POSTSPLENECTOMY PULMONARY RESECTION: RISK FACTORS FOR AN AVOIDABLE COMPLICATION

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ABSTRACT
In our locality, splenectomy is frequently done for bilharziasis and its complications. It can be done as isolated operation or in conjunction with devascularization. Over a period of 20 years ending in December 2000, fifty-three patients were submitted for left pulmonary resections due to postsplenectomy complications in the Department of Cardio-Thoracic Surgery at Mansoura University Hospitals. Thirty-two patients (60.4%) were males and 21 (39.6%) were females. Their ages range from 18 to 46 years (mean 34.9 ± 6.5 years).

Splenectomy was done for all patients because of bilharziasis. All patients had postsplenectomy subphrenic collection and in 42 of them (79.2%) the abscess was improperly managed. The elapsed time between splenectomy and start of respiratory symptoms ranged from 9 months to 13 years (mean 4.8 ± 2.9 years). The main respiratory presentations were productive cough with occasional hemoptysis that occurred in 23 patients (43.4%), suppurative syndrome in 18 (34%), and recurrent hemoptysis in 12 patients (22.6%). Radiological examination revealed bronchiectatic changed affecting the left lower lobe in 34 patients (64.2%) for whom lobectomy was done. The left lower lobe with the lingulae were affected in 19 patients (35.8%), 18 of them underwent lower lobectomy and lingulectomy, and in one patient left pneumonectomy was done because of massive vascular adhesions and accidental pulmonary vascular injury. Foreign bodies were found in 20 cases (37.7%) in the form of abdominal towels in 2, corrugated rubber drain in...
Splenectomy is an operation with significant postoperative complications. Respiratory complications affect 10% to 48% of patients after open splenectomy in the form of atelectasis in 15%, pleural effusion in 11%, and pneumonia in 7-13% (4). Other complications include subphrenic abscess in 4-8% (5,6), wound problems in 3-6% (7,8), ileus and small bowel obstruction in 1-10% (8), fever (4), thromboembolism in 2-11% (4,6), splenosis in 48-66% (9), and overwhelming postsplenectomy infection in 4% (10). Laparoscopic splenectomy almost has the same complications (11).

One of the late complications of splenectomy is the neglected prolonged infection in the subphrenic space, which spread superiorly leading to bronchiectatic changes and destruction of the left lower lobe. As far as we know no previous studies discussed this problem except one report from our department published in the last decade (12). The aim of this study is to review the results of our experience with postsplenectomy pulmonary resection. In addition a comparative study was done between patients and control group in a trial to reveal the risk factors of developing this problem and how to avoid it.

**PATIENTS AND METHODS**

Over a period of 20 years ending in December 2000, 53 patients underwent left lung resection for destroyed lung tissue as a late complication of splenectomy in the Department of Cardio-Thoracic Surgery at Mansoura University Hospitals. Thirty-two patients were males and 21 were females. Their ages range from 18 to 46 years (mean 34.9 ± 6.5 years).

All patients had previous splenectomy and all of them had postsplenectomy subphrenic collection and recurrent attacks of fever. The elapsed time between the operation and start of the respiratory symptoms was ranging from 9 months to 13 years (mean 4.8 ± 2.9 years).

All patients were submitted for careful history taking regarding the previous splenectomy, postoperative fever and methods of drainage of subphrenic collection if already done. Full chest examination and preoperative investigations necessary for diagnosis of the chest problem were done. Bronchoscopy was done as a routine for all patients to exclude other causes of bronchiectasis or lobar collapse.
nectomy complications over the last 20 years ending in December 2000. Thirty-two patients (60.4%) were males and 21 (39.6%) were females. Their ages range from 18 to 46 years (mean 34.9 ± 6.5 years).

All patients developed respiratory symptoms after an elapsed period ranging from 9 months to 13 years (mean 4.8 ± 2.9 years) after splenectomy. Respiratory symptoms include productive cough with occasional hemoptysis in 23 patients (43.4%), suppurative syndrome in 18 (34%), and hemoptysis in 12 (22.6%). The lapse period between beginning of respiratory symptoms and referral for thoracic surgery ranged from 3 months to 2 years (mean 10 ± 3.1 months).

Chest x-rays in the form of posteroanterior and left lateral views were done for all patients, bronchography was done for 21 of the early cases in this study, and CT scan was done for 32 cases. Radiological examination of the chest revealed in addition to bronchiecstatic changes (Fig 1&2) which was present in all patients, abscess cavities in 3 patients (5.7%), and chronic lung collapse in 15 (28.3%).

Abdominal ultrasound was done for all patients and revealed amalgamation of the subphrenic space in 38 patients (71.7%), and subphrenic abscess (Fig. 3) in 15 patients (28.3%). Associated colonic fistula was present in 3 patients (5.7%), gastric fistula in one (1.9%) as proved by contrast studies. Barium studies proved the presence of cecal fistula in 3 (5.7%) of our patients, and gastric fistula in one (1.9%)

Sinogram was done for 7 patients (13.2%) who presented with abdominal wall sinus and revealed the presence of communication between the subphrenic space and bronchial tree of the left lower lobe in 3 patients (Fig 4), while demonstrated the presence of subphrenic abscess in 4 patients.

In 34 patients (64.2%) the bronchiecstatic changes affected the left lower lobe and required left lower lobectomy, and the lingula was affected with the lower lobe in 19 patients (35.8%) who underwent left lower lobectomy and lingulectomy except one. Only in one patient (1.9%) the plane was to resect the bronchiecstatic left lower lobe and lingulae but because of massive adhesions and pulmonary vascular injury the decision
Table 1. Complications of postsplenectomy pulmonary resection.

<table>
<thead>
<tr>
<th>Complication</th>
<th>Number (15)</th>
<th>Percent (28.3%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraoperative bleeding</td>
<td>4</td>
<td>7.5%</td>
</tr>
<tr>
<td>Pulmonary vascular injury</td>
<td>1</td>
<td>1.9%</td>
</tr>
<tr>
<td>Rethoracotomy for bleeding</td>
<td>2</td>
<td>3.8%</td>
</tr>
<tr>
<td>Hematemesis</td>
<td>1</td>
<td>1.9%</td>
</tr>
<tr>
<td>Empyema</td>
<td>2</td>
<td>3.8%</td>
</tr>
<tr>
<td>Wound infection</td>
<td>5</td>
<td>9.4%</td>
</tr>
</tbody>
</table>

Table 2. Comparative study between patients and control.

<table>
<thead>
<tr>
<th>Factor</th>
<th>Patients (N=53)</th>
<th>Control (N=53)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age (years)</td>
<td>34.9 ± 6.5</td>
<td>34.3 ± 4.5</td>
<td>N.S.</td>
</tr>
<tr>
<td>Sex (male to female ratio)</td>
<td>32/21</td>
<td>33/20</td>
<td>N.S.</td>
</tr>
<tr>
<td>Indication of splenectomy (hypersplenism/devascularization)</td>
<td>46/7</td>
<td>44/9</td>
<td>N.S.</td>
</tr>
<tr>
<td>Mean time from operation (years)</td>
<td>4.8 ± 2.9</td>
<td>4.9 ± 2.6</td>
<td>N.S.</td>
</tr>
<tr>
<td>Postsplenectomy subphrenic abscess (prolonged fever)</td>
<td>53 (100%)</td>
<td>6 (11.3%)</td>
<td>0.000001</td>
</tr>
<tr>
<td>Delayed drainage of the abscess</td>
<td>42 (79.2%)</td>
<td>0 (0%)</td>
<td>0.0002</td>
</tr>
<tr>
<td>Operating place (peripheral small clinic)</td>
<td>32 (60.4%)</td>
<td>10 (18.9%)</td>
<td>0.001</td>
</tr>
</tbody>
</table>

N: Number of patients, P < 0.05 considered significant.
NS: Nonsignificant.
DISCUSSION

Pleural effusions often occur in response to sterile or infectious inflammation below the diaphragm (13). Postsplenectomy subphrenic abscess result from a bacterial infection below the diaphragm, but the symptomatic pleural effusion is usually sterile. The effusion becomes a thoracic empyema in only 15 to 20% of patients and is then secondary to necrosis of the diaphragm (14). Many cases with these early postsplenectomy complications were treated in our Department either by thoracocentesis or thoracostomy tube drainage with underwater seal. To avoid contamination of the pleural cavity the chest should not be entered during surgical drainage of the intraabdominal collection, and if tube thoracotomy is necessary to control the effusion, it should be placed some distance from the abdominal incision.

In this study we are presenting the problem of late postsplenectomy left lung bronchiectasis requiring left pulmonary resection. Some of the general surgeons, who did splenectomy, are not aware about this complication because patients lose contact with them by time. Moreover, most of these patients were referred to our Department from the chest physicians because of their chest problem.

Most of the authors described the early postoperative pulmonary complications in the form of left lower lobe atelectasis and pneumonia (4). Moreover, most of those who discussed the late infection after splenectomy, concentrated their work on children who had splenectomy done for hematological disease or trauma and attributed the late infection to the underdeveloped immune mechanism. Many studies have attempted to define the immunologic role of the spleen. It is apparent that the spleen is the major site of early IgM production and is important in the production of opsonins, particularly properdin. Asplenic patients have been found to have abnormalities of cell-mediated immunity as well (15). The reported incidence of severe late postsplenectomy infection varies considerably in the literature (16,17). Also differences exist as to what constitutes late postsplenectomy infection: miliary tuberculosis (18), osteomyelitis, rheumatic fever, respiratory tract infections (19), peritonitis (20), late wound infections (21), intraabdominal abscesses, Herpes zoster (21), and pyrexia of unknown origin (23) have been included.
drainage of the subphrenic space actually increases the incidence of subphrenic abscess (28).

Splenectomy performed as a single elective intraabdominal procedure should be followed by a very low incidence of subphrenic abscess of about 1% (29). If a subphrenic abscess developed the diagnosis should be suspected when there are signs and symptoms of inflammatory process in addition to tenderness either anteriorly or over the last rib posteriorly with elevation of the left hemidiaphragm in chest x-ray. Abdominal ultrasound has been the most valuable technique for early diagnosis of subphrenic abscess. CT scan of the abdomen could be done to confirm the diagnosis.

Once the diagnosis of subphrenic abscess is confirmed, the treatment is drainage. Approaches to drain the abscess include the posterior approach through the bed of the twelfth rib, lateral extraperitoneal approach, or anterior transabdominal approach. The decision concerning the proper approach depends on the localization site of the abscess cavity. In our series there was a reluctance to drain the subphrenic abscess early in 34 patients (64.2%), in whom there were no scars of previous drainage. Moreover, although there were abdominal scars of previous drainage of the abscess in 19 patients (35.8%), the sequelae of the abscess continued which may be attributed to the insufficient drainage and/or the presence of infected foreign body.

Abdominal ultrasound was done to all patients in this study and showed either loculated subphrenic collection with very thick wall in 28.3% or organized amalgamated subphrenic area in 71.7% which again assures the reluctance in early drainage of the subphrenic abscess or its insufficient drainage.

Another problem of delayed insufficient drainage of the subphrenic abscess is erosion of the adjacent structures with fistulae formation. Postsplenectomy abscess leading to gastric perforation has been reported (30,31). Barium studies proved the presence of colonic fistula in 3 (5.7%) of our patients, and gastric fistula in one (1.9%).

Pulmonary resection after splenectomy is a difficult surgery due to the extensive vascular adhesions to the

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صدأ في مريضين بإصابات بجرح العملية في 5 مرضى.

وتم مقارنة هؤلاء المرضى مع مجموعة مماثلة من أجريت لهم عمليات استخدام الطحال مسبقا ولم يصابوا بمشكاة رئوية للفوتو على أسباب تفاوت الحالة إلى حد الحاجة للاستعمالات الرئوية.

وأظهرت المقارنة أن إجراء استخدام الطحال في مستشفى فرعى وظهرت النتيجة تحت الجبج الحاجز بعد العملية، والتأخير أو عدم تصنيف هذا التشخيص على وجه السرعة كأنه أهم الأسوبا التي تؤدي إلى ظهور هذه المشكلة حيث كانت هذه الأسوبا ذات دلالات إحصائية مهمة.

وستخلص من البحث أن عمليات الاستعمال الرئوية بسبب المضاعفات المتأخرة بعد عمليات استخدام الطحال هي عمليات صعبة وترتبط بنسبة غير قليلة من المضاعفات والوفيات. ويمكن تجنب هذه المشكلة بمراعاة الدقة عند إجراء عملية استخدام الطحال وتوقيع حدوث التقيحات تحت الجبج الحاجز بعد هذه العملية وتصريف هذه التشخيص أن تحدث على وجه السرعة.