Splenic and portal vein thrombosis after splenectomy for massive spleen and the role of prophylactic anticoagulation: a retrospective single-center study

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Abstract

Introduction: The incidence of splenic (SVT) and portal vein thrombosis (PVT) after splenectomy for massive splenomegaly is significant, regardless of the surgical approach. The aim of this study was to determine the impact of extended venous thrombosis prophylaxis following minimally invasive splenectomy for massive splenomegaly. **Methods**: An 11-year retrospective chart review was undertaken for all splenectomies for massive splenomegaly performed at the Peter Lougheed hospital. The incidence of SVT and PVT, patient demographics and perioperative complications were collected. STATA V.14.0 was used for analysis. Pearson χ2 analysis was used where applicable. Data were presented as means and medians. **Results**: For the 39 patients who met our inclusion criteria, the majority had their surgery completed by a minimally invasively approach (conversion rate of 8%). The overall rate of morbidity was 33.3%, and the average post-operative length of stay was five days. All patients were discharged home on prophylactic dosing of low-molecular weight heparin (LMWH). Eighteen (46.2%) developed post-operative thrombosis. Most patients (61%) who developed thrombosis were asymptomatic, with the rest presenting with abdominal pain. A significant association with thrombosis was seen in patients who underwent pre-operative splenic artery embolization (p=0.014). All patients who developed thrombosis were managed with therapeutic dosing of anticoagulation and all had resolution of their thrombosis without long-term sequalae. **Conclusion**: Despite extended period of venous thrombosis prophylaxis with LMWH, the overall rate of thrombosis (SVT, PVT or both) was nonetheless high, however, we established the utility of intensive post-operative surveillance and aggressive treatment for this patient population..

Introduction

Minimally invasive surgery (MIS) is now the standard of care for splenectomy and is preferred to open surgery due to its shorter hospital length of stay (LOS) and reduced rate of peri-operative complications (3). However, massive splenomegaly has historically been managed by an open surgical approach (1-3).

Whether open or MIS, post-operative portal (PVT) and splenic vein thrombosis (SVT) is a major problem after splenectomy for massive splenomegaly with the incidence approaching 50% in some studies(6).

Objectives

The primary objective of this study was to assess the impact of extended venous thrombosis prophylaxis on the incidence of SVT and PVT after splenectomy for massive splenomegaly. Our secondary aim was to explore the potential factors associated with thrombosis and the outcomes of therapeutic anticoagulation for those found to have thrombus.

Methodology

we conducted a retrospective chart review for all patients 16 years and older who underwent MIS splenectomy for massive splenomegaly at the Peter Lougheed Center (PLC) between Jan 1st 2009 and Dec 31st 2019. Patients with pre-operative prothrombotic disorder or anticoagulation use, those whose surgery was planned as open, and those whose splenectomy was secondary (such as during gastric cancer surgery) were excluded.

A standardized data collection spread sheet was used to collect information. Whenever possible, patients received pre-operative vaccinations. A pre-operative splenic artery embolization was arranged 1 to 2 hours prior to surgery.

All procedures were attempted either laparoscopically (LAS) or hand-assisted laparoscopically (HALS) in the right decubitus position.

All patients were discharged on four weeks of venous thrombosis prophylaxis with low-molecular weight heparin (LMWH). Routine screening Doppler ultrasound (US) scans were performed at one and four weeks post-operatively. If thrombosis was detected, patients were treated with therapeutic dose anticoagulation (based on body weight) for a duration as determined by the hematologist.

Data analysis was performed using STATA V.14.0. Means and medians were used where appropriate. T-tests and χ2 analysis were used where appropriate. P-values less than 0.05 were considered significant

Results

Over 10 years interval, 218 patients underwent splenectomy, 39 of which met the inclusion criteria. The mean age was 53 years and males represented 44%. Malignancy constituted 59% of the sample size.

A pre-operative embolization demonstrated a significant correlation with thrombosis (Pearson chi2 6.1; P= 0.014). A correlation with malignancy was observed, however, it was not statistically significant (Pearson chi2 0.06 P 0.82).

Summary statistics	Patient N (%)
Median Spleen Length cm	22.5
Pre-operative embolization (%)	27(69.2)
Pre-immunization (%)	38 (97.4)
Procedure	
LAS	8(20.5)
HALS	31(79.5)
Conversion to Open	3 (7.7)
LS	1 (2.6)
HALS	2 (5.1)

Complications	Patient N (%)
Intra-operative	
Median blood loss ml	175
Blood transfusion	2(5.1)
Death	0(0)
Post-operative	
Complication secondary to embolization	0 (0)
Clinically significant leak	4(10.3)
Pleural effusion	3(7.7)
Pneumonia	2(5.1)
Wound infection	1(2.6)
Ileus	1(2.6)
Pancreatitis	1(2.6)
Reoperation	3(7.7)
Median Length of stay days	5

The incidence of splenic vein thrombosis, portal vein thrombosis and malignancy

Outcome		Patients N (%)
Thrombosis	Overall	18 (46.2)
	SVT only	4 (10.3)
	SVT & PVT	11 (28.2)
	PVT only	3 (7.7)
	Hepatic vein extension	2 (5.2)
Symptoms and Diagnosis	Asymptomatic	13 (72.2)
	US 1st w	10 (76.9)
	US 4th w	3 (23)
	Symptomatic	5 (27.8)
	CT	5 (100)
Malignancy		11(61.1)

Conclusion

Laparoscopic splenectomy for massive splenomegaly is associated with a high incidence of thrombosis. Extended venous prophylaxis with LMWH is safe, but does not appear to be effective at preventing post-operative thrombosis. Pre-operative embolization resulted in an increased rate of thrombosis and its use may need to be reconsidered.

We are also considering starting DVT prophylaxis prior to embolization. Active and intensive post-operative surveillance, and early and aggressive treatment of any identified thrombosis are recommended for patients undergoing laparoscopic splenectomy for massive splenomegaly.