Results of laparoscopic splenectomy for treatment of malignant conditions

E M Targarona, G Cerdán, E Gracia, M Rodríguez and M Trias

Service of General and Digestive Surgery, Hospital de S Pau, Autonomous University of Barcelona, Spain

Background

Laparoscopic splenectomy (LS) is widely accepted for treatment of benign diseases, but there are few reports of its use in cases of haematological malignancy. In addition, comparative studies with open operation are lacking. Malignant haematological diseases have specific clinical features – notably splenomegaly and impaired general health – which can impact on the immediate outcome after LS. The immediate outcome of LS comparing benign with malignant diagnoses has been analysed in a prospective series of 137 operations.

Patients and methods

Between February 1993 and April 2000, 137 patients with a wide range of splenic disorders received LS. Clinical data and immediate outcome were prospectively recorded, and age, diagnosis, operation time, perioperative transfusion requirement, spleen weight, conversion rate, accessory incision, hospital stay and complications were analysed.

Results

The series included 100 benign cases and 37 suspected malignancies. In patients with malignant diseases the mean age was greater (37 years [3–85] vs 60 years [27–82], $p<0.01$), LS took longer (138 min [60–400] vs 161 min [75–300], $p<0.05$) and an accessory incision for spleen retrieval was required more frequently (18% vs 93%, $p<0.01$) because the spleen was larger (279 g [60–1640] vs 1210 g [248–3100], $p<0.01$). However, the rate of conversion to open operation (5% vs 14%), postoperative morbidity rate (13% vs 22%) and transfusion requirement (15% vs 26%) did not differ between benign and malignant cases. Hospital stay was longer in malignant cases (3.7 days [2–14] vs 5 days [2–14], $p<0.05$).

Conclusion

LS is a safe procedure in patients with malignant disease requiring splenectomy in spite of the longer operative time and the higher conversion rate.

Keywords

laparoscopic splenectomy, spleen malignancy, splenomegaly, lymphoma.

Introduction

Laparoscopic splenectomy (LS) is a well-accepted procedure for the treatment of benign diseases, mainly in healthy patients with a small spleen, as in idiopathic thrombocytopenic purpura [1,2]. However, experience with LS for haematological malignancies is limited, and comparative studies with open operation are lacking [3,4]. Malignant haematological diseases have specific clinical features (e.g. splenomegaly, advanced patient age and more severe clinical disease) which increase the difficulty of the procedure or may have an impact on the immediate outcome after LS [5,6]. The aim of this study was to analyse the immediate outcome of LS, comparing benign with malignant diagnoses in a prospective series of 137 procedures.

Patients and methods

Between February 1993 and April 2000, 137 patients with a wide range of splenic disorders underwent LS (Table 1). Of these, 132 were operated using techniques previously described in detail [7], but in 5 patients with an enlarged spleen LS was performed with hand-assisted techniques (Hand Port, Smith and Nephew Endoscopy, Andover, MA, USA). Patients were classified as benign (group I) or malignant (group II) according to the haematological diagnosis. Clinical data, technical details and immediate outcome were recorded prospectively (Table 2). Student's t test and χ^2 tests were used for relevant comparisons between series.

Correspondence to: *Dr E M Targarona, Service of General and Digestive Surgery, Hospital de S Pau, C/ P Claret 167, 08025 Barcelona, Spain*

Table 1. *Clinical diagnosis of a series of 137 cases in which LS was attempted*

Diagnosis	Number of patients
Benign disease	100
Autoimmune thrombocytopenic purpura (ITP)	59
HIV-related thrombocytopenia	7
Autoimmune haemolytic anaemia	9
Spherocytosis	14
Elliptocytosis	1
Others	10
Unknown splenomegaly	2
Splenic benign tumour	
Angioma	2
Hydatid cyst	1
Hamartoma	1
Cyst	1
Angiomatosis	1
Splenic trauma	1
Thrombocytopenic thrombotic purpura	1
Malignant disease	37
Hodgkin's lymphoma	2
Non-Hodgkin's lymphoma	18
Hairy cell lymphoma	5
Myelofibrosis	4
Chronic lymphocytic leukaemia	3
Chronic myeloid leukaemia	1
Waldenström's macroglobulinaemia	1
HIV, splenomegaly and suspicion of malignancy	2
Metastatic histiocytoma	1

Results

In the malignant group, the most frequent diagnoses were non-Hodgkin's lymphoma (18/37, 46%) and myelofibrosis (4/37, 11%) (Table 1). In 15 patients, the LS was performed for diagnostic purposes and in 13 for hypersplenism. In two cases (myelofibrosis and LMC), LS was performed before bone marrow transplantation. There were two patients with acquired immune deficiency syndrome (AIDS), in whom malignancy was suspected due to splenomegaly, fever and hypersplenism, although it was not confirmed by histological analysis. The detailed preoperative and immediate results of each group are described in Tables 2 and 3. Patients in group II were significantly older and LS took significantly longer; most of them (93%) required an accessory incision at the end of the procedure to extract the intact spleen (at the request of the pathologist). These spleens were also heavier, but in spite of a slight increase in transfusion and morbidity rate, the difference was not statistically significant. However, postoperative stay was longer in the malignant group. There were no operative deaths in this series.

Discussion

The minimally invasive technique has been progressively accepted among surgeons as an advantageous and safe approach for splenectomy [1,8]. However, it is a complex laparoscopic procedure and most series include patients with benign diseases and small spleens. LS for malignant disease is a greater challenge for the surgeon because of the size of the spleen and the general condition of the patient [3,4,8]. In the pre-laparoscopy era, substantial morbidity and even the occasional death followed open splenectomy for malignancy [6]. However, few authors have analysed the results of the application of LS in this group of patients. The main results of this study show that LS is feasible and safe in cases of malignancy, and it appears to present the same advantages as in benign cases (despite the lack of a prospective randomised comparison with open splenectomy).

At present, splenectomy for malignancy is mainly limited to treating symptomatic hypersplenism or debulking patients with established disease, or for diagnosis in suspected cases. Surgical staging of Hodgkin's disease has been replaced by noninvasive methods, and splenectomy is reserved for more severe haematological diagnoses. In our study we included two patients with an infrequent clinical problem: splenomegaly and hypersplenism in AIDS patients in whom a lymphoma was suspected. Like other authors [3,4], we found that patients with malignant haematological diseases were older and that operative time was longer than in benign cases, but the conversion rate remained low in spite of the relatively large size of the spleen. The three series published to date (Table 3) analysing LS for malignancy show similar operative times, morbidity and transfusion rates. However, Berman and colleagues [3] reported a higher conversion rate (41%), in spite of the use of a hand-assisted technique in some cases.

Although there are no prospective randomised trials, the analysis of comparative trials of laparoscopic versus open splenectomy or the comparison of results of LS for malignant cases with recent published series of open splenectomy are in favour of LS; transfusion rates and major morbidity are reduced. In a recent study, Nelson and co-workers [9] showed a morbidity and mortality rate of 41% and 8% and a mean hospital stay of 13 days in a series

Table 2. *Clinical features and immediate outcome after LS according to benign or malignant haematological diagnosis*

	Group I: benign Laparoscopic	Converted (5%)	Group II: malignant Laparoscopic	Converted (14%)
n	95	5	32	5
Age (years)	36 (3–68)	48 (16–85)	59 (28–82)*	62 (57–75)
Operation time (min)	138 (60–400)	187 (135–240)	161 (75–300)†	162 (110–210)
Accessory incision	18%		93%*	
Size of accessory incision	5 (3–12)		11(6–18)*	
Transfusion rate	15%	80%	26%	80%
Morbidity rate	13%	20%	22%	40%
Stay (days)	3.7 (2 – 14)	6 (4–7)	5 (2–14)*	6 (4–15)
Reoperation	1	1	2	1
Spleen weight (g)	279 (60–1640)	1095 (175–3400)	1210 (248–3100)*	2856 (1824–3519)
Complications				
	Lung infection (3)	Haemoperitoneum	Urinary infection	Haemoperitoneum
	Subphrenic haematoma		Gout	Ileus
	Abdominal wall haematoma (2)		Haemoperitoneum	Pleural effusion
	Haemoperitoneum (2)		Ileus	
	Fever (2)		Sweet's syndrome	
	Haemopneumothorax		Catheter sepsis	
	Wound sepsis		Pneumonia	

*$<$ 0.01 vs benign laparoscopic, †$<$0.05 vs benign laparoscopic.

of 39 patients. Most of these splenectomies were considered 'high risk' because of non Hodgkin's lymphomas and a mean spleen weight of 1500 g. In a similar series, LS was followed by a reduced major morbidity (18–23%), lower mortality and reduced hospital stay [3,4,10,11]. In our series, five of eight complications were not technically related, and only one patient had pulmonary problems. Although there were no pancreatic injuries or subphrenic infections, three patients had to be reoperated for bleeding; but no clear bleeding source was found. In a recent multivariate study analysing factors related to complications during LS, we observed that malignancy, spleen weight and age were independent factors. The learning curve was another independent factor [12]. Thus patients with malignant disease are the most difficult cases for LS and need an experienced team.

From the technical point of view, the most challenging step is the mobilisation of a large organ inside the abdominal cavity and its retrieval. The main reason for conversion in our malignant group was spleen size, due to the

Table 3. *Comparative studies of laparoscopic splenectomy for benign or malignant haematological diseases*

	Schlachta (1999) Benign	Malignant	*p*	Decker (1998) Benign	Malignant	*p*
n	50	14		22	13	
Age	36±18	54±16	0.002	42±16	60±9	0.002
Conversion	6%	21%		0	23%	
Op. time	180±60	239±73	0.01	172±67	235±69	0.01
Morbidity rate	11%	18%		27%	15%	
Mortality rate	–	9%		0	8%	
Stay (days)	3	3		4.5±2.7	5±1.2	
Size	11	17	0.001			
Weight (g)				160±387	1420±850	
Transfusion rate	0	0		0	46%	0.005

Table 3. *cont.*

	Bremann (1999) Benign	Malignant	p	Walsh (1999) Malignant (NHL)
n	31	22		9
Age	38 (4–85)	55 (24–70)	0.001	55 (34–68)
Conversion	3%	41%	0.001	0
Op. time	155 (109–265)	203 (150–300)	0.005	185 (115–390)
Morbidity rate	9%	32%		0
Mortality rate	0	3%		0
Stay (days)	2 (1–11)	4 (3–24)	0.001	2.4 (1–6)
Size				
Weight (g)	164	930 (190–3500)	0.001	765 (380–1000)
Transfusion rate	10%	18%		10%

NHL = non-Hodgkin's lymphoma.

impossibility of handling; spleens were significantly larger in the converted subgroup than in the successful LS subgroup [7,13]. In recent months new devices for hand-assisted laparoscopic surgery have become available, and this technique can be especially useful in cases of LS for splenomegaly or malignancy [14,15]. Five patients in our series were operated using these techniques and our preliminary opinion is that this device facilitates the procedure enormously, especially in the final steps of handling the organ and stapling the hilum. In these five patients spleen weights ranged between 720 and 3100 g, and the LS lasted between 75 and 120 min; there were no complications and the patients were discharged after 3 days (Tables 4 and 5). This device can also facilitate the retrieval of large organs. The 'hand port' incision was located in the right hypochondrium or epigastrium depending on the size of the spleen, and the final size was 7 cm. We routinely extract the organ intact through an accessory incision at the request of the pathologist and so as to avoid the cumbersome manoeuvre of introducing a large organ into a bag. We consider that the final extraction incision – which is always much smaller than a formal laparotomy – maintains the characteristics of 'minimal invasion' and has a minimal impact on immediate outcome. In this situation, the placement of the incision for the 'hand-assisted' device may facilitate the extraction of the organ at the end of the procedure.

An unresolved issue is the role of laparoscopic techniques for the treatment of massive splenomegaly (>3000 g). Obviously, this procedure depends on the expertise of the surgeon, the shape of the spleen and the abdominal shape of the patient.

Table 4. *Comparison of immediate results of LS for splenomegaly (n = 39, spleen weight >700 g) treated by conventional LS and 'hand-assisted' LS (HALS)*

	Group I: LS	Group II: HALS
n	34	5
Age (years)	58 (19–82)	57 (44–72)
Operative time (min)	172 (95–300)	109 (75–120)
Conversion	20%	0
Transfusion rate	38%	20%
Morbidity rate	29%	0
Stay (days)	5.8 (3–14)	3.6 (2–4)
Reoperation	1/34 (3%)	0
Spleen weight (g)	1425 (700–3400)	1524 (720–3100)
Mortality	0	0

In conclusion, just as LS is being accepted as the standard treatment in benign cases, so it will have an important role in the surgical management of malignant cases. This subset of patients has unique clinical and anatomic features, but improvements in technical devices (such as hand-assisted surgery) are likely to increase the number of potential candidates and the safety of the procedure.

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Table 5. *Features of the patients treated with hand-assisted laparoscopic splenectomy*

No.	Age	Sex	Preoperative diagnosis	Operative time (min)	Spleen size (cm)	Transfusion	Number of trocars	Complications	Stay (days)	Spleen weight (g)	Diagnosis
1	72	M	Evans Sind	120	21	no	3	no	4	800	. . .
2	67	F	NHL	75	20×12×15	no	2	no	2	720	NHL
3	42	M	Fever + splenomegaly	105		no	3	no	4	1200	NHL
4	58	M	Splenomegaly + hypersplenism	120	28×15	yes	3	no	4	3100	NHL
5	45	M	Fever + splenomegaly	120	32×15	no	3	no	4	1200	HL

HL = Hodgkin's lymphoma; NHL = non-Hodgkin's lymphoma.

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