CASE REPORT

Laparoscopic Mesh Splenopexy (Sandwich Technique) for Wandering Spleen

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ABSTRACT

Background: Wandering spleen is a rare clinical condition caused by incomplete fusion of the 4 primary splenic ligaments, allowing the spleen to be mobile within the abdomen, predisposing to splenic torsion along the vascular pedicle leading to splenomegaly and infarction, often diagnosed in an emergency setting.

Methods: The wandering spleen diagnosis was achieved by ultrasound in our case. We successfully treated the patient with laparoscopic splenopexy because the size was almost normal, and no infarction or evidence of hypersplenism was present. We used the sandwich technique in which 2 meshes sandwich the spleen.

Results: This technique was found to be highly satisfactory as a treatment for wandering spleen. The patient was discharged on the third postoperative day with no intraoperative or postoperative complications.

Conclusion: Laparoscopy usually confirms the diagnosis. Recommended surgical procedures are splenopexy or splenectomy. Splenopexy is feasible, less invasive, and does not diminish splenic function.

Key Words: Splenoptosis, Pedicle torsion, Splenopexy, Sandwich technique.

INTRODUCTION

Wandering spleen (splenoptosis) is a rare congenital disorder; fewer than 500 cases have been reported in the literature. The incidence, based on several large series of splenectomies, is less than 0.5%.[1] A review of the literature from 1960 to 1992 by Dawson and Roberts[2] documented 148 cases, which included both pediatric and adult cases. Brown et al[3] reviewed the literature and identified an additional 127 cases of wandering spleens in patients younger than 21 years of age and with very different clinical presentations. The primary cause of splenoptosis is a fusion anomaly of the dorsal mesogastrium of the spleen that results in failure and laxity of its normal attachment to the diaphragm, retroperitoneum, and colon. These include the gastrosplenic, splenorenal, and phrenicocolic ligaments. With deficiency or laxity of these structures, the spleen is not confined to its normal posterolateral position in the left upper quadrant and becomes essentially a totally intraperitoneal hypermobile organ. It is relatively more common in children than in adults, and females with the anomaly outnumber males. Management is either splenectomy or splenopexy, laparoscopy being an attractive option.

METHODS

The patient was a 19-year-old female who presented with complaints of lower abdominal pain, dysuria, and fever for 7 days. She had no history of vomiting, hematuria, or increased frequency of micturition. Her bowel habits and vital signs were normal. Physical examination revealed a well-defined 7x8-cm intraperitoneal mass in the left iliac fossa that was mobile, firm in consistency, and tender.

Complete blood count revealed mild anemia and normal RBC and WBC counts. The platelet count, bleeding, clotting times, and a peripheral smear study were normal. In other words, no evidence was present of hypersplenism. Urine analysis including culture and sensitivity were within normal limits. Ultrasonography revealed the absence of a spleen in its normal anatomical position. Instead, the spleen was present in the left iliac fossa. Doppler study showed tortuous splenic vessels extending down into the left iliac fossa. No reduction in blood flow oc-

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curred. Upper GI endoscopy showed mild reflux esophagitis. The chest radiogram and ECG were normal. The patient was prepared and scheduled for laparoscopic mesh splenopexy with a possibility of splenectomy.

Operating Room Setup

During this procedure, the chief surgeon stands at the right of the patient; the camera surgeon stands to the right of the chief surgeon; the assistant for liver elevation stands to the left of the chief surgeon; the scrub nurse stands behind the camera surgeon. One monitor is to the left of the patient, diagonally opposite the chief surgeon on the caudal side, and one monitor is on the cranial side. This setup is convenient in that the caudal side monitor can be used for mobilizing the ectopic spleen and the cranial side monitor can be used for mesh fixation in the original position.

Patient Position

The patient is placed supine, with a 20° right lateral and Trendelenburg tilt. Once the spleen is brought to its original position, a reverse Trendelenburg position is applied.

Port Position

The optical 10-mm port is placed about 2cm above the umbilicus. A 5-mm port is placed in the epigastrium for liver elevation initially and later left-hand manipulation. A working port is placed in the left midclavicular trocar in the left lumbar area. A 10-mm port is inserted for initial maneuvering midline between the umbilicus and suprapubic area.

Procedure

At laparoscopy, a free-floating, macroscopically normal spleen attached to an abnormally long tortuous vascular pedicle with no gastrosplenic or phrenicosplenic ligaments was detected in the lower left quadrant **(Figure 1)**. There was a 4–1/2 clockwise torsion of the pedicle and mild congestion with a darkish color change in the spleen **(Figure 2)**.

The spleen and accessory spleens were located in the left side of the pelvic brim. The dissection was started by releasing the adhesions between the spleen and transverse colon and omentum by using a Harmonic scalpel (Ethicon, Cincinnati, OH). The torsion of the splenic pedicle was untwisted 4 and 1/2 turns in a counterclockwise direction. Up to this point, the monitor at the caudal end was used for visualization. For the rest of the procedure,

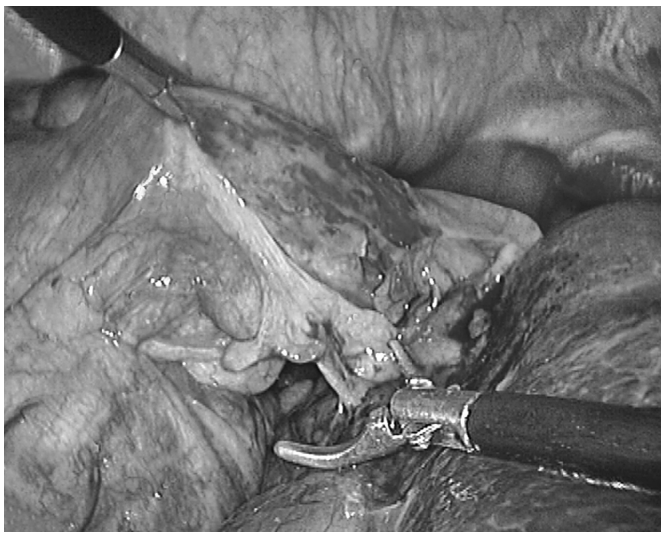

Figure 1. Spleen in left iliac fossa.

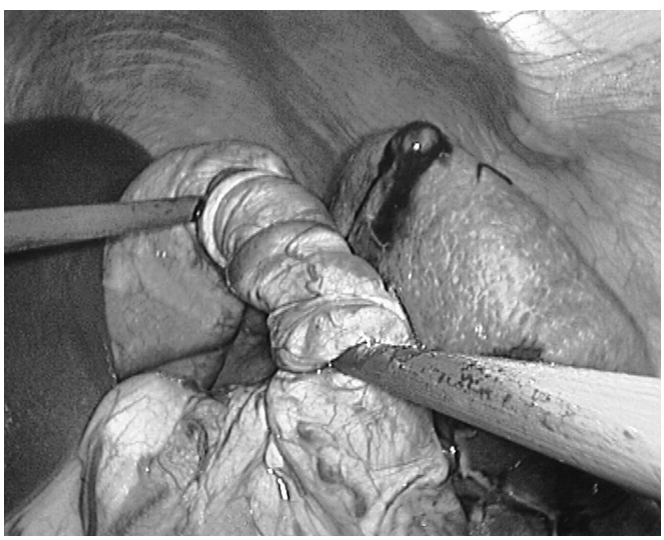

Figure 2. Torsion of the pedicle.

the monitor at the cranial end was used. The spleen and the splenic flexure were replaced in the left hypochondrium by gently moving them with atraumatic graspers. They were not actually grasped, but the shaft of the instruments were used **(Figure 3)**. The posterior peritoneum over the left kidney was opened, and a flap including peritoneum over the anterior abdominal wall was lifted up **(Figure 4)**. A 10x8-cm Parietex composite mesh (Sofradim, Trévoux, France) was sutured (with 2–0 Prolene) in place in the defect created by the lifting of the peritoneal flap **(Figure 5)**. Parietex is a composite mesh made of 3-dimensional multifiber polyester. It has 2 sides, 1 resorbable with a continuous, hydrophilic film (made of

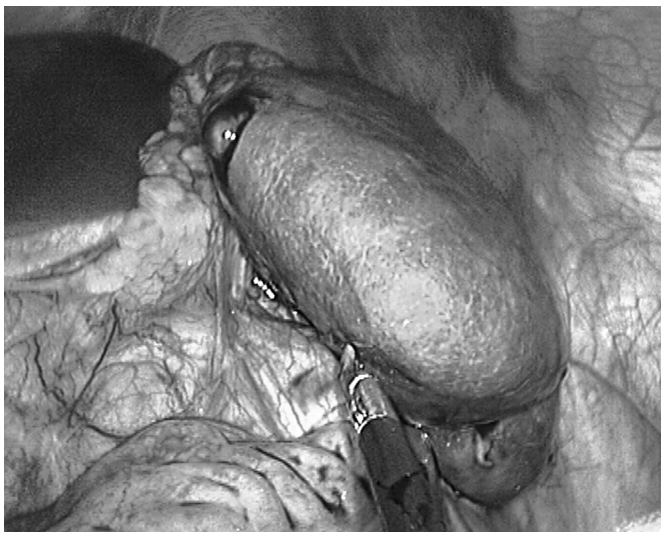

Figure 3. Replacing the spleen in the left hypochondrium.

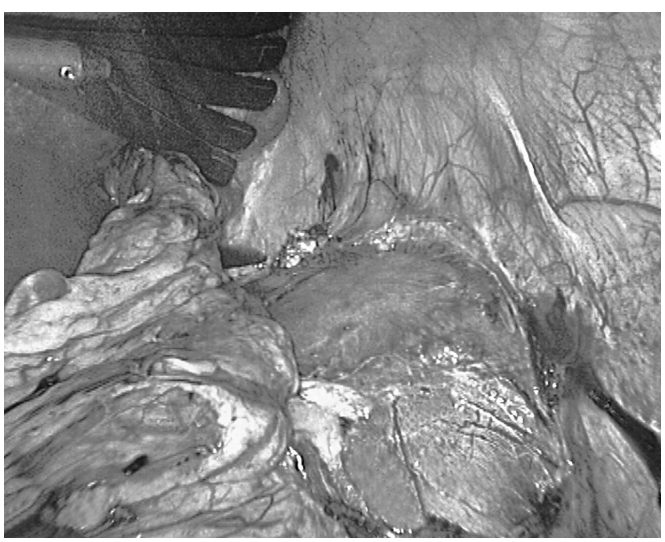

Figure 4. Creating raw area.

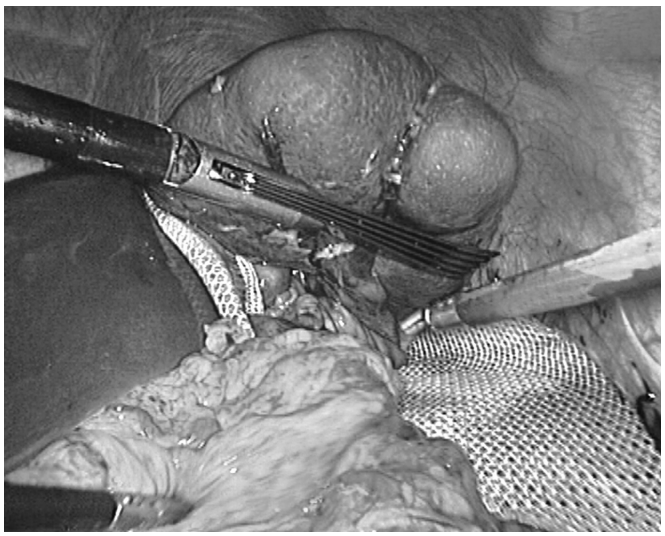

Figure 5. Placement of first mesh (Parietex).

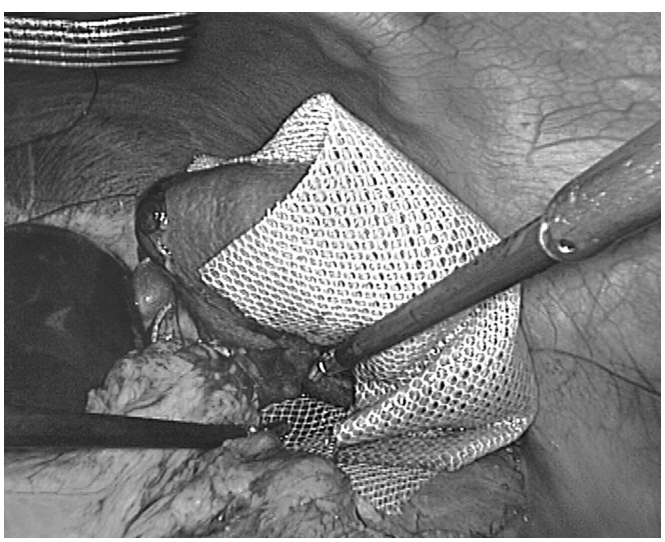

Figure 6. Wrapping the mesh around the spleen.

collagen, polyethylene glycol, and glycerol), and the other nonresorbable. The mesh is placed in such a way that the resorbable side faces outward so that it minimizes adhesions in case of direct contact with bowels. The resorbable side is smooth and continuous whereas the nonresorbable side is porous. Another Parietex mesh of similar size was placed over the first mesh and both were sutured together around the edges with 2–0 Prolene. Next, the spleen was placed in between the "sandwich" created by the 2 meshes **(Figure 6)**. The open end was sutured, thus preventing the organ from slipping out of the sandwich. Finally, the meshes were fixed to the diaphragm and lateral abdominal wall **(Figures 7 and 8)**. The ports were closed with 3–0 Vicryl.

RESULTS

No splenic infarction had occurred. Adhesions to the transverse colon and greater omentum were present. The splenic flexure was pulled down with the spleen. The spleen was multilobulated, and accessory spleens were apparent at the hilum. Oral liquids were allowed on the first postoperative day (POD) after the patient's bowels had moved. She consumed a normal diet on the second

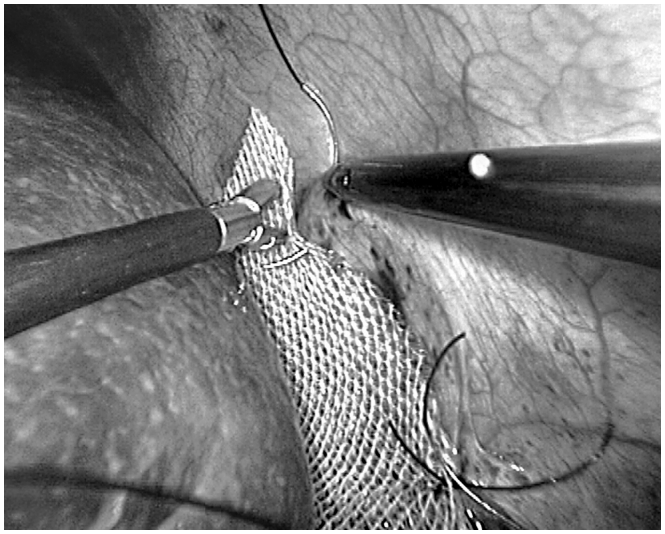

Figure 7. Fixing the mesh to the lateral wall.

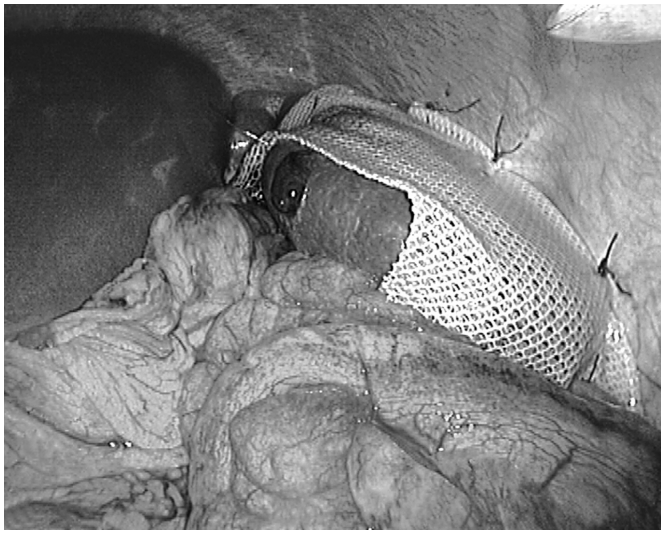

Figure 8. Spleen is sandwiched between 2. meshes.

POD. Thereafter, she was discharged on the third POD. Oral analgesia was begun on the second POD.

DISCUSSION

Wandering spleen is a rare disease that can remain asymptomatic for years. Torsion of its pedicle is what makes symptoms appear, but diagnosis is not easy. Clinical presentation can be acute or chronic. Buehner and Baker[4] conducted an extensive literature review and found 133 cases reported, of which 76 patients presented with a mass and nonspecific abdominal symptoms, 26 patients were asymptomatic, 25 presented with acute abdominal

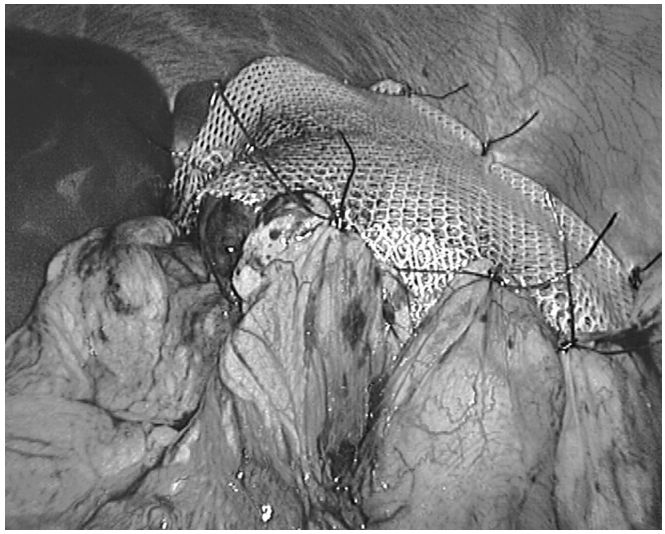

Figure 9. Completion of procedure.

pain, and another 6 had an asymptomatic mass. Mechanical factors resulting in urinary retention and constipation or symptoms due to pathological disturbances of the spleen, such as thrombocytopenia, hypersplenism, and lymphoma, have been described in the literature.[5] The subacute gastrointestinal complaints are the result of torsion of the pedicle, ischemia and splenic sequestration. About 50% of spleens are lost to acute ischemia from torsion.[5]

Torsion of the spleen, whether acute or chronic, with infarction can lead to the development of an acute abdomen. Venous drainage is compromised by torsion and arterial ligation becomes difficult, so edema and ischemia of the spleen appear. This causes pain because the spleen capsule is stretched due to its enlargement.[5] Rarely, splenoptosis may be complicated by occlusion of the celiac axis, possibly by median arcuate ligament compression.[6] This can be picked up by angiography. Ballui et al[7] reported a very rare case of a wandering spleen in a neonate that ruptured and presented as a perisplenic hematoma. Another rare case of torsion of a wandering spleen following blunt abdominal trauma has been reported.[8] Other complications are pancreatitis,[9] hypersplenism, cyst formation, and rarely gastric volvulus. An interesting case[9] with multiple problems was reported–wandering spleen associated with a gastric volvulus, gastric outlet obstruction due to extrinsic compression of the duodenum and partial small bowel obstruction due to extrinsic compression of a mobile, distended cecum that lay under the right diaphragm. Groszek-Terwei et al[10] also reported

a rare case where splenoptosis coexisted with gastric volvulus and torsion. The clinical diagnosis may be quite difficult, and hematological and biochemical investigations may be nonspecific but may occasionally reveal evidence of hypersplenism or functional asplenia.

Diagnosis needs a high index of suspicion and is achieved with imaging techniques (ultrasonography, nuclear scintigraphy, enhanced CT scanning and magnetic resonance imaging), some of which, especially in combination, are able to suggest it strongly. The gray-scale ultrasonograms will show a displaced spleen that appears as a homogeneous, hypoechoic mass suggestive of an enlarged, ectopic spleen.[11] Power Doppler sonograms will show no blood flow in the parenchyma or hilum of the spleen if torsion and infarction of the spleen have occurred.[12]

Plain radiogram of the abdomen is not very helpful.[13] Sulphur colloid scans can also show the abnormal location. CT shows displacement of the organ with enlargement if torsion with venous stasis is present. The diminished perfusion in arterial occlusive states is indicated by low density on contrast enhanced CT scan.[14]

Management consists of splenectomy for frank splenic infarct, or splenopexy for the viable spleens. Laparoscopic procedures have been used extensively for both splenectomy and splenopexy.[1] In the absence of infarction, thrombosis, hypersplenism and in patients presenting with an acute abdomen, detorsion and splenopexy is a recognized surgical option.[15–17] Different techniques for splenopexy have been described in the literature. Hirose et al[18] reported the first case of wandering spleen treated by laparoscopic mesh splenopexy in a 2-year-old child in 1998. Haj[19] and Cohen et al[20] reported on a wandering spleen treated in an adult for the first time with laparoscopic splenopexy using an absorbable (Vicryl) mesh. Splenopexy can be achieved by creating an extraperitoneal pocket or wrapping the spleen in absorbable mesh and anchoring it to the retroperitoneum (laparoscopic pocket splenopexy).[21] The extraperitoneal space is created by using an inflatable balloon device. With a 3-port approach, the spleen is introduced and fixated inside the created pocket. The ectopic spleen can also be inserted in a Vicryl mesh bag and fixed in the left upper quadrant.[22]

Nomura et al[17] described a laparoscopic sandwich technique using 2 sheets of mesh to wrap the spleen in its normal position. Peitgen et al[22] successfully performed another modification of splenopexy by laparoscopic reposition and fixation of the spleen by omental pouch creation. The spleen was repositioned and placed at a left phrenorenal angle. Splenopexy was achieved by suturing the left colophrenic ligament to the lateral diaphragm thus creating a pouch for the inferior part of the spleen and by suturing the gastrocolic ligament to the anterior diaphragm to create a pouch for the upper splenic pole.

Splenectomy has classically been the treatment of choice for symptomatic wandering spleen.[5] Nevertheless, the significant risk of postsplenectomy sepsis supports a conservative approach, especially in children, asymptomatic patients, or those with no splenic infarction.[24] Laparoscopic splenectomy is indicated in splenomegaly, hypersplenism, and torsion of the vascular pedicle with splenic infarction to avoid future complications like recurrent organ torsion resulting from the long, twisted vascular pedicle.[25]

Malignant involvement of a wandering spleen is even rarer, and we could find only 4 reports in the literature, all of malignant lymphomatous disease.[1,24] The dysuria was probably due to the irritation of the ectopic spleen on the ureter.

Complementary imaging examinations are very helpful and blood tests are usually nonspecific, unless hypersplenism is present. Final confirmation is normally reached by laparoscopy. Laparotomy and the laparoscopic approach are both perfectly valid options, although when a big specimen is found, laparoscopic extraction is done through a slightly extended port incision and fragmentation.

Surgery is the only definitive treatment for wandering spleen, and the decision to perform splenopexy versus splenectomy depends on the pre- and intraoperative findings of a viable spleen. Splenopexy should only be done in asymptomatic, small specimen cases with no evidence of hypersplenism. According to our research, only 11 cases of wandering spleen treated laparoscopically have been reported in the literature as of 2005.[24] Postoperative Doppler ultrasound followup can be done to confirm a well-fixated spleen in the left upper quadrant.

CONCLUSION

Laparoscopic splenopexy is definitely better than an open procedure because it causes less pain, and provides better cosmesis, early ambulation, faster recovery, reduction of postoperative stay, and wound complications, less overall morbidity, and sooner return to work.

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