Splenectomy in Myeloid Metaplasia

By Murray N. Silverstein and William H. ReMine

Between 1960 and 1977, 50 patients with myeloid metaplasia were splenectomized. Twenty-five of 26 patients with painful splenomegaly, 4 of 9 patients with refractory hemolytic anemia, 4 of 10 patients with refractory thrombocytopenia, and 4 of 4 patients with portal hypertension showed significant benefit from the procedure. There were five immediate postoperative deaths. Four of these deaths occurred early in our series of splenectomies for myeloid metaplasia before 1970. Only one death has occurred in the last 21 patients operated on. Survival following splenectomy averaged 25.5 mo.

AGNOGENIC MYELOID METAPLASIA (AMM) is a chronic myeloproliferative disease with apparent close interrelationships with polycythemia rubra vera, hemorrhagic thrombocythemia and chronic granulocytic leukemia. Our group published early observations on the role of splenectomy in AMM, and we summarized our experience with this procedure during the years 1960–1970. The purpose of this communication is to present an exegesis on splenectomy in AMM in all patients who have undergone this procedure at our institution from 1960 through 1977.

From 1960 to 1977, 385 patients with AMM were seen at our institution. Fifty patients in whom splenectomy was performed form the basis of this report. The diagnosis of AMM was established in each patient by the following criteria: (1) the presence of splenomegaly, (2) a leukoerythroblastic blood picture, (3) significant teardrop poikilocytosis on peripheral blood smear, and (4) some degree of demonstrable fibrosis on bone marrow biopsy.

There were 24 males and 26 females in this series. The mean age at the time of splenectomy for the entire group of patients was 57 yr. The range of ages at which the procedure was carried out was 36–79 yr. Table 1 shows the indications for and the responses to splenectomy. A patient was considered a responder on the basis of the following criteria. If the indication for splenomegaly was painful splenectomy, the pain disappeared. If the indication for splenectomy was refractory thrombocytopenia, the platelet count rose above 100,000 platelets/cu mm and there was complete disappearance of bleeding. If the indication for splenectomy was refractory hemolytic anemia, the hemoglobin rose above 12 g/dl and remained such without ancillary transfusion. If the indication for splenectomy was portal hypertension, the stigmata of portal hypertension including esophageal varices or ascites disappeared.

Complications immediately following surgery for the entire group are listed in Table 2. Of the 14 patients who experienced hemorrhage, 8 patients required reoperation with further hemostatic control and evacuation of clots. Six patients...
Table 1. Indications and Responses to Splenectomy

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<thead>
<tr>
<th>Indication</th>
<th>No. of Patients</th>
<th>No. of Responders</th>
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<tbody>
<tr>
<td>Painful splenomegaly</td>
<td>26</td>
<td>25</td>
</tr>
<tr>
<td>Refractory thrombocytopenia</td>
<td>10</td>
<td>4</td>
</tr>
<tr>
<td>Refractory hemolytic anemia</td>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td>Portal hypertension</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Indeterminant splenomegaly</td>
<td>1</td>
<td>1</td>
</tr>
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</table>

had spontaneous subsidence of hemorrhage with conservative management by the use of platelet transfusions and fresh whole-blood replacement.

Five patients developed septicemia postoperatively. In four instances the organism was *Escherichia coli* and in one instance *Proteus*. All septicemias were controlled with appropriate antibiotics. Two of these 5 patients required subsequent evacuation of subphrenic abscess collections.

Five patients died in the immediate postoperative period. The immediate postoperative period is defined as within 30 days of surgery. Four of these patients died before 1970. Three patients died from uncontrollable hemorrhage, and 2 patients died from shock associated with mixed bacteremia. Those patients who died of uncontrollable hemorrhage were patients operated on early in our experience with AMM. We strongly suspect that the cause of death related to disseminated intravascular coagulation prior to recognition of this state. Two patients died from shock associated with mixed bacteremia. In 1 patient the mixed bacteremia was a result of *Staphylococcus aureus* and *Klebsiella*. In the other patient the mixed bacteremia was due to *E. coli* and enterococci. Since 1970 only 1 of 21 patients has died in the immediate postoperative period. This patient died of bacteremic shock.

Table 3 lists survival data for the overall group as well as the causes of death in the 45 deceased patients. At the time of this writing, 5 patients are living at 12, 36, 48, 48, and 108 mo following the procedure.

DISCUSSION

Scattered series relating to splenectomy in AMM have been published. In 1974 our group described a 10-yr study of splenectomy in patients with AMM and pointed out the benefits of the procedure, especially in females. Our present data demonstrate 25.5-mo survival for patients in whom splenectomy was performed. We have carefully selected our patients for splenectomy, emphasizing the need for a qualified surgeon with much experience in this area to perform the splenectomy. We have further felt that it is mandatory that all patients have a full coagulation survey prior to surgery. We have urged and continue to suggest that all patients with a profile of "inapparent" DIC, that is, low platelet counts with associated low levels of factors V and VIII and high levels of fibrin split products, absolutely not

Table 2. Immediate Complications of Surgery

<table>
<thead>
<tr>
<th>Complication</th>
<th>No. of Patients</th>
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<tbody>
<tr>
<td>Hemorrhage</td>
<td>14</td>
</tr>
<tr>
<td>Septicemia</td>
<td>5</td>
</tr>
<tr>
<td>Immediate postoperative deaths</td>
<td>5</td>
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</table>
have surgery. The reason we use the word *inapparent* is that about 12% of patients with AMM have this coagulation profile and are not clinically bleeding.

Our previous data suggested that radiation therapy or alkylating agents were effective in ameliorating mechanical splenomegaly, with subsequent decrease in pain or pressure in approximately 66% of patients so treated. However, the effects of both alkylating agents and radiation therapy have been regrettably short-lived in that our patients have usually experienced return of their symptoms accompanied by massive splenomegaly 3–4 mo after conclusion of either radiation therapy or alkylating agents. The present data would suggest that any patient with a huge painful spleen who has no significant coagulation problems may be a prime candidate for splenectomy.

No data exist in the literature describing the influence of splenectomy in patient with refractory thrombocytopenia complicating AMM. Our present study would suggest that about 50% of patients with this horrendous problem may be benefited by the procedure.

Again, no data exist regarding refractory hemolytic anemia and the effects of splenectomy on this event in patients with AMM. Since 4 of our 9 patients with this very difficult problem did respond to splenectomy, we feel encouraged for the further use of the procedure in this situation.

We are very encouraged about the responses of our patients with portal hypertension to splenectomy. Medical treatment of patients with portal hypertension and esophageal varices who have previously bled has been quite discouraging, with death usually occurring within 6 mo of the bleeding. In 3 of our 4 patients with portal hypertension, splenectomy alone cured the esophageal varices. We would consider it mandatory to check portal dynamics in patients with AMM who are undergoing decompression surgery. If increased hepatic wedge pressure can all be accounted for on the basis of a tremendous increase in blood flow from the spleen, as occurred in 3 of our patients, then splenectomy alone is the procedure of choice. In these 3 patients splenectomy produced a marked reduction in portal blood
flow, a subsequent drop in portal pressure, and disappearance of the varices. Our other patient with portal hypertension had an elevated hepatic wedge pressure that could not be all accounted for on the basis of flow. This patient had a splenorenal shunt, with an acceptable response.

A question arises regarding development of massive compensatory hepatic myeloid metaplasia following splenectomy. Of the 50 patients in this study, this event occurred in only 6 patients. We were unable to discern from any single parameter, either physical examination or laboratory data, any element that could preoperatively predict the development of this serious problem.

It appears on balance from our study that there exists a definitive role for splenectomy in patients with AMM. Significant survival and amelioration of the serious problems of mechanical splenomegaly, refractory hemolytic anemia, refractory thrombocytopenia, and life-threatening portal hypertension can be provided for patients by this procedure. Obviously the role of splenectomy needs to be prospectively tested against other medical forms of therapy for these various problems. Currently, in the National Polycythemia Vera Study Group, studies are under way to further define the role of splenectomy in patients with AMM.

REFERENCES
Splenectomy in myeloid metaplasia

MN Silverstein and WH ReMine