

Prolapse of the spleen is easily recognized, and unless there are other injuries or hemorrhage from a portion of the spleen which is not exposed to view the prognosis is favorable. Ledderhose states that recovery occurred in 29 of 32 cases, the treatment being reposition, or partial or total extirpation. Berger reports 8 cases treated by reposition, 13 by resection of the prolapsed portion, and 20 by removal of the whole spleen. All the patients excepting 1 recovered.

**Treatment of Prolapse.**—If a patient with prolapsed spleen is seen soon after the injury occurred and the organ is sound, it should be thoroughly cleansed and returned to the abdominal cavity. If for any reason asepsis cannot be perfectly carried out, it is better to remove the spleen. If the prolapse is a partial one, the affected part of the organ may be excised and the wound of the spleen sutured. The abdominal wound in such circumstances should be tamponed.

Contusion of the spleen unless followed by abscess or a cyst usually terminates in recovery. The outlook for a patient whose spleen is ruptured is far less favorable. Edler estimates that the mortality is about 75 per cent. from hemorrhage and 10 per cent. from peritonitis. Berger places the mortality as high as 92.6 per cent. in rupture of the spleen, one-half the patients dying within an hour after the injury, and most of the remainder within twenty-four hours.

**Treatment of Contusions and Ruptures.**—A patient who suffers from contusion of the spleen should be treated by ice both internally and externally; and if a cyst or abscess develops, it should be opened, or the spleen removed. (Page 709.)

Rupture of the spleen requires the same treatment as rupture of the liver, to which the reader is referred. (Page 634.) The abdominal incision should be long. It may be made in the median line or at the outer border of the left rectus muscle, or a transverse incision may be preferred. If the spleen is sufficiently exposed and its tissue is firm, the rupture may be sutured. One should be certain, however, that a second rupture does not exist, otherwise he may lose his patient from hemorrhage. This happened to Lamarchia, who states that the inner surface of the spleen behind the gastrosplenic ligament is a favorite seat for rupture. Madelung succeeded in suturing a ruptured and bleeding spleen into the pleural cavity. He resected a portion of the thorax-wall and reached the spleen through an incision in the diaphragm. Several other surgeons have reported successful suture, although the number of successes following extirpation for rupture is far greater. Berger collected reports of 130 operations of this character, 77 of which were followed by recovery (59.2 per cent.). Expectant treatment was followed by recovery in only 7.4 per cent. Expectant treatment after gunshot-wounds was followed by recovery in 10 per cent. of the cases, and after incised wounds in 21.4 per cent. The results of operations recently performed are far better than those of even ten years ago. Thus recovery followed in 73.3 per cent. of 45 operative cases treated in 1900 and 1901.

## CHAPTER XXVII.

### DISEASES OF THE SPLEEN.

#### ABSCESS OF THE SPLEEN.

**Etiology.**—The acute inflammation and swelling of the spleen which occurs so often in connection with infectious diseases possesses no practical interest for the surgeon. The reverse is true of abscess, which may be idiopathic and primary, but is generally secondary. Injury and excessive muscular exertion are given as causes of primary abscess, while secondary abscesses are for the most part the result of embolic infarcts (endocarditis) and metastatic inflammation occurring in connection with pyæmia, typhoid fever, acute rheumatism, and malarial fever.

**Pathological Anatomy.**—An abscess of the spleen is apt to be situated in its upper portion, and to present on the outer surface or along the anterior margin. It varies in size from that of a walnut to that of a hen's egg. Much larger abscesses may result from the union of several suppurating infarcts and the destruction of intervening splenic tissue.

Sometimes an abscess rapidly destroys tissue, produces marked septic symptoms, and leads quickly to death. At other times it runs a chronic course with few symptoms. The abscess that is usually observed reaches the capsule of the spleen and then produces a variety of symptoms according to the direction of the pus after it breaks through the capsule. If the spleen becomes adherent to the stomach, or intestine, or kidney, or diaphragm, or abdominal wall, it may break into one of these organs, or externally, without infecting the peritoneal cavity. Indeed, suppurative peritonitis from splenic abscess is rare. Pyæmia, due to emboli discharged through the splenic vein, is another rare outcome of splenic abscess. The pus may break through the posterior peritoneum and extend behind the descending colon to the anus or vagina.

It is worth noting that a pathological examination of the pus from a splenic abscess has sometimes failed to reveal the presence of microorganisms. This fact may explain the latent course which these abscesses sometimes exhibit.

**Diagnosis.**—It is rarely possible to make a diagnosis of splenic abscess situated centrally in the spleen, although this condition should be considered if during typhoid or malarial fever the temperature rises, splenic tumor increases, and pain develops. Usually pain is not noted until the abscess reaches the capsule, nor is fever a constant



symptom. Fluctuation cannot be made out unless the abscess is a large one. If the abscess is not relieved spontaneously or by an operation, it will produce chills with afternoon fever, profuse sweat, loss of appetite, diarrhoea, emaciation, and death. Additional symptoms of splenic abscess mentioned by Lauenstein are: a high position and fixation of the left half of the diaphragm and a basal pleuritic friction-sound. If the pus breaks through the capsule of the spleen, the splenic tumor will become immediately smaller or disappear, and the presence of the pus can be made out in the stomach or pleural cavity. External rupture will be preceded by œdema and an increased tenderness of the abdominal wall. Rupture into the peritoneal cavity will produce the symptoms of diffuse suppurative peritonitis.

**Prognosis.**—In abscess of the spleen prognosis depends upon the cause of the abscess and the direction in which the pus extends. Rupture into the stomach is a relatively favorable outcome. In general if the condition of the patient is good and surgical aid is promptly summoned, recovery should be looked for.

**Treatment.**—The abscess may be opened and drained, or, if the spleen is in a large measure destroyed, it should be removed. A large abscess may be reached through an incision made along the left costal margin. If the abscess is smaller, it may be necessary to resect portions of two or three ribs and to cut through the diaphragm. Bessel-Hagen in 2 cases reached and drained an abscess of the spleen by a resection of the tenth rib and its cartilage without opening the pleural cavity. In operating through the pleural cavity one may complete the operation in one stage if the layers of pleura have become united by the inflammation, otherwise it is better to postpone the completion of the operation until such adhesions have formed. If the abscess has already broken through the capsule, the position of the pus must determine the site of the external incision. An attempt should be made to reach it as directly as possible so as thoroughly to drain the abscess cavity. Primary splenectomy for abscess is an operation which has not often been performed on account of the exhausted condition of the patient. It is better first to drain the abscess; afterward, if suppuration continues, to remove the spleen.

An exploratory puncture to determine the presence of pus is only permissible in case it is followed immediately by operation. Compare what has been said on this subject in connection with empyema of the gall-bladder and echinococcus of the liver.

#### TUMORS OF THE SPLEEN.

**Non-parasitic Cystic Tumors.**—The multiple cysts occasionally found in amyloid degenerated spleens have no surgical importance. Serous cysts and cysts containing bloody contents have sometimes been treated by operation. Such cysts are probably due to hemorrhage; a cause of non-parasitic cysts already spoken of in connection with

the liver. Of course, hemorrhage may take place in a simple serous cyst. Dermoid cysts of the spleen are also described.

A small cyst of the spleen gives rise to no symptoms. A larger one produces symptoms by pressure upon the stomach, intestine, lung, etc. Fluctuation cannot be made out unless the cyst is large.

A cyst of the spleen must be differentiated from one of the kidney, of the pancreas, of the mesentery, or of the pleura, and from echinococcus cyst of the left lobe of the liver. The area of the dulness on percussion, the shape of the tumor, and the history of its growth may aid in establishing the diagnosis. The examination of fluid obtained by aspiration will distinguish non-parasitic cysts from parasitic cysts, but the objections to this procedure are great, as stated on page 648. The treatment of the two kinds of cysts is, moreover, essentially the same.

**Parasitic Cysts of the Spleen.**—The animal parasites which may be found in the spleen are: cystocercus, pentastoma, and echinococcus. Only the last named occurs with sufficient frequency to merit a description.

Echinococcus of the spleen forms from 1 to 3 per cent. of human echinococcus. The cyst may develop in the centre or near the periphery of the organ, or it may become pedicled, or even completely separated. It grows at the expense of the spleen, which may completely atrophy as a result. There are often adhesions between the degenerated spleen and the stomach, intestine and omentum, diaphragm, or abdominal wall.

**Symptoms and Diagnosis.**—Echinococcus of the spleen forms a cystic tumor whose limits can be made out by palpation and percussion unless they are obscured by extensive adhesions. In such circumstances the diagnosis may be difficult. Hydronephrosis of the left side may be differentiated by the history (blood in the urine), by a cystoscopic examination, by distention of the colon, etc. An echinococcus cyst usually fluctuates, but rarely gives a hydatid thrill. If the cyst-wall is tense or thick, or if the cyst is deeply situated, it may be impossible to make out the fluctuation. A peritoneal friction-sound is not pathognomonic of this disease, since it may occur in connection with perisplenitis due to other causes. Any echinococcus perisplenitis is usually secondary to suppuration, the symptoms of which are increased tension of the cyst, with pain and increased temperature. In differentiating echinococcus cyst from other tumors of the spleen one should bear in mind the slow growth of the cyst, the slight disturbance of general health in the beginning of the disease, and in the later period the disturbance of function of the stomach, intestine, and lungs, according to the direction of growth of the echinococcus. Examination of the blood will indicate the presence of a leukemic splenic tumor, while the patient's history will indicate the probability of enlargement due to malaria. The danger from exploratory puncture has been already mentioned.

**Prognosis.**—Echinococcus of the spleen when treated peritoneally



has a relatively favorable diagnosis. Without operation the condition may terminate spontaneously, or go on to perforation into the transverse colon, or into the stomach or pleural cavity or peritoneal cavity.

**Treatment.**—Puncture and injection of an echinococcus cyst of the spleen had better never be performed. The proper treatment is incision complete in one or two stages. Mosler collected records of 12 operations, for the most part punctures, with 6 deaths and 6 recoveries. According to Trinkler, the mortality in the pre-antiseptic period was 42 per cent., and in the antiseptic period 22 per cent. Hahn says the diagnosis is good when adhesions are slight or absent. If the spleen is only moderately movable, the best treatment is incision in one or two stages. If it is freely movable and atrophied, splenectomy should be performed. Partial resection should not be performed unless the line of incision is certain to be easily accessible. Billroth's method of evacuating the contents of the cyst, filling it with iodoform-glycerin, suturing and dropping it back into the abdominal cavity, is a risky procedure. If the spleen is adherent to the abdominal wall in such a way that the peritoneal cavity need not be opened, there is no especial risk in an operation completed at once. According to Bessel-Hagen, splenectomy for echinococcus before 1890 had a mortality of 60 per cent., and 10 per cent. from 1891 to 1900. In spite of these figures incision seems preferable to splenectomy in most cases.

**Solid Tumors.**—Lymphangioma, cavernous angioma, fibroma, enchondroma, osteoma, myxoma, and lipoma are forms of solid tumors which rarely occur in the spleen. Primary carcinoma is doubtful. Metastatic nodules secondary to carcinoma of the stomach are without surgical interest. Melanosarcoma and lymphosarcoma are the forms of tumor most frequently encountered. There are on record 9 cases of removal of the spleen on account of sarcoma, with 3 deaths. The diagnosis of this condition is not easily made. It is suggested by a rapid increase in the size of the organ, by a rough surface and severe pain, especially if these symptoms are present in a patient whose blood is unaltered, who gives no history of malaria, and in whom there is no irregular fever.

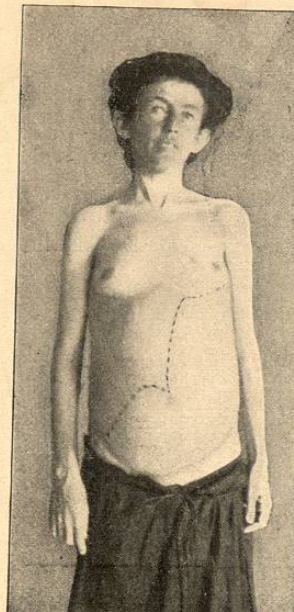
Other enlargements of the spleen than those due to a distinct new growth may require surgical treatment. Such are the leukæmic spleen, simple hypertrophy of the spleen (Figs. 330 and 331), malarial spleen, the spleen of congestion and amyloid disease, tuberculosis and actinomycosis of the spleen. The differential diagnosis of these conditions is given in text-books on internal medicine.

**Treatment.**—Experiments upon animals and observations upon healthy men whose spleens have been removed on account of traumatism show that the removal of the spleen does not necessarily affect the health of the individual. In some cases it is followed by a temporary increase in the white blood-corpuscles, decrease in the red blood-corpuscles, and a reduced percentage of hæmoglobin in the blood. Opinions differ as to the effect upon the lymph-glands, thyroid gland,

and the bone-marrow. Whatever may be the exact physiological function of the spleen, it is certain that its removal is followed by only slight disadvantages of a temporary nature.

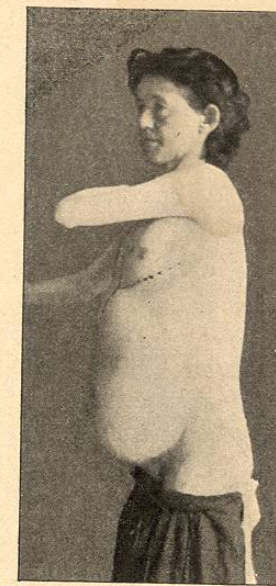
The chief danger of splenectomy is from hemorrhage. This is especially true in leukæmia, since the blood of a leukæmic patient possesses less than the normal power of coagulation. Furthermore, the separation of adhesions in persons not leukæmic often produces dangerous hemorrhage. In the ligation of the pedicle especial care should be taken to prevent the ligatures from slipping. The spleen itself contains such a mass of blood that its removal means a considerable loss to the body, and this should be borne in mind in estimating

FIG. 330.



Primary splenomegaly. Front view. The dotted line marks the outline of the spleen. (Brill.)

FIG. 331.



Primary splenomegaly. Side view. (Brill.)

the effect of operation. Péan considers that the removal of a spleen weighing 7 or 8 kilos (14 or 16 pounds) means a loss to the body in blood of at least 2 kilos (4 pounds). Such a loss is no trifling matter to the organism. The removal of an enlarged spleen also disturbs the abdominal circulation in such a manner that it may even cause death. The prognosis of splenectomy depends not a little upon the mobility of the spleen. If the spleen is adherent beneath the ribs and the adhesions will not stretch, the operation is more difficult and dangerous. This is especially true of adhesions between the spleen and the diaphragm.

With these general points in mind, it is necessary to determine in each individual case whether splenectomy is justifiable.



The removal of a leukæmic spleen may accomplish two objects: the cure of the disease and the removal of an annoying tumor. Leukæmia is primarily a disease of the bone-marrow, while the changes in the spleen and lymphatic glands are of a secondary nature. A simple splenic leukæmia is so rare that it need not be considered. Therefore, it is hardly possible to exert a favorable influence upon leukæmia by removal of the spleen. Nor is the removal of the enlarged spleen worth the risk of the operation. These patients have such a tendency to bleed that the incision in the abdominal wall may give trouble, while the division of the attachments between the spleen and diaphragm is certain to produce a fearful hemorrhage. Most patients of this sort who have been operated upon bleed to death within a few hours. If the spleen is only moderately enlarged and the blood-changes are not marked, splenectomy is possible. But in such circumstances the spleen as a tumor does not usually produce serious symptoms. It is fair to state therefore that in leukæmia splenectomy has little to recommend it, and that in the advanced stages of the disease it is a very dangerous operation. Vulpius mentions 28 cases of splenectomy in leukæmia, with 25 deaths from hemorrhage. One patient survived operation for thirteen days and one for eight months, both dying from increased leukæmia, and it seems doubtful whether the sole remaining patient, who permanently recovered from the operation, ever had leukæmia.

In simple hypertrophy of the spleen not due to malaria splenectomy has been performed with good results, but patients in whom it has occurred are often weakened by other diseases, such as syphilis and tuberculosis, so that they are not always in a condition to withstand the operation. When they have done so, it seems doubtful how much they have been benefited. If the spleen is very large and produces symptoms by pressure upon neighboring organs, its removal will, of course, bring about relief to the patient.

In malaria splenectomy is only worth considering if the patient is in fairly good condition and the tumor is not large. In such circumstances there is reason to hope for improvement from continued medical treatment. If in spite of this the symptoms grow worse, operation is indicated. Bessel-Hagen cites 69 cases of splenectomy for malaria since 1891, with a mortality of only 8.7 per cent. Even after malarial cachexia is established, operation has proved of benefit in some cases. It should be borne in mind that the removal of the spleen does not in any way protect the patient from further attacks of malaria. Parona has markedly reduced the size of the spleen in malaria by subcutaneous injections of iodine (iodine, 1 part; potassium iodide and guaiacol, 10 parts; glycerin, 100 parts).

Secondary enlargement of the spleen due to congestion or amyloid disease is no indication for splenectomy. Three splenectomies for primary tuberculosis, with 1 death, are on record, and 1 successful splenectomy for syphilis. Internal treatment will usually reduce the size of a syphilitic spleen.

Hypertrophy of the spleen associated with interstitial hepatitis has been treated by splenectomy in 16 cases, with 13 recoveries. (Bessel-Hagen.)

The mortality of splenectomy varies according to the different diseases for which it is performed, but it has grown decidedly less in the last few years. Thus according to Bessel-Hagen, 97 splenectomies previous to 1897 had a mortality of 42.2 per cent., and 164 splenectomies performed between 1890 and 1900 had a mortality of 18.9 per cent. Still better results may be expected as the technic and exact diagnosis improve.

**Technic of Operation.**—The patient is prepared as for laparotomy. A median incision, or one along the outer border of the left rectus muscle, is usually employed, although some operators add a transverse incision to the vertical one. The object of the incision is to expose the pedicle of the spleen and to make the separation of adhesions easy. The operator stands at the left side of the patient and passes his left hand through the abdominal incision in order to determine the presence of adhesions, especially between the spleen and diaphragm. Those between the spleen and colon or omentum are more easily reached and ligated. In the separation of adhesions it is better to injure the diaphragm or even the pleura rather than to tear the tissue of the spleen which bleeds so readily. As far as possible adhesions should be tied in two places and divided between the ligatures. If they are very extensive, the removal of the spleen had better not be attempted. Experience in this direction, as in so many others, reduces the risk to the patient materially. Adhesions between the omentum, colon, or abdominal wall are best separated or ligated with silk and divided. Some operators employ the cautery for this purpose. As the pedicle contains the splenic artery and vein, its ligation requires special care, and should usually be carried out after the spleen is brought out through the abdominal wound. One should avoid seizing the spleen with instruments, as fatal hemorrhage has resulted from this mistake. The pedicle should be ligated in sections, and Billroth includes in the ligatures the tail of the pancreas so that they will not slip off. Martin leaves attached to the pedicle a bit of the spleen for the same purpose. The wound may or may not be tamponed. A tampon should be employed in all cases in which there is bleeding or torn adhesions, or in which a space is left by the removal of the spleen not directly filled by the other organs. If the hemorrhage is completely stopped by ligatures and sutures, the abdominal cavity may be completely closed. A firm dressing should be applied and the patient carefully watched for post-operative hemorrhage.

Partial ligation of the splenic vessels has been performed in an attempt to cause atrophy of an enlarged spleen, but this is an operation as difficult and dangerous as splenectomy, and while it will not be followed by hemorrhage it may be followed by gangrene.

Aneurism of the splenic artery is a rare condition that may be cured by splenectomy. Tuberculosis and syphilis do not often require



surgical treatment. Actinomycosis is one of the causes of suppuration within the spleen, and it is well to examine the pus of a splenic abscess for the characteristic actinomycotic grains.

#### MOVABLE SPLEEN.

The spleen is kept in its normal position by ligaments from it to the stomach and to the diaphragm, and from the diaphragm to the colon. It moves with respiration and with the motions of the stomach during digestion. If it is found in portions of the abdomen where it does not normally belong, the condition is spoken of as movable spleen. (Fig. 332.)

FIG. 332.



Wandering spleen. (Stierlin.)

**Etiology.**—If the spleen enlarges as a result of malaria, leukæmia, etc., its ligaments are necessarily stretched. It sinks toward the left iliac fossa, and may even reach into the right iliac fossa (hypertrophic movable spleen). If there are no adhesions, it can be pushed back into its normal situation. Such is the typical movable spleen. If it is fixed by adhesions in an abnormal position, it is spoken of as an adherent dislocated spleen. Abnormal length and elasticity of the

gastrosplenic and suspensory ligaments are the chief causes of movable spleen, while pregnancy, childbirth, relaxed abdominal walls, and the other conditions which predispose to enteroptosis all favor mobility of the spleen. This condition is much more often seen in women than in men. Movable spleen is often secondary to movable kidney of the left side since the kidney is one of its normal supports. The mobility develops gradually in most cases, but it may come on suddenly as the result of traumatism.

**Pathological Anatomy.**—The displaced spleen is usually found in the left iliac fossa, less often in the region of the umbilicus or pelvis or right iliac fossa. It may even be found in the sac of an inguinal hernia. It frequently becomes adherent in its normal situation. Twisting of its pedicle may interfere with its blood-supply so that atrophy or softening results. Usually such an alteration goes on aseptically, although it may produce peritonitis. The spleen has been found in congenital diaphragmatic and umbilical hernia.

**Diagnosis.**—If the dulness normally due to the spleen is wanting, and if a movable tumor is palpable with a hilus directed upward and to the left and with pulsating vessels, the diagnosis is easily made. If the spleen is adherent in an abnormal position, the diagnosis is more difficult. If it is situated in the pelvis, bimanual examination will be of service. It may be mistaken for fecal accumulation in the sigmoid flexure, for a movable kidney, for an ovarian tumor, or for extrauterine pregnancy. Twisting of the pedicle of a movable spleen produces characteristic symptoms (intense pain, peritonitis) whose cause is easily recognized if it is known that the patient possesses a movable spleen.

**Prognosis.**—The prognosis is on the whole favorable since only in exceptional cases does a movable spleen cause intense pain, disturbances of digestion, etc.

**Treatment.**—Radical treatment is seldom called for. If the patient has had malaria, attempts should be made to reduce the size of the spleen by quinine, etc., while a bandage should be applied to hold the spleen in place. For this purpose an operation may be performed and the spleen sutured in its normal relations or removed. If the spleen is not diseased, the former operation is certainly to be recommended. If it is diseased and hypertrophied, or if the twist in the pedicle has altered its structure, it should be removed.

The passage of a suture through the substance of the spleen has in some instances produced dangerous hemorrhage. Moreover, the suture easily tears out. For this reason Rydygier loosens the parietal peritoneum so as to make a pocket into which he tucks the spleen. This operation is performed as follows: A median incision is made and the spleen replaced in its normal position so that the operator shall know where and how large to make the peritoneal pocket. The spleen is then pushed out of place and a transverse incision corresponding to the transverse diameter of the spleen is made in the neighborhood of the ninth, tenth, and eleventh ribs through all the layers of the abdominal



wall. The peritoneum is stripped up both below and above this incision; the spleen is placed in the pocket thus made, and fixed there by sutures passed through the parietal peritoneum and suspensory ligament of the spleen. Additional fixation can be secured by sutures through the margin of the spleen itself or by scraping its lower end in order to set up granulations.

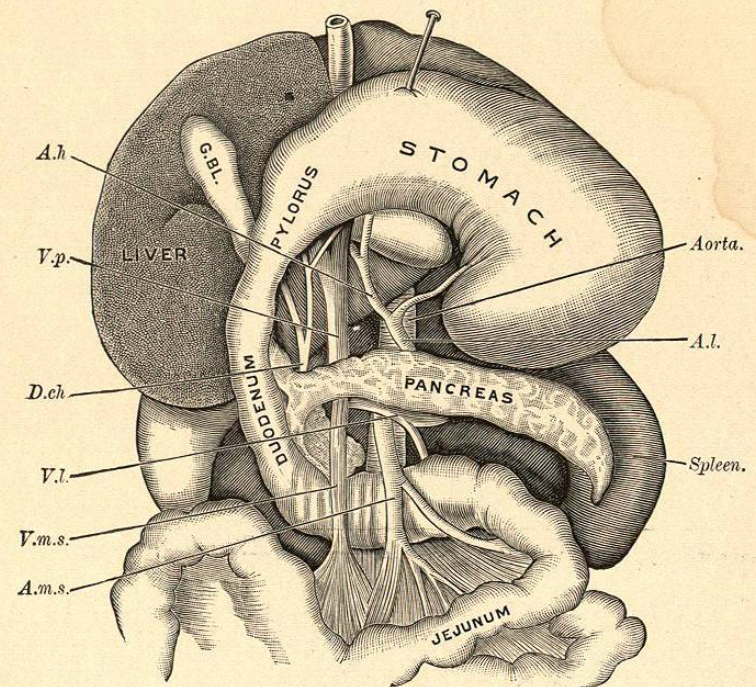
If a movable spleen is hypertrophied or contains a tumor, it should be removed. The extirpation of a movable spleen has, according to Stierlin, a mortality of only 6.25 per cent. Some surgeons have preferred splenectomy to splenopexy, the former operation being easier to carry out, being an absolute cure and having, as above stated, a slight mortality. Certainly in twisting of the pedicle splenopexy ought never to be performed unless operation is undertaken within a very short time.

## INJURIES AND DISEASES OF THE PANCREAS.

BY PROF. W. KORTE.

**Anatomy and Physiology.**—The pancreas is accessible in several ways. The gastrocolic omentum may be divided between ligatures and the stomach and transverse colon separated. (Fig. 333.) The pancreas

FIG. 333.



Upper portion of the peritoneal cavity of a child. The liver is drawn upward, the gastrocolic ligament is divided, the stomach is drawn upward and the colon downward. The whole peritoneum is removed. *A.m.s.*, superior mesenteric artery; *V.m.s.*, superior mesenteric vein; *V.l.*, splenic vein; *D.ch.*, common bile-duct; *V.p.*, portal vein; *A.h.*, hepatic artery; *A.l.*, splenic artery. (Henle.)

will then be discovered loosely covered by the posterior peritoneal layer of the lesser omental cavity. Through this incision the whole of the