

WANDERING SPLEEN WITH TORSION OF THE PEDICLE

BY IRVIN ABELL, M.D.

OF LOUISVILLE, KY.

UNDER certain conditions which permit loosening of its attachments the spleen descends from its normal position in the left hypochondrium into the abdomen. When the elongation of its pedicle is such as to allow its appearance in other than the left upper abdominal quadrant it is designated as a wandering or floating spleen. The factors concerned in its abnormal mobility are both congenital and acquired. The former are chiefly two, the length of the splenic pedicle and the conformation of the abdominal cavity. In the latter the area between the intercostochondral arches is materially diminished while the paravertebral niches are definitely shallower, as a result of which intra-abdominal pressure is diverted from its normal direction and prolapse occurs. The acquired factors may be grouped under two headings, increased weight of the spleen and the conditions which bring about relaxation of the abdominal wall and of the ligaments which support the abdominal viscera. While either of these factors may be the determining one in a given case, in a majority of instances two or more will be found to have contributed to the splenoptosis. When the mobility of the spleen attains an extent that will allow axial rotation on its pedicle, torsion of varying degree may result with more or less disastrous consequences. Two such instances have come under my observation.

CASE I.—A white woman, aged thirty-four, robust and well developed, came under my care in 1912. She gave no history of previous illness or of symptoms related to the spleen. She had borne one child and at the time of the then present illness was three and one-half months pregnant. While engaged in household duties she was seized with sudden, abdominal colic attended with nausea and vomiting. She was admitted to the hospital forty-eight hours after the onset of the attack, at which time she had a temperature of $101\frac{1}{2}^{\circ}$ and pulse of 110. The right half of the abdomen was rigid and tender and presented a tumor which extended from the pelvic brim to a point above and to the right of the umbilicus. Pelvic examination revealed a pregnant uterus with the tumor lying in contact with its right upper surface. The urine was negative. The blood count showed a leucocytosis of 12,000 with an increase in the polymorphonuclear cells. Operation revealed the tumor to be the spleen, approximately two and one-half times the normal size. It was not adherent and was easily delivered through the incision. The pedicle showed two complete turns, the tail of the pancreas being incorporated in its proximal end. This was disengaged by detorsion, the pedicle ligated and the spleen removed. The latter showed intense congestion but no thrombosis of the vessels. The patient made a good recovery and underwent normal delivery five and one-half months later.

CASE II.—White woman, aged forty-six, thin and ptotic in physique, came under observation in 1919. She had borne four children and had passed the menopause seven years before. She gave a history of digestive disturbance extending over a period of years but had had no colic until the onset of her present illness. The latter was charac-

TWISTED PEDICLE OF WANDERING SPLEEN

terized by severe cramps in the abdomen lasting three days, accompanied by nausea, vomiting and fever. Following the subsidence of the cramps the right lower quadrant became exquisitely sensitive and a mass became apparent. At the time of her admission to the hospital, two weeks after the onset of her illness, she presented a fixed mass in the right lower quadrant which was extremely sensitive. Pelvic examination showed an atrophic uterus; tubes and ovaries not palpable. Urine showed a trace of albumin, some granular casts, otherwise negative. Blood showed hæmoglobin of 80; red cells, 4,000,000; white cells, 10,000. Operation revealed a tumor completely covered by omental and intestinal adhesions except at its upper pole. Upon separation of adherent omentum and intestine the tumor proved to be the spleen. The pedicle showed two complete turns and presented thrombosis of both artery and vein. The surface of the spleen showed a number of spontaneous ruptures from which no bleeding had taken place, indicating that they had occurred subsequent to the occlusion of the arterial blood supply by torsion. Capillary oozing from raw surface on adhered organs controlled by ligatures and hot packs, pedicle ligated and spleen removed. Recovery was delayed by a right femoral thrombophlebitis, the patient being discharged from hospital four weeks after operation. This spleen weighed 370 grams; was of dark, reddish-gray color, smooth, with a few fine, fibrous tags attached over its diaphragmatic surface. The organ consisted of two almost completely separated lobes with a fissure between, extending from the hilus over the anterosuperior surface down to the inferior margin. On the diaphragmatic surface there was a transverse fracture near the lower pole, forty-seven centimetres long, two to three millimetres wide and about 5 millimetres deep. A crescentic fracture was found near the upper pole posteriorly, thirty millimetres long, six millimetres wide and seven millimetres deep. In the parietal surface was an L-shaped longitudinal fracture near the hilus, sixty-three millimetres long with an arm twelve millimetres long, four millimetres wide and six millimetres deep. In the diaphragmatic surface near the anterior border was a fracture thirty-three millimetres long, three millimetres wide and eight millimetres deep extending longitudinally from the end of a cleft. On section the pulp was very dark reddish-brown, almost black, except near the capsule, where it was reddish-gray. No Malpighian corpuscles were apparent. The vessels were thrombosed.

In a review of the literature we have been able to find ninety-five reports of wandering spleen with torsion of the pedicle, in addition to the two cases herewith recorded. No case has been included in which torsion of the pedicle is not specifically mentioned as a causative factor in the production of symptoms and pathology. The pertinent facts, as revealed by an analysis of these reports, are shown in the following tables:

AGE AND SEX

Age	Female	Male	Total
1-10.....	0	1 (age 6)	1
11-20.....	9	2	11
21-30.....	28	1	29
31-40.....	26	1	27
41-50.....	11		11
51-60.....	3		3
61-70.....	1		1
71-80.....	1		1
Not stated.....	9		9
Age and sex not stated.....			2
Totals.....	88	5	95

IRVIN ABELL

It is interesting to note that twelve, or 14.3 per cent., were observed before the age of twenty, while fifty-six, or 66.7 per cent., occurred between the ages of twenty and forty, leaving but 16, or 19 per cent. for the years of normal physical decline. Of the ninety-three cases in which the sex was stated but five were noted in males. In the group occurring before the age of twenty it would seem that congenital factors played the predominant etiological part since the conditions which give rise to abdominal distension and atony were absent. In the group of twenty-nine occurring between the

PHYSICAL DEVELOPMENT

Normal.....	11
Obese, robust or muscular.....	9
Spare, thin or delicate.....	12
Asthenic or ptotic.....	13
Not stated.....	50
	—
Total.....	95

MALARIA

History of	Splenic Enlargement Before Torsion	Size of Spleen When Removed
I.....	I	2190 gms.
I		
I, no history, parasites found.		1350 gms.
I		
I.....	13 years	4200 gms.
I.....	1½ years	1200 gms.
I.....		1520 gms.
I		
I.....	3 years	37x22x12 cm.
I.....		1750 gms.
I.....	I	400 gms.
I.....	I	5 to 6 times normal
I.....	I	2100 gms.
I.....	I	3500 gms.
I.....	I	800 gms.
I.....	I	3000 gms.
I.....	2 years	1000 gms.
I.....	3 years	1600 gms.
I.....	2 years	2125 gms.
I.....	7 years	750 gms.
I.....	I	1635 gms.
I.....		25x18 cm.
I		
I.....	3 years	1870 gms.
I		
I.....	I	710 gms.
I.....		1520 gms.
I.....		1540 gms.
I.....	17 years	840 gms.
	—	
Total, 29.....	18	

TWISTED PEDICLE OF WANDERING SPLEEN

ages of twenty-one and thirty, constituting 34.5 per cent., at a time of life when physical development is presumably at its highest, it is reasonable to presume that congenital causes could not be entirely excluded in the determination of etiology.

Of the forty-five cases in which physical development was registered but twenty-five were recorded as belonging to the types in which ectopia is commonly found, the remaining showing normal or robust physique. While the spleen may participate in a general visceroptosis it is frequently the one organ which remains in its normal position and again it is often the one organ showing ptosis when the remainder evince no such tendency.

A history of malaria was given by twenty-eight patients and the parasites found in a twenty-ninth who gave no such history. In eighteen there was a known presence of splenic enlargement or "ague cake" before the advent of torsion. Even in the presence of such an incidence it is evident that the weight of the spleen is not the prime factor in its displacement and torsion since in no history is there mention made of tumor or splenomegaly of other origin in which prolapse and torsion were complicating features. The splenic enlargement common to Banti's and Gaucher's disease, leukæmia and hemolytic jaundice is usually unassociated with prolapse even in the absence of anchoring adhesions. Of the twenty-one cases in which the weight of the

PREGNANCY AND THE PUERPERIUM

88 Females

Parous	Cases	Torsion During Pregnancy or the Puerperium		
P	3	1	Pregnant 4 mos. Splenectomy.	Recovery
P	7	1	Pregnant 5 mos. Splenectomy.	Died
1 P	8	1	Pregnant 2 mos. Splenectomy.	Recovery
2 P	6	1	Pregnant 4 mos. Splenectomy.	Recovery
3 P	5	1	Pregnant 5 mos. Splenectomy.	Died
4 P	4	1	Pregnant 3 mos. Abortion during attack. Splenectomy.	Recovery
5 P	6	1	Pregnant 5 mos. Abortion 24 hrs. after op. Splenectomy.	Died
6 P	4	1	Pregnant 4 mos. Splenectomy.	Recovery
7 P	3	1	Pregnant 2 mos. Exploration and drainage.	Died
8 P	1	1	Torsion several days after delivery. Splenectomy.	Recovery
9 P	2	1	Pregnant 3 days after delivery. Splenectomy.	Died
10 P	1	1	Pregnant 2 weeks after delivery. Splenectomy.	Recovery
14 P	1		Total—12 Deaths—5 Recoveries—7	
—				
Total	51			
Non-P.	21			
Not				
stated	16			
—				
Total	88			

The autopsy records of two, both in the fifth month of pregnancy are given.

(1) Operative diagnosis, Torsion of pedicle with intestinal obstruction: death sixth day: autopsy: purulent decidual endometritis due to strangulation of intestine.

(2) Operative diagnosis, Torsion of pedicle. Death fifth day. Autopsy: purulent decidual endometritis, endocarditis, hypostatic pneumonia, pulmonary œdema.

IRVIN ABELL

spleen was recorded at the time of removal, sixteen had noted splenic enlargement for periods varying from one to seventeen years, the weight of the organ in the twenty-one cases ranging from 400 to 4,200 grams, the average being 1,695 grams. Uncomplicated malarial splenomegaly does not as a rule attain such size, the enlargement in these instances being augmented by the changes incidental to the altered circulation.

Of seventy-two females in whose record the obstetrical history is given, twenty-one are classified as non-parous and fifty-one as parous; of the latter eight were uni-parous, three parous, seven multiparous, while thirty-three had borne from two to fourteen children each. The latter group doubtless forms the basis for the statement that prolapse of the spleen occurs most frequently in women whose abdomens have become inelastic from numerous pregnancies. It is readily granted that flaccidity and relaxation of the abdomen resulting from repeated pregnancies furnish the ideal conditions for such prolapse but a further explanation must be sought in the twenty-one non-parous women and in the five males forming 26.4 per cent of the total number under discussion. The gravity of splenic torsion in the course of pregnancy and the puerperium is graphically shown by the mortality rate of 41.7 per cent. in the twelve cases reported. In two abortions occurred during the acute attack, one before and one after splenectomy, one dying and one recovering. In three torsions occurred after delivery, one dying and two recovering following splenectomy. Of the remaining seven operated on during pregnancy, six by splenectomy and one by exploration and drainage, three died and four recovered.

PREVIOUS HISTORY

One or more colics	19
Abdominal discomfort, digestive disturbance, one with malena	10
Tumor known to be present, no other symptom mentioned	25
Tumor known to be present, with colics or discomfort	3
Pelvic pain and discomfort, 1 with malena, 1 with uterine hæmorrhage	4
Previous history not stated	34
	—
	95

DURATION OF ATTACK AT TIME OF OPERATION

Acute, Under 2 Weeks, 58		Chronic, Over 2 Weeks, 37	
Acute	58	2 mos.	3
Time stated	13	5 weeks	1
Chronic—Time not stated	24	4 mos.	2
	—	4 weeks	1
	95	Several days	1
		8 weeks	1
		2 weeks	3
		1 mo.	1
		Time not stated	24
			—
			37

History of acute onset following lifting heavy weight given in seven.

TWISTED PEDICLE OF WANDERING SPLEEN

In sixty-one cases there is a history of symptoms antedating the torsion which may be justly ascribed to the splenic displacement, in twenty-eight of which a tumor was known to be present. Colics of mild type, presumably due to partial twists of the pedicle, were noted in nineteen. Digestive disturbances due to pressure and to traction on the stomach, intestine and pancreas were commonly noted in these and were the only symptoms observed in ten. Pelvic discomfort, disturbance of menstruation, vesical and rectal tenesmus have been noted when the spleen occupied a pelvic location. Both metrorrhagia and malena have resulted from pressure and secondary circulatory change.

In thirty-four no symptoms are mentioned other than those noted with the initial attack. The attacks may be classified as acute, subacute and chronic. The symptoms of the acute attacks, barring the known presence of a wandering spleen, offer nothing conclusive other than the presence of a major abdominal disaster. Pain, nausea and vomiting with elevation of pulse, temperature and leucocyte count are usually present. Such an onset with variation in intensity of symptoms is described in fifty-eight cases. In the subacute and chronic varieties the torsion of the pedicle has stopped short of strangulation or the patients have survived the acute onset with the spleen more or less isolated by adherence of omentum and intestine with symptoms directed to the site of the misplaced organ. In instances in which the spleen was known to have been mobile and in others in which a movable tumor had been noted, comment is made upon the rapid enlargement of the tumor following torsion. In thirteen instances the duration of the attack as stated varied from several days to four months while in twenty-four the time is not stated. The description of the findings in the latter group indicates them to be of the chronic type.

LOCATION OF TUMOR

Location given	85
Right upper quadrant	2
Left upper quadrant	7
Epigastrium	2
Mid-abdomen	4
Right half abdomen	3
Pelvis and abdomen	13
Abdomen	6
Right lower quadrant	9
Left lower quadrant	8
Hypogastrium	4
In all four quadrants	2
Left half abdomen	15
Pelvis	10
Location not mentioned	7
Tumor not detected, distension and rigidity	3
Total	95
Number palpable through vagina and rectum, 34	

The displaced spleen escaped detection in but three instances, the distension and rigidity effectually hiding it. In seven no mention is made of loca-

IRVIN ABELL

tion and in six the tumor is merely described as being in the abdomen. In seventy-nine the tumor is accurately located and it interesting to note that in but seven was it found in the left upper quadrant. The length of the pedicle offers the only limitation to its wandering proclivities, it being found in all parts of the abdomen and pelvis. In the latter it may rest on the uterus forcing the latter into a retroverted position or it may lie in the cul de sac behind the uterus. Mention is made in thirty-four of the histories of the tumor being palpable through the vagina or rectum.

PRE-OPERATIVE DIAGNOSIS

Prolapsed spleen or kidney	1
Kidney	1
Tumor left kidney or ovary	1
Hydronephrosis right kidney with twisted pedicle	1
Appendiceal abscess	1
Acute appendicitis	1
Appendicitis with peritonitis	1
Ovarian tumor	8
Ovarian tumor with twisted pedicle	11
Ovarian cyst, twisted pedicle with intestinal obstruction	1
Hydrosalpinx or tubo-ovarian cyst	1
Uterine or ovarian tumor	1
Uterine fibroid	1
Cyst	1
Hæmatocele	1
Tumor omentum or mesentery	1
Sacrococcygeal tumor	1
Intestinal obstruction	1
Peritonitis or obstruction	1
Peritonitis, indeterminate	1
Tumor	9
Spleen	2
Enlarged spleen	1
Inflamed spleen	1
Floating spleen	1
Floating spleen with twisted pedicle	1
Wandering spleen	1
Wandering spleen or hydrated cyst	1
Wandering spleen, fixed	2
Movable spleen or peritonitis	1
Dislocated spleen	1
Dislocated spleen with twisted pedicle	4
Diagnosis not stated	33
<hr style="width: 10%; margin-left: auto; margin-right: 0;"/>	
Total	95

When one notes the varying locations in which the spleen has been found, in all but seven of which it was widely distant from its normal position, one is prepared for the failures in diagnosis. In thirty-three the condition was recognized as an acute abdominal catastrophe but no pre-operative diagnosis charted. In nine it was tumor of unknown origin. In twenty-three the tumor was thought to have originated in the ovary or uterus. In but nineteen

TWISTED PEDICLE OF WANDERING SPLEEN

was the spleen recognized as the organ at fault while in the remainder obstruction, peritonitis, the omentum, appendix and kidney, hæmatocele and sacrococcygeal tumor were suspected. When a history of splenic enlargement or mobility was lacking and the tumor was located other than in the left upper quadrant, its origin was obviously thought to be connected with the organs normally situated at its point of lodgement.

BLOOD COUNT

Made.....	48
Not made.....	47
	—
Total.....	95

Before and After Operation, 11

15500	Normal in 1 mo.
28000	Normal in 4 mos.
28700	10000
13500	10650
7000	Normal
10000	Increased lymphocytes
Normal	Increased white cells
Increased whites	Normal
12200	43000
17800	14800
11300	27000 - 10000

After Operation, 13

17000 - 15000 - 14000
7000 With decreased lymphocytes
2 Increased blood-platelets
10000 4 months later 50000
14000 - 7000
30000
14400
13760 - 12500
Normal
14000
5600
30000 - 10000

Low Hem. & R. C. Normal W. C. Inc., B. P.....	1
Malarial parasites.....	1
Anæmia. Normal W. C. 3 yrs. later 16000.....	1
Low R. C. Normal W. C.....	2
Normal white count.....	1
Low R. C. Increased W. C.....	1

Increased W. C.....	2
Increased W. C. with parasites.....	1
Anæmia of pernicious type with megalo- and normoblasts, poikilocytosis.....	1
Normal blood counts.....	12
8400 before operation, none after....	1

Blood counts at some time in the course of the calamity were made in forty-eight of the ninety-five cases. With but few exceptions the blood study has not been carried out through complete convalescence. Normal counts are reported in a rather surprisingly large number of cases, the inference being that the degree of torsion was not sufficient to produce marked circulatory changes in the splenic tissue. With the acute torsions the number of leucocytes has uniformly been increased, the differential count showing nothing distinctive. Following splenectomy the red cells showed a temporary decrease with rather rapid replacement: the white cells, a gradual decrease with a temporary preponderance of lymphocytes. Increased blood-platelets were recorded in but two. The blood count, as a rule, has regained its normal proportions in from one to four months. In two cases an increased white-cell count was noted long after splenectomy, one of 50,000 at the end of four months, and one of 16,000 at the end of three years: no explanation is offered in either instance.

IRVIN ABELL

OPERATIONS

Primary splenectomy.....	83
Recovered.....	66
Died.....	15
Result not given.....	2
Detorsion and replacement followed later by splenectomy.....	2
Total splenectomies (deaths 15, mortality 17.6 per cent.).....	85
Detorsion and replacement (died, 1—mesenteric thrombosis)...	5
Splenopexy alone (no deaths).....	3
Exploration (closure 1, drainage 1—died).....	2
—	—
Total.....	95

Primary splenectomies were done in eighty-three. Detorsion and replacement were carried out in two cases, both of which later showed acute torsion and were then treated by splenectomy, making a total of eighty-five splenectomies, of which sixty-eight recovered and fifteen died with the result not stated in two, a mortality of 17.6 per cent. Detorsion and replacement constituted the only operation in five with four recoveries and one death, the latter due to mesenteric thrombosis. Splenopexy alone was done in three with no deaths and exploration alone in two, one with drainage and one without drainage, with one death. In the patients treated by splenopexy and detorsion with replacement classed as recovered, no follow-up as to the ultimate fate of the replaced organ is given. The operations which attempt to conserve the spleen when the organ has acquired a wanderlust and become the victim of a torsion must have a very limited scope. The circulatory damage sustained as a result of the twisting of the pedicle, the greatly increased size commonly noted in such organs and the insecurity of any known

SIZE

By weight.....	53
By measurement.....	10
Not enlarged.....	1
Enlarged.....	11
Not stated.....	20
—	—
Total.....	95

Size by Weight in Grams

200-500.....	8
500-1000.....	13
1000-1500.....	10
1500-2000.....	8
2000-2500.....	7
2500-3000.....	3
3000-3500.....	2
3500-4000.....	1
4000-4500.....	1
—	—
Total.....	53

Size by Measurement

12x5x9 cm.....	1
19x9 cm.....	1
18x11x7 cm.....	1
21x15 cm.....	1
37x22x12 cm.....	1
16x11 cm.....	1
30x15 cm.....	1
25x18 cm.....	1
177x101x114 mm.....	1
5½x5 inches.....	1
—	—
Total.....	10

TWISTED PEDICLE OF WANDERING SPLEEN

method of replacement all argue against conservative procedures. The ease with which other tissues rich in reticulo-endothelial cells compensate for its loss invalidates any objection as to a loss of its function. In the light of these considerations splenectomy is to be considered the operation of choice.

The normal spleen varies greatly in size in different individuals and in the same individual under varying conditions. Its average weight is given as 225 grams and its average dimensions at ten centimetres in length, six centimetres in width and three centimetres in thickness. Of fifty-three of the present series whose weight was stated, but eight were under 500 grams, the remaining forty-five varying from 500 to 4,500. In ten in which the size was determined by measurement only, a corresponding increase in size over the normal is indicated. It is evident that circulatory change dependent upon the elongation of the pedicle with malposition induces in the wandering spleen a gradual enlargement aside from that resulting from malarial infection and acute torsion, while, as noted above, the latter accident causes an immediate enlargement due to the intense congestion.

PATHOLOGICAL FEATURES

Infarction.....	2
Thrombosis of splenic vein with infarction.....	2
Old diffuse infarcts.....	1
Hæmorrhagic infiltration, with and without necrosis, rents and ruptures.....	17
Fibrosis.....	4
Enlargement, congestion, hepatization, no gross microscopical change.....	17
Chronic congestion with hyperplasia.....	4
Malarial splenomegaly.....	8
Necrosis with hæmorrhage—no stain.....	5
Chronic passive congestion.....	11
Pathology not mentioned.....	24
	—
Total.....	95

The pathology reported by the various observers, as far as it relates to the spleen alone, comprises nutritional changes varying from congestion to necrosis superinduced by mechanical interference with the splenic artery and vein.

Four specimens are mentioned as containing blood cysts of appreciable size: eighteen as showing thrombosis of the splenic artery or vein, or of both. One refers to a woman, with recognizable splenic tumor during pregnancy, who two weeks after normal delivery was seized with acute pain and brought to the hospital at the end of the seventh week following labor. Incision showed a cystic tumor from which fourteen litres of thick, brownish pus, sterile on culture, were removed. This was due to a necrotic spleen resulting from dislocation and twisting of pedicle. Recovery followed splenectomy.

In fifteen cases the presence of free fluid was noted in the peritoneal cavity, varying in amount from several ounces to six litres: it was described as colorless and yellow fluid, serum, hæmorrhagic serum, blood and blood-clots. Three of the fifteen showed fatal termination.

IRVIN ABELL

The pedicle has been described as of various lengths, the longest being ten inches, the largest compared in size to that of the fetal arm. In all the cases it has been noted as twisted and in sixty an estimate of the torsion given, ranging from one-half to six complete turns. The vessels have been described as thrombotic and as dilated, both artery and vein in some, the vein alone in others. In two the size of the vein was compared to that of the small intestine. In eight the tail of the pancreas is noted as being involved in the torsion, in all but one it being disengaged by detorsion and escape injury; in one it was resected with the pedicle without untoward result.

Seven cases are recorded as showing intestinal obstruction, three involving the small intestine, one the transverse colon and three the sigmoid: two recovered, four died and in one the result was not stated. In the small intestine obstructions, the bowel was adhered to and caught in the twists of the pedicle: the transverse colon was adhered, kinked and compressed: the sigmoid showed volvulus from traction in one, adherence and kinking in one and adherence and compression occlusion in one.

BIBLIOGRAPHY

- ¹ Brossmann, Hanns: Extirpation einer stielgedrehten Wandermilz. *Zentralbl. f. Chir.*, vol. xlix, pp. 675-677, Leipzig, 1922.
- ² Catsaras, Joh.: Vollständige Nekrose einer Wandermilz mit kompensatorischer peripherischer, vielknotiger Hyperplasie von Milzgewebe. *Virchow's Arch. f. Path. Anat.*, vol. cclxviii, pp. 181-188, Berlin, 1928.
- ³ Childe, Charles P.: Wandering Spleen; Hæmorrhage within Capsule; Splenectomy; Recovery. *Brit. Med. Jour.*, vol. ii, pp. 1631-1634, 1905.
- ⁴ Fisher, Eric M.: Wandering Spleen Impacted in Pelvis. *Med. Jour. Australia*, vol. ii, pp. 758-759, 1930.
- ⁵ Gemmell, J. E.: Two Cases of Enlarged Wandering Spleen Simulating Pelvic Tumor. *Jour. Obst. and Gynæc. Brit. Emp.*, vol. xiv, pp. 237-245, London, 1908.
- ⁶ Gemmell, J. E.: Two Cases of Enlarged Wandering Spleen Simulating Pelvic Tumor. *Jour. Obst. and Gynæc. Brit. Emp.*, vol. xiv, pp. 237-245, London, 1908.
- ⁷ Gersuny, R.: Ueber die Indicationen zur Laparotomie wegen actuer Processe. *Wien. med. Presse*, vol. xxix, pp. 1649-1654, pp. 1693-1695, 1888.
- ⁸ Halban, Josef.: Zwei Falle von Torsion einer Wandermilz. *Arch. f. Gynak.*, vol. cxvii, pp. 432-433, Berlin, 1922.
- ⁹ Halban, Josef.: Zwei Falle von Torsion einer Wandermilz. *Arch. f. Gynak.*, vol. cxvii, pp. 432-433, Berlin, 1922.
- ¹⁰ Hartman and Terrier: Sur une observation de splenectomie pour torsion du pedicule de la rate suivi d'accidents de peritonite aigue. *Bull. et. mém. Soc. de chir. de Par.*, n.s., vol. xx, pp. 348-354, 1894.
- ¹¹ Hartman, Henri: Note sur quatre cas de rate mobile. *Cong. franc. de chir.*, vol. ix, pp. 499-506, Paris, 1895.
- ¹² Haskins, J. B.: Report of Two Spleen Cases: (1) Movable Spleen; (2) Splenic Abscess. *Jour. Tennessee Med. Assn.*, vol. xxiv, pp. 272-273, 1931.
- ¹³ Kopp, J. W.: Over Steeldraaiing van de Milt. *Nederl. Tijdschr. v. Geneesk.*, vol. lxxiii, pp. 379-391, Haarlem, 1919.
- ¹⁴ Lott, H. S.: Case of Floating Spleen with Twisted Pedicle; Celiotomy; Splenectomy; Recovery. *Am. Jour. Obst.*, vol. lxvi, pp. 985-986, New York, 1912.
- ¹⁵ Lucy, R. H.: Case of Enlarged Wandering Spleen; Splenectomy. *Lancet*, vol. ii, p. 92, London, 1906.
- ¹⁶ Macdonald, Ian, and Mackay, W. A.: Case of Acute Torsion of Wandering Spleen; Splenectomy; Recovery. *Lancet*, vol. ii, pp. 917-918, 1909.

TWISTED PEDICLE OF WANDERING SPLEEN

- ¹⁷ McLaren, Archibald: Wandering Spleen with Twisted Pedicle, Producing Tumor in Pelvis. *ANNALS OF SURGERY*, vol. li, pp. 834-836, 1910.
- ¹⁸ Malins, Edward: Rotation of Spleen; Removal; Recovery. *Lancet*, vol. ii, p. 627, 1894.
- ¹⁹ Meek, H.: Dislocated Spleen with Torsion of Pedicle Complicating Pregnancy. *Brit. Med. Jour.*, p. 928, London, 1907.
- ²⁰ Merhaut, K.: Torsion der ektopischen, enora vergrößerten Milz, mit Inkarceration des Omentum. *Casopis lekara ceskych*, 1917, No. 4. Abs. by O. Muhlstein in *Centralbl. f. Chir.*, vol. xlv, p. 779, 1917.
- ²¹ Montuoro, Fortunato: Die Wandermilz in ihren Beziehungen zu Geburtshilfe und Gynakologie. *Ztschr. f. Geburtsh. u. Gynak.*, vol. lxxiii, pp. 702-736, Stuttgart, 1913.
- ²² Montuoro, Fortunato: Die Wandermilz in ihren Beziehungen zu Geburtshilfe und Gynakologie. *Ztschr. f. Geburtsh. u. Gynak.*, vol. lxxiii, pp. 702-736, Stuttgart, 1913.
- ²³ Muller, Arthur: Ein Fall von Stieldrehung der Wandermilz mit parasplenischem Hamatom. *Deutsch. Ztschr. f. Chir.*, vol. cxix, pp. 189-191, Leipzig, 1912.
- ²⁴ Nasaroff, N. N.: Splenektomie wegen scharfer Achsenverdrehung der Malaria-Milz. *Deutsch. Ztschr. f. Chir.*, vol. cxci, pp. 420-424, Leipzig, 1925.
- ²⁵ Nasaroff, N. N.: Splenektomie wegen scharfer Achsenverdrehung der Malaria-Milz. *Deutsch. Ztschr. f. Chir.*, vol. cxci, pp. 420-424, Leipzig, 1925.
- ²⁶ Nijhoff, G. C.: Splenectomy wegens Zwerfmilt met Steeldraai. *Nederl. Tijdschr. v. Geneesk.*, vol. lxxiii, Pt. ii, pp. 183-186, Amsterdam, 1919.
- ²⁷ O'Shea, John H.: Wandering Spleen. *Northwest Med.*, vol. vii, pp. 139-141, Seattle, 1915.
- ²⁸ Oulie, G.: Rate ectopique dans la fosse iliaque droite, torsion du pedicule avec occlusion intestinale. *Ann. d'anat. path.*, vol. ix, pp. 85-86, 1932.
- ²⁹ Paterson, Peter: Two Rare Surgical Conditions: (1) A Case of Acute Torsion of the Splenic Pedicle; Recovery after Splenectomy; and (2) A Case of Floating Liver Cured by Operation. *Lancet*, vol. ii, p. 1496, 1909.
- ³⁰ Porsonyi, E.: Extirpation einer malarisch-hypertrophischen Wandermilz wegen Stieldrehung während der Schwangerschaft. *Sebescet*, 1902, No. 5; Abs. *Zentralbl. f. Gynak.*, vol. xxxi, pp. 126-127, 1907.
- ³¹ Prochownik: Ein Fall von extirpiertter Wandermilz. *Deutsch. med. Wchnschr.*, vol. xi, pp. 479-480, Berlin, 1885.
- ³² Rummel, Hans: Stieldrehung einer Wandermilz, unter dem klinischen Bild der Stieldrehung eines Ovarialtumors verlaufend. *Munchen. med. Wchnschr.*, vol. lxxvi, pp. 371-373, 1929.
- ³³ Runge, M.: Extirpation einer Wandermilz mit Aschendrehung der Stieles. *Berl. klin. Wchnschr.*, vol. xxxii, p. 346, 1895.
- ³⁴ Rydygier: Die Behandlung der Wandermilz durch Splenopexis. *Arch. f. klin. Chir.*, vol. i, pp. 880-886, Berlin, 1895.
- ³⁵ v. Salis, H.: Ein Fall von Torsion der Milz- Milzextirpation. *Cor.- Bl. f. schweiz. Aerzte*, vol. xliii, pp. 1669-1672, Basel, 1913.
- ³⁶ Sen, J. N.: Enlarged Wandering Spleen Mistaken for Ovarian Tumor; Splenectomy and Recovery. *Indian Med. Gaz.*, vol. lx, pp. 576-577, Calcutta, 1925.
- ³⁷ Southam, A. H.: Note on Splenectomy for Torsion of Spleen in Child. *Lancet*, vol. i, p. 642, London, 1921.
- ³⁸ Subbotic, V.: Beitrage zur Pathologie und chirurgischen Therapie einiger Exkrankugen der Milz. *Deutsch. Ztschr. f. Chir.*, vol. liv, pp. 487-502, Leipzig, 1899-1900.
- ³⁹ Subbotic, V.: Beitrage zur Pathologie und chirurgischen Therapie einiger Exkrankugen der Milz. *Deutsch. Ztschr. f. Chir.*, vol. liv, pp. 487-502, Leipzig, 1899-1900.
- ⁴⁰ Subbotic, V.: Beitrage zur Pathologie und chirurgischen Therapie einiger Exkrankugen der Milz. *Deutsch. Ztschr. f. Chir.*, vol. liv, pp. 487-502, Leipzig, 1899-1900.
- ⁴¹ Subbotic, V.: Beitrage zur Pathologie und chirurgischen Therapie einiger Exkrankugen der Milz. *Deutsch. Ztschr. f. Chir.*, vol. liv, pp. 487-502, Leipzig, 1899-1900.
- ⁴² Sutton, J. Bland: Case in Which Splenectomy Was Performed for Wandering Spleen. *Trans. Clin. Soc. London*, vol. xxxiv, pp. 31-33, 1901.

- ⁴³ Sutton, J. Bland: Case of Axial Rotation of Wandering Spleen; Splenectomy; Recovery. *Trans. Clin. Soc. London*, vol. xxvi, pp. 46-49, 1892-1893.
- ⁴⁴ Taylor, F. E.: Two Cases in Which Enlarged Wandering Spleens Simulated Pelvic Neoplasms. *Trans. Obst. Soc. London* (1904), vol. xlvi, pp. 179-183, 1905. Also: *Jour. Obst. and Gynec. Brit. Emp.*, vol. vii, pp. 116-120, 1905.
- ⁴⁵ Taylor, F. E.: Two Cases in Which Enlarged Wandering Spleens Simulated Pelvic Neoplasms. *Trans. Obst. Soc. London* (1904), vol. xlvi, pp. 179-183, 1905. Also: *Jour. Obst. and Gynec. Brit. Emp.*, vol. vii, pp. 116-120, 1905.
- ⁴⁶ Ullman, Emerich: Milzextirpation wegen Stieltorsion der Wandermilz. *Klin.-therap. Wchnschr.*, vol. x, pp. 41-44, Vienna, 1903.
- ⁴⁷ Wallace, W. L.: Removal of Strangulated Spleen in Child. *Jour. Am. Med. Assn.*, vol. xlix, p. 1774, 1907.
- ⁴⁸ Whitehouse, Beckwith: Torsion of Spleen Simulating Ovarian Tumor; Splenectomy; Recovery. *Birmingham Med. Rev.*, vol. lxxiv, pp. 18-22, 1914, 1 pl. Also: *Jour. Obst. and Gynec. Brit. Emp.*, vol. xxiii, pp. 161-161, 1 pl., London, 1913.
- ⁴⁹ Zimmerman, Victor L.: Wandering Spleen with Twisted Pedicle Removed from the True Pelvis. *Am. Jour. Obst.*, vol. lxxvi, p. 116, New York, 1917.
- ⁵⁰ Giordana, Giacinto: Di un caso di milza torta sul peduncolo. *Riforma med.*, vol. xlv, pp. 339-340, Napoli, 1929.
- ⁵¹ Kadigroboff, B. A.: Torsion of Pedicle of Floating Spleen. *Chirurgia*, vol. xxiii, pp. 3-20, 2 figs., 1908; *abst.: J. de chir.*, vol. i, pp. 72-73, Paris, 1908.
- ⁵² Robertson, Fay: Floating or Wandering Spleen: Twisted Pedicle: Splenectomy. *Trans. Southern Surg. Assn.*, vol. xxxvi, pp. 363-369.
- ⁵³ Lewis, Arthur J.: Wandering Spleen. *Brit. Med. Jour.*, vol. i, p. 1237, 1907.
- ⁵⁴ Treves, Frederick: *Manual of Operative Surgery*. Lea Bros. & Co., Phila. and N. Y., 2 vols., 1903.
- ⁵⁵ Treves, Frederick: *Manual of Operative Surgery*. Lea Bros. & Co., Phila. and N. Y., 2 vols., 1903.
- ⁵⁶ Orsos, F.: Beitrage zur Kenntnis der Wandermilz und der Splenomegalie. *Virchow's Arch. f. path. Anat., etc.*, vol. cxcvii, pp. 91-112, Berlin, 1909.
- ⁵⁷ Perini, Elio: Sindrome da ectopia splenica. *Rassenga internaz. di clin. e terap.*, vol. x, pp. 198-211, 1929.
- ⁵⁸ Deramond: Rate prolabee avec torsion du pedicule depuis dix mois; ablation; guerison. *Rev. de clin. et de therap.*, vol. xxx, p. 568, Paris, 1916.
- ⁵⁹ Malone, Battle: Splenectomy, with Report of Case. *Jour. Tenn. State Med. Assn.*, vol. xvii, pp. 277-279, 1925.
- ⁶⁰ Schwarz, Rodolfo: Considerazioni sopra dieci splenectomie per splenomgelia malarica associata ad ectopia. *Gazz. d. osp.*, vol. xxiii, pp. 980-986, Milan, 1902.
- ⁶¹ Schwarz, Rodolfo: Considerazioni sopra dieci splenectomie per splenomgelia malarica associata ad ectopia. *Gazz. d. osp.*, vol. xxiii, pp. 980-986, Milan, 1902.
- ⁶² Schwarz, Rodolfo: Considerazioni sopra dieci splenectomie per splenomgelia malarica associata ad ectopia. *Gazz. d. osp.*, vol. xxiii, pp. 980-986, Milan, 1902.
- ⁶³ Schwarz, Rodolfo: Considerazioni sopra dieci splenectomie per splenomgelia malarica associata ad ectopia. *Gazz. d. osp.*, vol. xxiii, pp. 980-986, Milan, 1902.
- ⁶⁴ Schwarz, Rodolfo: Considerazioni sopra dieci splenectomie per splenomgelia malarica associata ad ectopia. *Gazz. d. osp.*, vol. xxiii, pp. 980-986, Milan, 1902.
- ⁶⁵ Schwarz, Rodolfo: Considerazioni sopra dieci splenectomie per splenomgelia malarica associata ad ectopia. *Gazz. d. osp.*, vol. xxiii, pp. 980-986, Milan, 1902.
- ⁶⁶ Walter: Splenektomi. *Ded. Hygiea*, vol. lix, pp. 213-215, Stockholm, 1897.
- ⁶⁷ Bond, Y. H.: Splenectomy for Floating Spleen with Strangulated Pedicle. *Weekly Med. Review*, vol. xix, pp. 393-396, St. Louis, 1889.
- ⁶⁸ Lahey, Frank H.: Prolapsed Spleen with Acute Torsion: Splenopexy. *ANNALS OF SURGERY*, vol. liv, pp. 612-616, 1911.
- ⁶⁹ Chandelux: Splenectomie pour rate mobile avec torsion du pedicule. *Lyon Med.*, vol. xciii, p. 452, 1900.

TWISTED PEDICLE OF WANDERING SPLEEN

- ⁷⁰ Conklin, W. J.: Splenectomy, with Report of Successful Case. *Med. Rec.*, New York, vol. xlvi, pp. 103-105, 1894.
- ⁷¹ Glasgow, F. A.: Spleen as Factor in Gynecology; Report of Successful Splenectomy for Dislocation into True Pelvis. *Trans. Am. Assn. Obst. and Gynec.*, vol. iii, pp. 233-242, Philadelphia, 1890.
- ⁷² Heurtaux: Rate deplacée dans la fosse iliaque droite et à pédicule tordu; Splénectomie. *Bull. et mem. Soc. de chir. de Paris*, vol. xix, pp. 752-757, 1893.
- ⁷³ Hunter, J. W.: Result of Splenic Removal, with Report of Successful Removal of Wandering Spleen, with Twisted Pedicle, Occupying the Left Iliac Region, with Perisplenitis and Necrosis of Pulp. *Am. Jour. Med. Sci.*, n.s., vol. cxxix, pp. 609-616, Philadelphia and New York, 1905.
- ⁷⁴ Kakels, M. S.: Hypertrophic Wandering Spleen with Torsion of Pedicle. *New York Med. Jour.*, vol. lxxxvi, pp. 639-642, 1907.
- ⁷⁵ Lawrason, G. B.: Case of Splenectomy. *New Orleans Med. and Surg. Jour.*, vol. xvi, pp. 354-357, 1888-1889.
- ⁷⁶ Lejars: Ectopies et torsions chroniques du pédicule de la rate. *Bull. et mem. Soc. de chir. de Paris*, vol. xxix, p. 870, 1903.
- ⁷⁷ Matas, Rudolph: Wandering Spleen with Twisted Pedicle Producing Tumor in Pelvis. *ANNALS OF SURGERY*, vol. lii, p. 138, 1910; also: *Trans. Am. Surg. Assn.*, vol. xxviii, p. 455, 1910.
- ⁷⁸ Curtillet, Lombard P., and Pelissier, G.: Malarial Spleen Displaced into the Pelvis; Splenectomy. *Bull. med. de l'Alger.*, vol. xxiv, pp. 367-379, 1913.
- ⁷⁹ Fata, M.: Splenectomy for Torsion of the Spleen. *Riv. venezia di sc. med.*, vol. lix, pp. 252-268, 1913.
- ⁸⁰ Fata, M.: Splenectomy for Torsion of the Spleen. *Riv. venezia di sc. med.*, vol. lix, pp. 252-268, 1913.
- ⁸¹ Fata, M.: Splenectomy for Torsion of the Spleen. *Riv. venezia di sc. med.*, vol. lix, pp. 252-268, 1913.
- ⁸² Ivanyi, Kornel: Movable Spleen Grown to the Uterus. *Szuleszet es nagyogy*, No. 1, pp. 7-10, Budapest, 1903.
- ⁸³ Ledomsky, V. I.: Wandering Spleen with Twisted Pedicle and Obstruction of the Bowels. *Khirurgia*, vol. xxiv, p. 559, 1908.
- ⁸⁴ Lovrich, Jozsef: A Case of Torsion of the Spleen in the Puerperal Period. *Gynækologia*, vol. v, pp. 226-229, Budapest, 1906.
- ⁸⁵ Pozsonyi, J.: Torsion of Peduncle of a Hypertrophied, Wandering Spleen. *Magyar orvosok lapja, sebesz. mell.*, Buda P., 1902.
- ⁸⁶ Rakhmanova, A. N.: Case of Excision of Wandering Spleen During Pregnancy. *Meditinskoe Obozrenie*, vol. xlv, p. 611, 1896.
- ⁸⁷ Stavely, A. L.: Floating Spleen. *Washington Med. Annals*, 1907-1908.
- ⁸⁸ Viano, O.: Two Cases of Wandering Spleen with Torsion of the Pedicle. *Folio gynaec.*, Pavia, vol. xii, p. 211, 1917-1918.
- ⁸⁹ Viano, O.: Two Cases of Wandering Spleen with Torsion of the Pedicle. *Folio gynaec.*, Pavia, vol. xii, p. 211, 1917-1918.
- ⁹⁰ Vincent: Presentation of Specimen of Large Ectopic Spleen with Torsion of the Pedicle, Removed by Operation. *Bull. Med. de l'Alger*, vol. xx, p. 210, 1909.
- ⁹¹ Horsley, J. Shelton: *Clin. and Collect. Papers*, 1922. St. Elizabeth Hospital, vol. i, pp. 60-62, Richmond, Va., 1923.
- ⁹² Harris, H. A. H.: A Case of Wandering Spleen Causing Intestinal Obstruction. *Brit. Jour. Surg.*, vol. xv, pp. 163-165, 1927.
- ⁹³ Stone, I. S.: Splenectomy for Floating Spleen with Twisted Pedicle. *ANNALS OF SURGERY*, vol. xxx, pp. 32-33, 1899.
- ⁹⁴ Sutton, J. E.: Wandering Spleen with Torsion of Its Pedicle. *ANNALS OF SURGERY*, vol. lxxxii, pp. 239-245, 1925.
- ⁹⁵ Webster, J. C., and Tiekens, T.: A Case of Successful Removal of an Enlarged Spleen with Twisted Pedicle. *Jour. Am. Med. Assn.*, vol. xl, pp. 887-891, 1903.