

RUPTURED SPLEEN*
WITH REPORT OF THREE CASES
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IN reporting these cases we wish to emphasize the fact that two of the men had spontaneous rupture, of normal spleens, so far as could be demonstrated by macroscopic and microscopic examination and careful history excluding malaria and other diseases likely to affect the spleen. The third case was from trauma. All cases showed similar symptoms and Case II was diagnosed by Major Francis and Case III by Colonel Metcalfe before operation. So sure were we of the condition to be encountered, that a high left rectus incision was made, and a splenectomy performed with recovery in each case. After detailing the cases we wish to briefly review the literature on the subject.

CASE I.—R. F. Sergeant, Co. "K," 14th Cavalry. Age twenty-one. White. Male. Two and three-twelfths years service. Born in Texas. Occupation farmer. Denied ever having used alcoholics.

Previous Personal History: Measles and pertussis in childhood. Influenza and pneumonia in October, 1918. Never any injuries or accidents. Denies venereal infection.

July 28, 1919, shortly after returning from morning drill at Fort Sam Houston, Texas, patient noticed a sudden severe pain in left side of abdomen. Had nausea and vomited twice. Brought direct to Hospital. Admitted to Hospital at 12:00 noon, July 28, 1919. Temperature 96.2, pulse 78 and very weak. Patient appeared in shock, pale and extremities cold. Patient suffering severe pain in left side of abdomen just opposite to umbilicus. At 4:30 P.M., same date, pain in left upper abdomen, paroxysmal in character. Maximum pain just to left of umbilicus. Temperature 99.9° rectal. Leucocyte count 25,000. Examination showed marked tenderness across upper abdomen, rather more marked to the left of mid line. No definite rigidity and no distention. More pain on inspiration and on moving. No urinary symptoms and no previous gastric symptoms. Patient examined by Major Francis about 4:30 P.M. The most prominent symptom noted was pain in left upper abdomen, radiating to left shoulder. Tenderness over left upper abdomen. Patient mentally bright and alert. No other pathology found. Exploratory laparotomy at 6:10 P.M., July 28, 1919. Peritoneal cavity full of free blood. Spleen found ruptured and was removed. Abdomen closed without drain-

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age. Operated by Major Erdman. Patient made uneventful recovery. Wassermann and urine examination negative.

CASE II.—J.F. Private, 12th Field Artillery. White. Twenty-one years of age. Soldier. Six months service. Family history negative. Previous personal history diseases of childhood only. No serious illness or injuries.

Patient while on stable police with other soldiers morning of June 3, 1921, became very thirsty and was not permitted to leave work to get a drink until later, when he drank a large quantity of cold water; soon afterwards he developed cramp-like pain in abdomen and felt dizzy; told sergeant in charge he was sick and was told to go to quarters. Was walking to quarters some distance away when patient states that he fainted but was soon able to proceed to quarters. Had pain in abdomen and left shoulder. Was seen by Medical Officer and sent to hospital as appendicitis suspect at 8:15 P.M. Examination of patient at receiving ward was negative for appendicitis and he was admitted to General Medical Ward and given routine treatment.

Morning of June 4th, patient up and around ward, but says he feels dizzy and has a little pain in abdomen. At 4:00 P.M. nurse's attention was called to patient now in bed, suffering intense pain in abdomen. Seen at once by Captain Fletcher and found to be in state of severe shock. Temperature 96, pulse 140, skin cold and moist. Presenting picture of hemorrhage. Had constant desire to evacuate his bowels, passing small dark-colored stools, no blood. Abdomen showed no distention or rigidity. Some dullness in sides of abdomen. Patient given 1000 c.c. of ten per cent. glucose solution intravenously. At 9:00 P.M. pulse 150, but good volume, given stimulants during night. The following morning, June 5th, general condition was slightly improved over evening, temperature 99, pulse 120. Still complaining of pain in abdomen and left shoulder. Abdomen showed more apparent dullness but no distention or rigidity. Condition of shock improved sufficiently to warrant operation. Operated 11:00 A.M. Left rectus, high incision. Abdominal cavity full of blood with large clot surrounding spleen. Rupture of dorsal surface of spleen. Spleen and blood clots removed. Cavity filled with normal saline and closed, without drainage. Operated by Colonel Metcalfe. Uneventful recovery.

CASE III.—M.T. Private, Co. "D," 3rd M.R.Bn. Age twenty-two. White. Four years' service. Birthplace Missouri.

Previous Personal History: Patient had measles when small. Never had any serious illness. Right forearm fractured in 1915, good recovery. Venereal history, denied.

On July 6, 1921 about 4 P.M. he was riding a motorcycle on race track preparing for the motorcycle races to be held on July 23rd. He was thrown from his machine, due to machine leaving the track and going over a bank. The patient was brought to this hospital at 6 P.M. same day. Had multiple small lacerations over face, hands and back. Complained of severe pain in left shoulder. Examination of shoulder negative. Abdomen board like rigidity throughout, evidence of small amount of free fluid in peritoneal cavity. Patient's pulse good volume, rate 96, respiration normal. General condition good. Watched until following day, when patients only complaint was pain in left shoulder. Abdomen tender and rigid with some free fluid present. Diagnosis of ruptured spleen made and patient operated on 6 P.M., July 7th. High left rectus incision. Free blood in peritoneal cavity. Spleen showed transverse and stellate laceration. Spleen removed, abdominal cavity freed of blood clots, normal saline introduced, closed without drainage. Operated by Colonel Metcalfe. Recovery uneventful. Duty, August 12, 1921.

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BLOOD PICTURE FOLLOWING SPLENECTOMY—R. F. CASE I.

	July 28.	August 4.	August 5.	August 6.	August 24.
Red Corpuscles		4,320,000			4,460,000
White Corpuscles	15,250	17,550	17,050	14,600	11,950
Hæmoglobin, Per cent.		80%			80%
Differential Count					
Small Mononuclears	15	23	15	13.5	20
Large Mononuclears	2		8.5	9.5	10
Transitionals		4	4	3.5	2
Polymorphonuclears	83	73	74.5	73.5	68
Eosinophiles		4	4	2	1
Neutrophiles	83	69	70.5	71	67
Basophiles			0	0.5	

BLOOD EXAMINATION FOLLOWING SPLENECTOMY, CASE III M.T. Private., Co. "L", 3rd M.R. Bn.

	July, 11, 1921.	July 14, 1921.	July 16, 1921.	July 18, 1921.
Red Corpuscles	4,450,000	3,740,000	4,280,000	4,130,000
White Corpuscles	14,300	35,150	19,050	13,350
Hæmoglobin, Per cent.	85	80	85	85
Differential Count				
Small Mononuclears	19	7	11	20
Large Mononuclears	4	0	4	1
Transitionals	6	3	10	18
Polymorphonuclears	70	90	75	64
Eosinophiles	6		4	2
Neutrophiles	65		70	62
Basophiles	0	0	1	0

	July 19, 1921.	July 23, 1921.	July 25, 1921.	Aug. 9, 1921.
Red Corpuscles	5,333,000	4,700,000	4,730,000	3,290,000
White Corpuscles	12,050	8,600	17,050	8,350
Hæmoglobin, Per cent.	85	85	85	85
Differential Count				
Small Mononuclears	25	27	18	32
Large Mononuclears	4	1	2	8
Transitionals	6	7	5	5
Polymorphonuclears	65	65	75	55
Eosinophiles	6	4	2	0
Neutrophiles	56	60	73	0
Basophiles	3	1	0	0

Commenting on the foregoing cases, it is interesting to note that two patients were twenty-one and one twenty-two years of age, young, healthy, robust soldiers. Without history of previous serious illness or injuries. Cases I and II were spontaneous ruptures and Case III followed trauma, but each showing symptoms of intra-abdominal hemorrhage, dizziness, faintness, shock, nausea and vomiting, some abdominal pain and tenderness, rigidity, marked in one case and slight in two, slight dulness in lower flank when turned on side, the tossing about of the patient, which is not present in ruptured bowel.

Each case was very restless and had what seems to us as almost a pathognomonic symptom, severe pain radiating to left shoulder, and in each

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instance the patient complained bitterly of this shoulder pain and when recovered from the anæsthetic remarked upon the relief of this left shoulder pain.

Case No. II, who had the dizzy and fainting spell, no doubt had a subcapsular hemorrhage sufficient to cause the faintness. Then he recovered from this and later from the intracapsular pressure, the capsule was ruptured and then he had his second spell of shock and revived by glucose injection sufficient for operation. In Volume I, *Sajous Analytic Cyclopedia of Practical Medicine*, he quotes that malarial spleens are more prone to laceration by trauma than healthy spleen. Very extensive lacerations may be followed by death before surgery can be employed.

Trendelenburg¹ states that vomiting is the most important guide to diagnosis of ruptured spleen, that simple contusion of the alimentary tract is rarely accompanied by vomiting. He further states that ruptured spleen is usually not diagnosed prior to laparotomy.

Watkins² states that the mortality following removal of a healthy spleen for rupture is 40 per cent., with the non-operative mortality probably 100 per cent.

Nystrom⁶ reports three cases in which intestinal paresis was a prominent symptom.

Ross in the *ANNALS OF SURGERY* for July, 1908, summarizes splenic ruptures found in the literature as follows: Of 220 cases unoperated, 17 recovered, giving a mortality of 92.3 per cent. of 67 cases operated, 38 recovered and 29 died, giving a mortality of 43.3 per cent. In two cases the splenic laceration was repaired, one died and one recovered. In the splenectomies 13 of the patients had complicating injuries, from which nine died.

Sajous states that splenic laceration or punctures of the spleen if unoperated are usually followed by abscesses, which are very difficult to heal. In the Civil War 93 per cent. of gunshot wounds of the spleen were fatal, while in the World War in eight cases reported by Duval mortality was as low as 37.5 per cent. In *Progressive Medicine*, June, 1920, four cases reported by Willis³ are quoted. One case complicated by cerebral concussion could not be operated upon, three of the patients complained of agonizing pain in the left shoulder, which was promptly relieved by splenectomy.

That several days may elapse before a ruptured spleen becomes manifest, due to the subcapsular hæmatoma, is conceded by all surgeons who have had these cases to treat.

One case of a spontaneous rupture of the spleen is reported by Shorten,⁴ in *British Medical Journal*, in which a soldier of the British army was seized by severe pain while walking about, sudden vomiting with rigidity, free fluid in the abdomen, no localized symptoms. Splenectomy was followed by recovery. Gangeli reports a case of apparent recovery from a ruptured spleen, who after nineteen days left the hospital and returned later with a sudden severe pain and died with an abdomen full of blood. Connors reports in the

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ANNALS OF SURGERY for July, 1921, a case of spontaneous rupture of the spleen, which at operation showed a large subcapsular hæmatoma, which ruptured on manipulation, showing deep rents in the parenchyma.

Nolan and Watson⁶ report on 30,000 malarial cases admitted to Colon Hospital in eight years; there were only three cases of spontaneous rupture of spleen.

Connor and Downes⁷ reported a spontaneous rupture of a typhoid spleen and were able to collect only twelve other cases.

Fauntleroy⁸ reports a case who experienced severe pain, left shoulder, and attaches great importance to this symptom, which was relieved by operation. This same symptom was reported as present in the case of Connor and Downes.

In each of our cases we have made careful blood studies, which show a considerable increase of the total leucocyte count following splenectomy, which persists with more or less irregularity for a period of one to two months. Case I was extensively studied with reference to the blood and leucocytes following splenectomy and reported by Major Milton W. Hall, in the *American Journal of Medical Sciences*, July, 1920. From the study of the three cases above reported and those reported by others, especially the four cases reported by Willis, the one by Fauntleroy and one by Connor and Downes the following conclusions are drawn:

1. That the healthy spleen may rupture spontaneously or by comparatively slight trauma.
2. That the symptoms at first may be slight, some dizziness, nausea or vomiting with restlessness and indefinite abdominal pains or we may have immediate symptoms of severe intra-abdominal hemorrhage depending on whether the capsule of the spleen has ruptured or remains intact, forming a large subcapsular hæmatoma.
3. That with our three cases, three of Willis', one of Fauntleroy's and one of Connor and Downes, an agonizing pain was experienced in the left shoulder, and we believe that if evidence of this radiating pain from the splenic region to the left shoulder can be elicited in any indefinite abdominal case with evidence of hemorrhage, that one may safely conclude that he has a ruptured or lacerated spleen to deal with.
4. That in view of the high mortality of unoperated cases, we believe that the only safe treatment is immediate splenectomy.

REFERENCES

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³ Willis: Surgery, Gynecology and Obstetrics, 1919.
⁴ Shorten: British Medical Journal, 1919, ii, 844.
⁵ Nystrom: Abstract, Journal A. M. A., 1917, xxii, 221.
⁶ Nolan and Watson: ANNALS OF SURGERY, 1913, lvii, 72-80.
⁷ Connor and Downes: American Journal Medical Service. 1914, clxvii, 322-344.
⁸ Fauntleroy: American Surgical, 1913, lvii, 68-71.