarely made during life. Treatment consists of rest and the administration of morphine for the pain.

**PERFORATION.**—Perforation is produced by a localized suppurative process, usually by the burrowing of pus upward or downward, and by the extension of neoplasms. The common etiological factors are empyema, purulent pericarditis, suppurative hepatitis, subphrenic abscess, and perforating ulcer of the stomach. In 28 cases of ulcer of the stomach causing perforation of the diaphragm, 20 were found to have produced this directly, and in only 8 was a subphrenic abscess formed before the perforation. Treatment should be directed to the underlying cause.

**ADHESIONS.**—Adhesions between the diaphragm and neighboring organs (either thoracic or abdominal) are of common occurrence. They are usually the result of the inflammation of the pleura or peritoneum of this region, and are commonly elastic bands which are occasionally infiltrated with calcareous material and do not hold the adjacent organs very closely or firmly together. When adhesions exist between the diaphragm and the pericardium, there is pulsation visible in the epigastrium. Other adhesions may cause displacement or impede the movements of the diaphragm.

**RHEUMATISM.**—Rheumatism may attack both the muscular and the aponeurotic structures of the diaphragm. It may be acute or chronic; the acute form may be idiopathic or may be secondary to rheumatism in other parts of the body. The attack comes on suddenly, usually after exposure to damp and cold with chilling of the body surface. There are systemic symptoms only when this is a part of a general rheumatic affection. Pain at the line of attachment of the muscle to the body wall is severe and is increased by movements and pressure; it may often be marked out by palpation; only rarely is it unilateral. Food passing the œsophageal opening may cause distress. Pain embarrasses the movements of the diaphragm and respiration becomes costal. There may be tonic or clonic spasm of the diaphragm with hicough, also spasms of the œsophagus and larynx. The diagnosis is sometimes difficult. The conditions most frequently confounded with it are pleurisy, intercostal neuralgia, asthma, and angina pectoris. Rheumatism in other parts of the body, the absence of pleuritic râles, and the location of the pain will aid in establishing a diagnosis. The prognosis is nearly always good. Anti-rheumatic treatment affords the most satisfactory results, notably the administration of the salicylates with alkalies. Physiological rest is important and may be assisted by strap-

ping the lower chest with broad strips of adhesive plaster. Locally cupping and painting with tincture of iodine are of service. Morphine may be necessary to relieve the pain.

**NEOPLASMS.**—Neoplasms of the diaphragm are secondary to growths in adjacent parts. The diagnosis is made during life only in extremely rare cases; they are in the main post-mortem curiosities. Grancher has reported one case of primary new growth. The forms met include cancer, tuberculosis, hydatid cysts, and calcareous deposits associated with muscle degeneration (Otto). This seems to be frequently produced by a long-existing pleurisy. Perforation of the diaphragm has occasionally been produced by neoplasms.

**NERVOUS AFFECTIONS.**—The affections of the diaphragm due to a traumatic or diseased condition of its nerve supply may be considered under the headings of neuralgias, spasms, paralyses, and atrophies. As the phrenic nerves convey by far the most important nerve impulses to and from this organ, the changes in this nerve and in its centres in the spinal cord include the major portion of such affections, while changes in the intercostal nerves may be practically disregarded in this connection.

**Neuralgias** are not uncommon affections, their etiology being much the same as that of neuralgias of other nerve areas; a sudden chilling of the body, nutritional disturbances as in anæmia and rheumatic affections, and inflammatory processes in adjacent organs, such as pleurisy and pericarditis, may be mentioned as especially prominent. Pain, usually severe, at the line of attachment of the diaphragm to the chest wall, sometimes radiating to the shoulder, is always present. The pain may follow the course of the phrenic nerve in the neck. The pain often interferes with respiration. There may be dysphagia. Diaphragmatic neuralgia is often confounded with angina pectoris, pericarditis, and pleurisy. The treatment consists in removing the general causal condition, in the local application of revulsives, and in the hypodermic use of morphine, antipyrin, etc.

**Spasm** of the diaphragm is rare, excepting when it is secondary to some general disease, which is usually a neurosis. Spasms may be tonic or clonic, the latter being far more common and less serious than the former. While rare cases of idiopathic *tonic spasms* have been described by Duchenne and others, by far the greater number are symptomatic and are merely developed in the course of some general disease. Of these may be mentioned epilepsy, asthma, eclampsia, rabies, tetanus, and strychnine poisoning. The spasms may be short or may continue for a considerable period, the respiration is altered to the costal type, the thorax is enlarged at the base, and the liver is pushed down. There are attacks of dyspnoea and a feeling of suffocation with pain encircling the body like a girdle. As the suffocation verges on asphyxia all the accessory muscles of respiration are brought into play. There is a diminished vesicular murmur over the lower part of the lungs. If the spasm is short, the patient soon resumes normal breathing; if long, he dies with the agonies of asphyxia. To relieve the condition, energetic counter-irritation should be applied to the thoracic walls, epigastrium, and lumbar regions, the actual cautery, hot compresses, and wet or dry cups being especially serviceable. The faradic brush, applied along the line of attachment of the diaphragm, has also accomplished good results. As anti-spasmodics one may employ chloroform, ether, valerian, the bromides, and the nitrites.

**Clonic Spasm** of the diaphragm occurs far more frequently than the tonic; there is no idiopathic type, and it occurs only as a symptom of some causal disease. The subjects of such a spasm are usually of a neurotic temperament. The main etiological condition is an irritation of the respiratory centres. This may be functional, as in hysteria and epilepsy; it may follow a central or spinal lesion or poisoning, as in typhoid, septicæmia, uræmia, etc.; or it may be the result of reflex irritation from a peripheral source, e.g., stricture of the œsophagus, intes-

tinal and gastric affections, overloading of the stomach, peritonitis, disorders of the pleura, pericardium, liver, bladder, uterus, etc. The contractions of the muscular apparatus vary extremely in force and frequency. From one a minute they may, as in some observed cases, increase to one hundred a minute when the successive movements form a continuous tremor. The diaphragm strikes violently against adjacent viscera and pushes them about. With each inspiration the whole abdomen is raised and there is often a peculiar succussion sound. In the common form the ordinary hiccough is the most evident manifestation; so common is it that many writers consider it synonymous with clonic spasm of the diaphragm. Speech is interrupted and inarticulate noises accompany each spasmodic movement. A small group of these cases occurring in patients of a neurotic disposition may be considered true spasmodic tics. There is the quick, convulsive movement of the diaphragm followed by an explosive expulsion of the breath, with a harsh rasping noise. When the patient is noticed or becomes excited the spasms increase in frequency. If these spasms pass away quickly the patient soon regains his normal status; but if they are long-continued (cases lasting several weeks are on record), the patient becomes exhausted with the movements and consequent loss of sleep.

The prognosis depends on the cause and the duration of the attack. It is not as dangerous as the tonic spasm, but may seriously interfere with the ingestion and assimilation of food. Of the tics it is said they "rarely shorten life." The prognosis is bad in adults, but good in children if the affection is taken in hand early. Treatment should be directed to the cause, which should be removed, if possible; general tonics, moral control, with rest and massage, have their place. As symptomatic treatment innumerable methods have many zealous advocates. Among these are: holding the breath for long periods, pressure over the phrenics in the neck, pressure or ethyl chloride spray on epigastrium, galvanism and faradism (one pole over each phrenic, or one over phrenic and one at diaphragm), and the administration of atropine, hyoscine, anaesthetics, nitrites, and morphine.

**Paralysis** of the diaphragm may follow injuries, inflammations, or pressure on the phrenic nerve. The common site of injury to the phrenic nerve is in the neck, where its protection is less than in other parts of its course. A neuritis involving the phrenic may follow diphtheria, beriberi, influenza, rheumatism, and poisoning by lead, alcohol, coal-tar products, etc.; or it may be a direct extension from neighboring inflamed organs as in pleurisy. Pressure may be the result of tumors of the neck or mediastinum. Paralysis of the diaphragm also occurs with pathological processes of or injuries to the upper cervical segments of the spinal cord. Among the pathological processes may be mentioned tumors, hemorrhages, tuberculous or other chronic inflammatory affections, as amyotrophic sclerosis, bulbar palsy, ascending myelitis, and progressive muscular atrophy. Paralysis also occurs in hysteria and with inflammations of the lungs and pleura; in the latter the movements of the diaphragm are inhibited by the reflex pain. The loss of diaphragmatic function may be unilateral or bilateral, and again it may be complete or partial. In complete bilateral paralysis the breathing is costal and may be easy while the patient is at rest, but the least exertion induces marked dyspnoea; there is a feeble voice, embarrassed by inspiration, or complete aphonia. Palpation fails to reveal descent of the diaphragm, and the abdominal wall sinks in inspiration and bulges in expiration. Litten's sign is absent. There is loss of vesicular murmur over the base of the lungs and the fixing of the diaphragm for coughing, straining at stools, etc., becomes impossible. When the paralysis is unilateral, the loss of function on one side may be so compensated by the movements of the other that the paralysis is not evident. If the patient is directed to take deep inspirations, the difference between the two sides will show plainly; furthermore, in this condition the contrast between the two sides, as shown by the Litten's diaphragm shadow, is particularly marked. Following the defective respira-

tion bronchitis often develops in the lower lobes, and the exudate is coughed up with the greatest difficulty. The diagnosis is at times easy, at other times extremely difficult; the changes in the respiratory movements, the loss of Litten's diaphragm phenomenon, the aphonia, and the weakening of the vesicular murmur are important points in differentiating this from other affections. The prognosis, while favorable in rheumatism and hysteria, is extremely grave when the paralysis arises from other causes. It varies according to the extent of muscle involved. If the paralysis is complete, a fatal asphyxia may come with the slightest exertion; this is the final termination of many diseases instanced above as among the causes of paralysis. Treatment should be directed primarily to the underlying cause. Locally electricity has proved of great value, in some cases faradism and in others galvanism being found most efficacious. One pole should be placed over the phrenic nerve in the neck, the other over the abdomen just below the diaphragm. A current passed transversely through the diaphragm has also been found to work satisfactorily.

**Atrophy** of the muscle of the diaphragm may occur in any of the general diseases which cause muscular atrophy in other parts of the body. It occurs as a result of the destruction of its motor nuclei in the spinal cord (in spinal progressive muscular atrophy), as a result of a peripheral neuritis involving the phrenic nerve, and as a myopathic condition (in pseudo-hypertrophic muscular paralysis and idiopathic muscular atrophy). The symptoms depend on the weakness following the muscular atrophy, which ultimately results in complete paralysis. It has been discovered post mortem in patients dying of bronchitis, emphysema, interstitial pneumonia, and pericarditis. The dyspnoea and asphyxia, of which it is the cause, are frequently the closing features of the diseases above enumerated. The prognosis is bad. Treatment has been of small avail. When the spinal disease is of syphilitic origin, mercury and potassium iodide may arrest the disease. For the atrophy of myopathic origin, arsenic, nitrate of strychnine, and galvanism have been recommended.

**SUBPHRENIC ABSCESS.**—Subphrenic abscess is not a rare condition, although it is only in comparatively recent years that this name has been applied to localized collections of pus having the under side of the diaphragm as one of its boundaries. The etiology of this lesion comprises two factors: a source of bacterial infection and a localizing agent. It may be a part of a general infection as in pyæmia, septicæmia, or tuberculosis. Trauma may act as the localizing agent, while infection may travel by metastasis from a distant infected area, by means of the lymphatics so abundant in this region, or by direct invasions from neighboring organs. Prominent among these are ulceration of the stomach, duodenum, and colon, appendicitis, abscess of the liver, suppurating echinococcus cysts, perforation of the gall bladder and bile ducts, and empyema. In an exhaustive monograph Maydl reports 179 cases with the following classified sources of infection: Stomach and duodenum, 35; cæcum and appendix, 25; liver and bile passages, 20; internal injuries, 18; hydatid disease, 17; intestines, 13; metastasis, 11; inflammation about the kidney, 11; interior of chest, 9; external, 6; caries of ribs, 3; miscellaneous, 11.

A classification of subphrenic abscesses naturally arranges them as intra- or extra-peritoneal; the latter occur far more frequently on the right side. Since the falciform ligament forms a natural barrier, the abscesses are usually confined to one side. Those of the right side occupy the space between the diaphragm and the liver; those of the left have the diaphragm above and posteriorly, and for their other boundaries some part or all of the following organs, which are commonly matted together by adhesions: stomach, spleen, transverse colon, and the left lobe of the liver. Any one of these may have been the chief causal factor as a starting-point for the infection. The abscess may often be considered as a localized encysted peritonitis; it may vary in size from that of an egg to a cavity holding over two litres. The edges are, as a rule, rough and lined with fibrin-

ous pouches; a few have smooth walls. The contents may be pus alone or pus and gas. The pus may be thick and devoid of odor, or ichorous, mixed with necrotic tissue, putrid and foetid, and colored by the pigments of bile or blood. Gas may come from a primary opening, from an organ containing gas, from a secondary opening formed by the abscess breaking into such an organ, or from gas-forming bacteria. Of Maydl's 179 cases 47 contained gas; of these, 20 came from primary perforations from the alimentary tract, 18 from secondary perforations (16 into lung and 2 into alimentary tract), and 9 from gas-forming bacteria, no perforation being present. Among the micro-organisms found the *Bacillus tuberculosis*, *Micrococcus tetragenus*, staphylococci, and the *Bacillus coli communis* have been isolated. Osler considers the finding of *Bacillus coli communis* helpful in proving the alimentary tract as the source of infection. The diaphragm is pushed up and is frequently adherent to the lower ribs. Pleurisy and pericarditis, serous or purulent, may exist as cause or effect. The abscess, if left to itself, most commonly perforates the diaphragm, infecting the pleural cavity and the lung. The destructive process may reach the bronchi, which may afford sufficient drainage for complete evacuation and spontaneous cure. Other paths of exit are through the abdominal wall and into some part of the alimentary canal.

The clinical features of subphrenic abscess are greatly modified by the associated lesions and may accordingly have extreme variations. While at times the respiratory functions are so modified as to make this aspect the most prominent, it is more usual for the symptom complex to suggest an abdominal lesion. The symptoms may be obscure and develop slowly, or, as in cases due to the perforation of a gastric ulcer, they may be very evident and may accumulate with extreme rapidity. There is usually considerable pain in the hypochondriac or epigastric region, often radiating to the shoulder, with or without tenderness. The pressure on the diaphragm and the pain embarrass respiration, making it short and superficial in character, with more or less dyspnoea. The inflammation of the peritoneum is evidenced by meteorism, vomiting, hiccough, and general depression, with rapid, weak pulse. There may be signs of a general pyæmic infection, with rigors, fever, and sweating. The abscess may cause a bulging of the upper abdomen or lower part of the chest, with superficial heat and redness associated with nature's attempt to form an exit externally. The region in which these abscesses commonly point is near the ensiform cartilage. The ribs may be displaced, lying more horizontally than normal, and separated by broader intercostal spaces. Palpation may show fluctuation when the collection of pus is superficially placed, friction from the surrounding peritoneal exudate, a liver or spleen displaced downward, and, when the abscess cavity is partially filled with gas, succussion. Percussion elicits dulness over the lower part of the chest and upper abdomen continuous with that of the liver or spleen, or, if gas is present, amphoric and metallic resonance and obliteration of normal hepatic or splenic dulness. Amphoric breathing, splashing, and metallic tinkling may frequently be heard, closely simulating the signs of a pyopneumothorax. The clinical picture may vary from day to day as in cases in which the abscess cavity, originally filled with pus, is additionally distended with gas. Perforation of the diaphragm, with its resulting empyema, rupture into the lung, and evacuation of the cavity through a bronchus, are features not infrequently added. If the abdominal adhesions are broken down a fatal peritonitis rapidly follows. The condition lasts for from fifteen days to several months, and is usually fatal unless relieved by operative interference. In a number of cases evacuation may take place through a rupture into a bronchus, into some portion of the alimentary tract, or externally, the latter being an extremely rare occurrence. Death results from general sepsis, empyema, rupture of pericardium, or abscess of the lung, or from peritonitis. This condition is frequently difficult to diagnose from empyema and pyopneumothorax.