Residual Splenic Function After Laparoscopic Splenectomy

A Clinical Concern

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Objective: To document the existence of residual splenic function after laparoscopic splenectomy in a series of 48 patients.

Design: A noncomparative descriptive case series.

Setting: A tertiary care center.

Patients: A series of 9 patients without clinical improvement after laparoscopic splenectomy of 48 consecutive patients undergoing laparoscopic splenectomy for several hematologic disorders after a mean follow-up of 16 months (range, 1-40 months).

Interventions: A computed tomographic scan and technetium Tc 99m sodium pertechnetate heat-damaged red blood cell scintigraphy were performed for patients with partial (platelet count <100×10⁹/L) or total (platelet count <50×10⁹/L) failure of improvement.

Main Outcome Measure: Evidence of residual splenic tissue by image diagnosis.

Results: The condition of 9 of the 48 patients failed to improve after laparoscopic splenectomy. Six patients experienced a total failure of improvement and 3 experienced a partial failure of improvement (1 patient had human immunodeficiency virus–related thrombocytopenia and 8 had idiopathic thrombocytopenic purpura). Three patients had residual splenic function, which was revealed by scintigraphy. The results of a computed tomographic scan showed an accessory spleen in one patient and splenic implants in splenic fossa in another patient.

Conclusion: Laparoscopic splenectomy has a promising role in the management of hematologic diseases requiring splenectomy, but it requires exquisite care to avoid parenchymal rupture and cell spillage and to avoid leaving accessory spleens, which can lead to the failure of surgical treatment.

Arch Surg. 1998;133:56-60

Laparoscopic splenectomy (LS) has become a useful alternative to open splenectomy, offering the advantages (less pain and fewer scars) of laparoscopic surgery.¹ ² However, there is no wide experience with this technically demanding operation; as with other laparoscopic procedures, new clinical situations appear after the application of laparoscopic techniques. Clinical success after splenectomy is related to the complete removal of splenic tissue. However, there are some theoretical risks during laparoscopy of inducing splenic tissue spillage or of leaving unidentified accessory spleens (ASs). It is well known that splenic tissue can implant and grow into the peritoneal cavity.³ ⁵ However, manipulation and retrieval of solid organs during laparoscopy can be difficult; also, the intra-abdominal bag can break during spleen morcellation, with a risk of splenic tissue spillage.⁶ Accessory spleens are present in more than 15% of the population; if they are left or not identified, they can induce relapsing disease.⁷ ¹² Some previous reports have suggested a more difficult identification of ASs during LS.¹³ ¹⁴ This article documents residual splenic function in 3 patients of a series of 48 patients in whom LS was performed.

RESULTS

Between February 1992 and October 1996, 48 LSs were performed. The demographic and operative variables can be
PATIENTS AND METHODS

Between February 1992 and October 1996, 48 consecutive patients with a wide range of hematologic diseases requiring splenectomy underwent a laparoscopic approach; the clinical data and technical details were prospectively recorded. Laparoscopic splenectomy was performed via an anterior approach in 13 patients and via a lateral approach in the remaining 35 patients. Both techniques have been previously described elsewhere. In all cases, ASs were sought routinely after opening the omental pouch. The spleen was retrieved in a bag or, in selected cases, through an accessory incision to obtain an intact organ or because of the size of the spleen. Early and late responses to splenectomy were assessed with clinical and analytic examinations. The conditions of patients in whom there was a late failure to improve after LS were reevaluated with technetium Tc 99m sodium pertechnetate heat-damaged red blood cell scintigraphy (LFOV 609 γ camera, high-resolution collimator, Elscint, Haifa, Israel) and computed tomographic (CT) scanning.

Early failure is defined as the inability to normalize the platelet count during the first week after LS. Late failure is defined as the decline of the platelet count below 100 x 10^9/L (partial failure) or below 50 x 10^9/L (complete failure) after a transient increase (>200 x 10^9/L).

summarized as follows (all data are given as the number of patients unless otherwise specified):

<table>
<thead>
<tr>
<th>Variable</th>
<th>No. of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>48</td>
</tr>
<tr>
<td>Age, y*</td>
<td>36±15</td>
</tr>
<tr>
<td>Sex</td>
<td>18 M and 30 F</td>
</tr>
<tr>
<td>Hematologic diagnosis</td>
<td></td>
</tr>
<tr>
<td>Thrombocytopenia</td>
<td>32†</td>
</tr>
<tr>
<td>Spherocytosis</td>
<td>7</td>
</tr>
<tr>
<td>Hemolytic autoimmune anemia</td>
<td>4</td>
</tr>
<tr>
<td>Other‡</td>
<td>7</td>
</tr>
<tr>
<td>Operative time, min*</td>
<td>177±64</td>
</tr>
<tr>
<td>Operative position</td>
<td>13 Anterior and 35 Lateral</td>
</tr>
<tr>
<td>Conversion, %</td>
<td>6</td>
</tr>
<tr>
<td>Accessory incision</td>
<td>7</td>
</tr>
<tr>
<td>Platelet count, ×10^9/L</td>
<td></td>
</tr>
<tr>
<td>Preoperative</td>
<td>76±78</td>
</tr>
<tr>
<td>Immediate postoperative</td>
<td>239±162</td>
</tr>
<tr>
<td>Long-term postoperative</td>
<td>214±114</td>
</tr>
</tbody>
</table>

*Data are given as the mean (±SD).
†Twenty-seven patients had idiopathic thrombocytopenic purpura, and 5 had human immunodeficiency virus–related thrombocytopenia.
‡Other indicates unknown origin splenomegaly, splenic tumor, myelofibrosis, chronic lymphatic leukemia, and refractory anemia.

The platelet count of the 32 patients in whom an LS was performed for the treatment of autoimmune thrombocytopenia ranged between 5 x 10^9/L and 10 x 10^9/L. Laparoscopic splenectomy was accomplished in 45 (94%) of the 48 patients. Conversion was required in 2 patients because of the difficulty in handling the spleen and because of diffuse ooze (in one patient with idiopathic thrombocytopenic purpura and in one patient with human immunodeficiency virus–related thrombocytopenia); conversion was required in a third patient with massive splenomegaly (>3500 g) because of the difficulties in controlling the splenic vein. Accessory spleens were found in 6 (12.5%) of the 48 patients. Five of them were easily located close to the inferior pole of the spleen or next to the great curvature; however, one, corresponding to one of the converted cases (massive splenomegaly for spherocytosis), was found in the mesocolon, only felt by palpation, and completely hidden from view.

The spleen was extracted through a bag in 38 patients, and a laparotomy was performed in 7 patients. Accidental perforation of the bag occurred in 4 cases, but all the spleen pieces were recovered.

The platelet count normalized within 48 hours of the operation in 29 of the 32 patients with a low platelet count.

After a mean follow-up of 18 months, the hematologic status of 39 (81%) of the 48 patients improved; however, 9 patients had a low platelet count (1 patient with human immunodeficiency virus–related thrombocytopenia and 8 patients with idiopathic thrombocytopenic purpura). There were 6 total failures and 3 partial failures. All 9 patients were assessed with scintigraphy and CT scanning. Scintigraphy showed residual splenic function in 3 patients with idiopathic thrombocytopenic purpura (Figure 1 through Figure 3 and Table 1). Two corresponded to a hot-spotted image that the CT scan confirmed as an AS. In one of these patients, another AS had been retrieved during a former LS. The residual spleen was located in a pararenal area. Scintigraphy showed multiple images in the splenic fossa in a third patient; a CT scan confirmed these images as implants. This patient was one of the patients converted to open surgery because of the difficulty in handling the spleen during LS. A previous rupture of the bag did not occur during spleen retrieval in any of these patients. The platelet counts in 2 of these patients were between 70 x 10^9/L and 100 x 10^9/L without associated treatment; an observation policy was established for these patients. The third patient refused further explorations or surgery.

COMMENT

Advances in laparoscopic surgical techniques have favored a laparoscopic approach for splenectomy. However, surgical laparoscopy entails different features from open surgery. After the wide application of laparoscopy in other intra-abdominal surgical diseases, which include the treatment of known (colon) or unsuspected (gallbladder) tumors, a higher incidence of early recurrence has been observed at the site ports or at the site of abdominal dissemination. Some recent experimental studies suggest that the pneumoperitoneum is able to disseminate free abdominal malignant cells. It is well known from experimental and clinical studies that spleen tissue possesses a great facility to...
implant, even when it is removed after trauma. Lapa-
roscopic splenectomy is a technically demanding proce-
dure associated with a notably longer operative time
than open splenectomy. The spleen parenchyma is frail;
during LS, the spleen is mobilized and tears or paren-
chymal bleeding can occur. There may be a theoretical
high risk of splenosis. One of the patients (patient 2)
described in this series had several implants in the
splenic fossa. These implants may have been secondary
to rupture of the spleen capsula, although the patient
was converted to open surgery and major breaches were
not observed. Another situation in which spleen tissue
can be spilled is during morcellation and retrieval if the
bag is broken; however, none of the 4 patients in whom
the bag was broken had residual splenic tissue.

Accessory spleens are frequently observed (10%-
30%), and the incidence in open series is higher than that
reported in laparoscopic series (Table 2). Accessory
spleens can be located in many sites (splenic hilum to
scrotum) and are sometimes surrounded by fatty
tissue that impairs their visualization. When left in situ,
they can prevent the resolution of hematoLogic disease,
mainly in patients with autoimmune thrombocytope-
nia. Gigot et al described the increased difficulty in
locating such accessory organs after the impossibility of
finding an AS previously demonstrated by CT scanning.
The experience in our series shows that ASs were not iden-
and removal has been reported. In our patients, be-
cal response of 20% to 60%; laparoscopic identification
of ASs to be identified. The use of perioperative lapa-
roscopic ultrasonography has been proposed, but its
value is unknown. Another point from the practical
point of view could be preoperative identification by a
real-time procedure. The technique that LS proposes
has the drawback that it does not permit the existence
of the endostapler without opening the omental pouch,
which is then excised with several applications
of the stapler.

The next step is to explore the large curvature of the
stomach. Then, the omental pouch should be opened
leaving ASs, which can induce the failure of surgical
management of hematologic diseases requiring
spleenectomy, but it requires exquisite care to avoid
parenchymal rupture and cell spillage and to avoid
leaving ASs, which can induce the failure of surgical
treatment.

This study was supported by grant 97/760 from the Fondo
de Investigaciones Sanitarias, Madrid, Spain.

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