# Evaluation of Treatment Results of Patients Treated with Splenectomy due to Hematological Cancer

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## Abstract

Purpose: Hematological disorders are the most common indications for performing splenectomy after trauma in adults. The aim of this study is to investigate the treatment outcomes of splenectomy in hematological malignancy patients who were operated between the years 1998 and 2009.

Patients and Methods: We analyzed the patients' clinical characteristics, type of surgical treatment, preoperative and postoperative medical treatments, complications and thrombocyte responses, retrospectively.

Results: Seventeen male and 13 female patients, with a mean age of 50.7 (17-79), underwent splenectomy due to following indications: Hodgkin lymphoma (n=10), Non Hodgkin lymphoma (n=12), Chronic Lymphocytic lymphoma (n=5), MALT lymphoma (n=2) and Hairy Cell Leukemia (n=1). The indications for surgery was splenomegaly and its complications (n=20), gastric obstruction (n= 5), diagnosis splenic mass (n=3), major bleeding (n=1) and abscess (n=1). Complications related to surgery occurred in 10 patients: pneumonia (n=6), bleeding (n=2), abscess (n=1) and sepsis (n=1). Early 30-day mortality was observed in two cases. During the follow-up period, platelet value revealed response in 19 (63.3 %), partial response in 8 (26.7 %) and unresponsive in 3 (10 %) patients due to splenectomy.

Conclusion: In conclusion; for hematological diseases, thrombocytopenia, massive splenomegaly and its complications, splenectomy is a safe method with acceptable complications rate and improves the patients' survival outcomes.

**Key Words:** Hematological cancer, Splenomegaly, Splenectomy, Thrombocytopenia, Treatment

## Hematolojik Kanserlerde Splenektomi Uygulanan Hastaların Tedavi Sonuçlarının Değerlendirilmesi

## Özet

Amaç: Hematolojik hastalıklar, travma sonrası splenektomi geçiren hastalarda en sık görülen endikasyondur. Bu çalışmada, hematolojik malignite nedeniyle splenektomi yapılan hastaların tedavi sonuçlarının değerlendirilmesi amaçlanmaktadır.
Hastalar ve Yöntem:1998-2009 yılları arasında hematolojik malignite tanısıyla splenektomi yapılan hastalar retrospektif olarak değerlendirildi. Hastaların yaşı, cinsiyeti, cerrahi öncesi ve sonrası uygulanan medikal tedavileri, uygulanan cerrahi tedavi ve gelişen komplikasyonlar ve hastaların ameliyat sonrası dönemdeki trombosit yanıtları incelendi.
Bulgular:Çalışmaya ortalama yaşı 50,7 (17-79) olan 17 erkek ve 13 kadın hasta alındı. Hastaların 10'unda (% 33,3) Hodgkin lenfoma, 12'sinde (% 40) Non Hodgkin lenfoma, beşinde (% 16,6) Kronik Lenfositik Lösemi, iki (% 6,6) tanesinde MALT lenfoma ve bir (% 3,3) hastada ise Hairy Cell Lösemi tanısı mevcuttu. Yirmi hasta splenomegali ve komplikasyonları nedeni ile opere edilirken, beş hasta mide obstrüksiyon bulguları nedeni ile, üç hasta tanı amaçlı, bir hasta apse ve bir hasta kanama nedeni ile ameliyat edildi. Postoperatif komplikasyon olarak hastalardan 6'sında pnömoni görülürken iki hastada kanama, bir hastada apse ve bir hastada sepsis gözlendi. İki hasta postoperatif erken dönemde kaybedildi. Trombosit yanıtları takip edilen hastaların 19'u (% 63,3) tam yanıt, 8'i (% 26,7) parsiyel ve 3 (%10) tanesi ise yanıtsız olarak değerlendirildi.
Sonuç: Splenektomi, hematolojik maligniteli hastalarda hipersplenizme bağlı sitopenilerin ve komplikasyonların geliştiği durumlarda ve tanı amaçlı güvenle uygulanabilen bir cerrahi girişimdir

**Anahtar sözcükler:** Hematolojik Kanser, Splenomegali, Splenektomi, Trombositopeni, Tedavi

## Introduction

Apart from trauma purposes, splenectomy is a common procedure employed in the hematological diseases. Due to the role of the spleen for the immune system functions and the new treatment modalities at the lymphoproliferative disease, the indications for splenectomy implementation have changed considerably compared to past few years (1).

Splenectomy may be performed at different stages of the lymphoproliferative disease treatment (2). The common symptoms and complaints regarding the splenic involvement at clinical presentation are related to abdominal distension, massive splenic enlargement, early satiety, fullness and pain. Hematological disorders, splenomegaly symptoms and signs, unresponsiveness to chemotherapy, widespread infiltration of the spleen, reduction of the tumour burden and treatment of the isolated or combined cytopenias (anaemia, leucopoenia or thrombocytopenia) are the main indications of splenectomy (2-7).

The aim of the present study is to determine the feasibility, complications and outcomes of the open splenectomy techniques at the hematological cancer patients.

**Patients and Methods**

During the period between 1998 and 2009, 30 patients were treated with splenectomy for hematological cancer. The medical records of patients were collected retrospectively, including the data on age and sex of the patient, indications for the procedure, the type of surgery (isolated splenectomy or combined with other surgical procedures), previous and postoperative medical treatment protocols, procedure-specific complications and surgical complications.

All patients' preoperative abdominal computed tomography and ultrasound images were evaluated with respect to the invasion of spleen. Except for the urgent surgeries, patients were vaccinated for encapsulated bacteria. All patients were administrated prophylactic antibiotics preoperatively.

Patients' short (<3 month) and long (>3 month) term pre- and post-operative hematological profiles as well as their response to splenectomy were recorded. At the postoperative period the patients who underwent surgery due to splenomegaly and thrombocytopenia were classified into three groups with regards to platelet counts: complete response (>$150x10^9$/L), partial response (50-$150x10^9$/L) and unresponsive (<$50x10^9$/L). The patients were followed after the splenectomy and their final conditions were evaluated.

**Results**

Patient characteristics are shown in Table 1. There were 30 patients of whom 13 (43.3 %) were female and 17 (56.6 %) were male. Mean age was 50.7 years (range 17-79). The major complaints were nausea and vomiting in one (3.3 %), abdominal pain in 7 (23.3 %), weight loss in 7 (23.3 %) patients and more than one symptom was observed in 15 (50 %) patients. Diagnosis of the patients was with endoscopy in six (20 %) patients, image guided biopsy in 7 (23.3 %) and lymph node biopsy in 10 (33.3 %). At seven (23.3 %) patients there was no diagnosis before the operation. At bone marrow biopsy in 9 (30 %) patients there was involvement. The patients' diagnosis were Hodgkin Lymphoma (HL) for 10 (33.3 %), Non-Hodgkin Lymphoma (NHL) for 12 (40 %), Chronic Lymphocytic Leukaemia (CLL) for five (16.6 %), MALT (Mucosa associated lymphoid tissue) lymphoma for two (6.6 %) and Hairy Cell Leukaemia (HCL) for one patients (3.3 %) (Figure I). Thirteen (43.3 %) patients had taken various chemotherapy treatments before the surgery.

Indications for splenectomy was splenomegaly and its complications in 20 (66.7 %) patients, gastric obstruction and spleen involvement in five (16.6 %), diagnostic purposes in three (10 %), abscess and recurrence in one (3.3 %). One patient (3.3 %) underwent splenectomy due to acute splenic sequestration, rupture and haemorrhage under emergency conditions(Figure II). In five patients (23.8 %) splenectomy was implemented in addition to gastrectomy.

Of all the patients undergoing surgical procedures, six (20 %) had postoperative fever with respiratory problems ranging from atelectasis to pneumonia, two (6.6 %) were bleeding, one (3.3 %) had subphrenic abscess and one (3.3 %) had sepsis. Twenty patients (66.6 %) had no surgery related complications whereas there were two (6.6 %) perioperative deaths. The causes of death were pulmonary sepsis and emboli with multisystem organ failure in one patient and intraabdominal haemorrhage after emergency conditions splenectomy in the other. Thrombocyte response of the patients reveal that 19 ( 63.3 %) had complete response whereas 8 (26.7 %) had partial response and 3 (10 %) patients were classified as unresponsive.
The follow-up period ranged from 1 to 84 months (mean 20.4). Twenty five patients underwent various chemotherapy regimens for adjuvant therapy. Except for the early two postoperative deaths, 13 patients (43.3 %) died owing to progression of their underlying diseases and two (6.6 %) died due to unrelated causes of primer diseases. The remaining thirteen (43.3 %) patients were alive and being follow up at the hematology department.

**Discussion**

The role of splenectomy at hematological cancer is controversial. Although splenectomy remains to be an important treatment procedure, recent studies have developed new chemotherapeutic regimens and medical management of the complications and the approach to the disease had changed significantly compared to the past. Besides, performing splenectomy for staging purposes in hematological cancer patients is no longer recommended by recent studies.

In this study, we demonstrated a group of patients with NHL, HL, CLL, HCL and MALT lymphoma who underwent surgery because of the splenomegaly and various complications. In our series, only three patients had a surgery related to the diagnosis of a mass involvement at the spleen. For the HL and NHL patients staging is not an indication for surgery (8 -11). The major causes for surgery for these groups of patients are splenomegaly complications and improved treatment results at the myelosupression and resistance to chemotherapy (3, 8 -11). Primer splenic lymphoma is often NHL. Surgery is recommended for primer splenic lymphoma and isolated splenic involvement. At NHL and HL patients early period splenectomy is recommend for improving the other treatment options and preventing the lethal complications of disease (3).

The major indications for splenectomy in CLL are splenic infection, progression of the disease, immunodeficiency, complications with splenomegaly and cytopenias (4). Bermann and co-workers report that surgery complications are low and comparable to those of chemotherapy treatment (1). Moreover they assert that early splenectomy improves the hematological parameters, treatment options and also the survival of the patients. At the HCL treatment interferon alpha and purine analogues replace the priority of splenectomy (6). Surgery is useful at the HCL treatment in terms of decreasing the tumour burden and the splenomegaly complications such as cytopenia, bleeding and pain surgery (8).

MALT lymphoma is a rare tumour leading to frequent gastric involvement originating from the marginal zone of B-cell follicles on spleen lymph node and mucosal lymphoid tissues. Helicobacter pylori are present in approximately 90 % of the patients and eradication treatment is not enough at the nodal and infiltrative form. Gastric MALT lymphomas are disseminated and multifocal disease and total gastrectomy should be preferred as a surgical procedure (12). After surgery, patients require systemic chemotherapy and radiotherapy treatment. The multi-organ involvement rates of gastric and non-gastric MALT lymphomas are detected to be 25 % and 46 %, respectively (13). In some series, splenectomy is suggested as a first line therapy because of the improvement in hematological parameters and life expectancy for MALT lymphoma (14).

Safety of splenectomy with hematological cancer has been a theme for debate for a long time. Concerns regarding infection, bleeding and thrombosis lead to delays in decision for a surgery and increases the need for longer term medical and supportive therapy. Despite the early reports of high morbidity (13%- 49%) and mortality (6%- 27%) rates, today splenectomy can be regarded as a safe surgical procedure that can be applied with high experience and technical advance (1, 15, 16). Mortality rates may increase with complications arising from surgery under emergency conditions, such as bleeding, obstruction, poor general health conditions, and cytopenia. In our series, we had two (6.6 %) early deaths: one patient died due to receiving multiple transfusions and was operated under emergency conditions because of bleeding and one patient died due to pulmonary embolism. This rate is similar to Berman et al., who reported 5 % mortality at general and 16 % mortality at the profound thrombocytopenia patients and describe it as acceptable (1). The chemotherapy or similar treatments may yield comparable or even higher mortality rates (1, 17).

Profound thrombocytopenia and cytopenia result in important problems during the therapy and follow up period. Life-threating bleeding, frequent and costly transfusions of blood and platelet products, the risks related with exposure to infectious diseases and development of antibodies impede the optimal order to receive chemotherapy (1). During the long term follow up, the numbers of patients with complete response and partial response are 19 (63.3 %) and 8 (26.7 %), respectively and this finding is compatible with the literature. It has been shown that the hematologic cancer patients who underwent splenectomy have significant long term improvements in platelet values and less need for platelet transfusion as well as decreased costs of treatment (1, 18).

The patients evaluated in this study were treated with open techniques. While laparoscopic splenectomy prolongs the operation duration, it is preferred to open techniques due to decreased hospital stay and less postoperative pain (19). Spleen size is significant in determining the surgery type in terms of conversion requirement, duration of the operation and complication rates (20). There are studies arguing that open techniques yield improved outcomes in patients with large spleens and massive splenomegaly constitutes a relative risk for laparoscopy due to high complication rates (21, 22).

Splenectomy can be performed safely in hemotological cancer patients with acceptable morbidity and mortality rates. Complications are related with massive splenomegaly and at the emergency surgery conditions. Splenectomy is related with improvement in life expectancy and quality.

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Table I- Patient Characteristics

| | | |
|---|---|---|
| Age (Years) | | 50.7 (17-79) |
| Sex | Male | 17 (56.6 %) |
| | Female | 13 (43.3 %) |
| Diagnosis | Non Hodgkin Lymphoma | 12 (40 %) |
| | Hodgkin Lymphoma | 10 (33.3 %) |
| | Chronic Lymphocytic Lymphoma | 5 (16.6 %) |
| | MALT Lymphoma | 2 (6.6 %) |
| | Hairy Cell Leukemia | 1 (3.3 %) |
| Indications for Operations | Splenomegaly | 20 (66.7 %) |
| | Gastric Obstruction | 5 (16.6 %) |
| | Diagnosis | 3 (10 %) |
| | Abscess | 1 (3.3 %) |
| | Bleeding, Rupture | 1 (3.3 %) |
| Additional Surgical Procedures | Gastric Resection | 5 (23.8 %) |
| Follow-up Period (Months) | | 20.4 (1- 84) |
| Follow-up Results | Exitus – Early perioperative period | 2 (6.6 %) |
| | Exitus - Disease Progression Related | 13 (43.3 %) |
| | Exitus – Other Reasons | 2 (6.6 %) |
| | In follow-up | 13 (43.3 %) |

Figure I: Diagnosis of the Patients

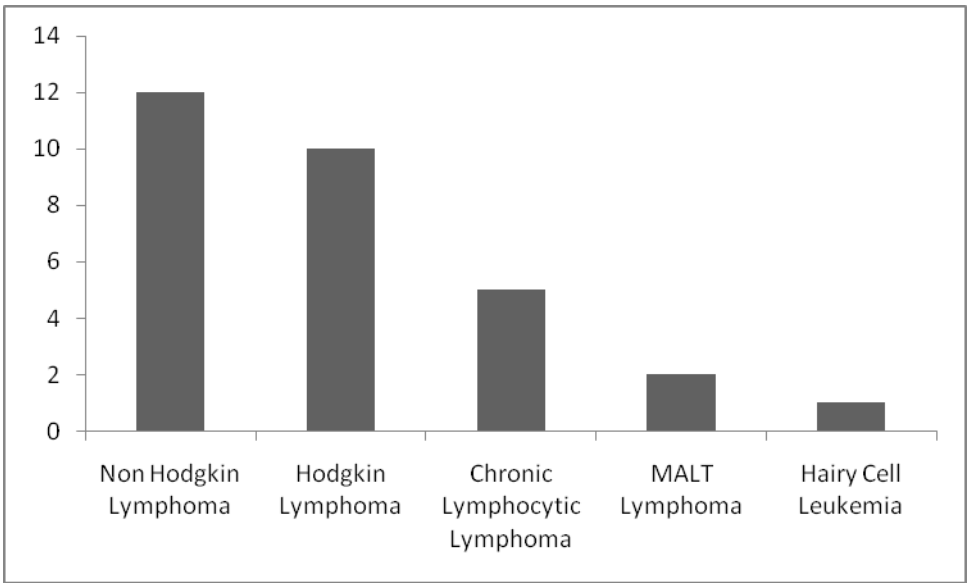

Figure II:  Complications