The use of surgical drains in laparoscopic splenectomies
Consideration on a large series of 117 consecutive cases

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BACKGROUND DATA: *The use of surgical drains after traditional splenectomy has been largely debated and several Authors have been unfavorable to their use. With the advent of laparoscopic splenectomy, their role has been re-discussed. The increased risk of undetectable pancreatic, gastric or colon injury in challenging laparoscopic removal of the spleen have induced some surgeons to reconsider the advantages related to their use.*
METHODS: *One hundred seventeen consecutive cases of laparoscopic splenectomy with routine use of surgical drains have been reviewed. Indications for surgery, length of operations, post-operative day of drain removal, post-operative complications were retrospectively analyzed.*
RESULTS: *Laparoscopic splenectomy was performed for idiopathic thrombocytopenic purpura in 77 patients (65,8%), splenic lymphoma in 11 (9,4%), hereditary spherocytosis in 12 (10,2%), β-thalassemia in 6 (5.1%), other diseases in 11 (9,4%) cases. Conversion to open surgery was necessary in 11,1% of cases. Drains were removed 2-3 days after surgery in 95,8%, within 10 days in 3.4%, within 2 months in 0,8% of cases. In 2 cases a post-operative bleeding, detected through the drainage, required re-operation. One patient with myelofibrosis and massive splenomegaly developed a late post-operative subphrenic abscess, successfully treated by a percutaneous drainage.*
CONCLUSIONS: *In Authors' experience, the use of drains after laparoscopic splenectomy helped detect early post-operative bleeding. Surgical drains could reduce the incidence of fluid intra-abdominal collections and infections. Their use should be recommended in the laparoscopic approach, especially in technically demanding surgical procedures.*

KEY WORDS: Laparoscopy, Surgical drainage, Splenectomy

Introduction

The use of surgical drain after abdominal surgery has always been a controversial issue. Intra-abdominal drains have been traditionally proposed to identify post-operative bleeding, to drain and monitor residual intraperitoneal pathologic fluids (such as bile, fecal material, pancreatic juice), and in order to prevent intra-abdominal septic collections [1].
So far, however, there is a lack of evidence proving significant benefits of surgical drains and, moreover, drains themselves have been imputed as responsible for related complications which may increase post-operative morbidity [1-3].
Similarly, placement of drains after splenectomy has been historically largely debated. The use of drain in splenec-

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tomised patients, whose susceptibility to infections and sepsis due to some microbial agents is well known, has been considered a factor predisposing to an increased risk of subphrenic abscess formation and systemic infections [4,5]. This assertion, however, has been resized in some studies [6,7].

With the increasing acceptance of laparoscopic splenectomy, subphrenic surgical placement of drainage has been rediscussed [8]. Especially in large spleens or in patients with lymphoproliferative disorders, removal of the spleen by laparoscopy could be associated with an increased risk of pancreatic tail injuries and, therefore, drains usage might be appropriated.

In this study, we report the results of a large series of 117 laparoscopic splenectomies where left sub-phrenic drainage has been routinely used. Emphasis has been given on the role of the drainage in this reported laparoscopic series.

Material and Methods

The charts of patients operated on with laparoscopic splenectomy from January 2001 to December 2014 have been retrospectively reviewed. The following data were analyzed: demographic data, indications for surgery, associated surgical procedures, length of operations, post-operative day of drain removal, post-operative complications.

Laparoscopic splenectomy was performed as discussed elsewhere [3]. Briefly, with four port access and with the patient lying in the right semilateral position (left flank elevated about 45° above the operating table), using a 30° scope, dissection of the spleno-colic ligament and division of the gastro-splenic ligament with the short gastric vessels were accomplished first, using the ultrasonic dissector. After dissection of the spleno-diaphragmatic attachments, the splenic hilum was separated from the pancreatic tail and then divided, by using a laparoscopic stapler. In cases with a technically challenging splenic hilum, as it was in massive large spleens or for associate hilar lymph nodes involvement, a preventive clip occlusion of splenic main artery at the superior margin of the pancreas was accomplished, before approaching the splenic hilum.

Routinely, a double lumen active drain was left in place in the splenic bed at the end of the procedure.

Results

In 117 cases all the above data were available and were reported in this study. Male to female ratio was 0,8. Patients' age ranged from 8 to 83 years. Indications for splenectomy were idiopathic thrombocytopenic purpura in 77 patients (65.8%), splenic lymphoma in 11 (9.4%), hereditary spherocytosis in 12 (10.2%), β-thalassemia in 6 (5.1%), 11 (9.4%) other diseases (myelofibrosis, splenic cyst, splenic mycosis, benign tumors), as shown in Table I. Splenic longitudinal diameter, detected preoperatively through ultrasonography or CT scan, ranged from 10 to 14 cm in benign diseases, and from 18 to 24 cm in malignant diseases.

Associated procedure performed during splenectomy included 11 liver biopsies, 12 cholecystectomies, 2 ovarian cyst resections, and 2 abdominal lymph nodal biopsies.

Mean operative time was 65 minutes, ranging from 40 to 90 minutes. Intraoperative blood loss varied from 0 to 150 ml (mean 40).

Thirteen patients required conversion to open surgery (11,1 %), 10 for tumoral invasion of the peri-splenic structures, 3 for uncontrolled intra-operative bleeding.

Drainage was removed in 48 - 72 hours after surgery in almost all the cases (Table II). Only in 5 cases (4,3 %) drainage was left in place longer, because of a persistent fluid effusion through the drain itself. In these cases the drainage was removed within 10 days after surgery, except for one patient who developed a pancreatic fistula, where the drainage was removed after 2 months. No mortality was reported. In 2 patients with splenic lymphoma (1,7 %) post-operative bleeding, detected through the surgical drain, required reoperation. The patients were

TABLE I - *Patients' data**

N° patients	117
M/F	0.8
Age (range)	8 - 83 years
Indications to splenectomy	
Idiopathic thrombocytopenic purpura	77 pts (65.8%)
Splenic lymphoma	11 pts (9.4%)
Hereditary spherocytosis	12 pts (10.2%)
B-thalassemia	6 pts (5.1%)
Others	11 pts (9.4%)

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TABLE II - *Results**

Conversion to open splenectomy	11.1%
Time of surgical drain removal	
48-72 hours after surgery	95.7%
Within 10 days	3.4%
Within 2 months	0.8%
Post-operative bleeding detected through the drain	1.7%
Subphrenic abscess	0.8%

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discharged from the hospital in day 7 and day 8, respectively. One case (0,8 %) of sub-phrenic abscess was observed two weeks after surgery in a patient operated on for myelofibrosis, successfully treated by a CT scan guided percutaneous drainage [9,10].

Discussion

Abdominal drainage has always been a subject of controversy and debate. Drainage placement has been the oldest procedure applied in surgery, but since the first use at the beginning of the '90s not all the surgeons were in favor of it. After almost one century, the debate is still open and, so far, no evidence exists whether or not to use abdominal drains after abdominal surgery.

Abdominal surgical drains have been used for therapeutic or prophylactic reasons. For therapeutic reasons, drains have been placed in cases of intra-abdominal infections like in acute appendicitis with abscess, diffuse infectious peritonitis or to create a controlled external fistula in patients with leaking from intestinal suture line or pancreatic fistula.

Prophylactic use of the drain has been advocated to prevent abscess formation after surgical procedures at risk of peritoneal post-operative contamination (colon surgery, duodenal closure after perforation, hepatobiliary and pancreatic surgery at risk of bile and pancreatic leaks) [11,12]. Furthermore, prophylactic drains have been placed as a warning sign to detect post-operative bleeding or anastomotic leakage [13].

However, some surgeons [14] found that their use was associated with increased risk of septic complications, incisional hernias and intestinal obstruction.

Surgical drainage of the splenic bed following splenectomy has similarly been hotly debated in the past Literature. Some Authors have sustained that drainage use is safe, and, moreover, it is efficacious in detecting post-operative bleeding, as it happened in two of our cases, and in removing pancreatic tail secretions [8]. The risk of infections secondary to the drain itself has also been discussed. In a retrospective study of a large series of splenectomised patients who were drained, Ugochukwu [15] reported a low incidence of subphrenic abscess, which accounted for 0.17% of cases. An incidence of subphrenic infections of only 3.4% was also reported by Naylor [6] in more than 400 patients. In our report, incidence of subphrenic abscess was 0.8% of cases, in a patient who was at risk of infections because of immune-depression related to the underlying disease. On the contrary, other Authors [8,16,17] have argued against surgical drain use after splenectomy. In Piotr's series [8] post-operative bleeding complications were not diagnosed by means of the surgical drains, but, instead, they were detected on the basis of the clinical picture and radiologic imaging. With respects to post-operative infectious complications, Piotr et al. reported infections in 10% of the drained patients. Similarly, Olsen et al. [16] reported a 4,4% incidence of subphrenic abscess and Schwegman [17] a 9% incidence.

Few studies have addressed the comparison of infectious complications rates between drained and not drained splenectomised patients. Daoud et al. [7] reported a comparable complication rate in splenectomised patients with 18,7% incidence of subphrenic abscess in the drained group and 12% in the undrained group. In a prospective randomized study, Pachter [18], comparing patients not drained after splenectomy and patients with passive or active drains did not find significant differences in the incidence of infectious complications. In a recent study by Mohseni [2], in patients operated on for severe splenic injuries in a trauma setting, a deep vein thrombosis was observed respectively in 17% and 18% of drained and not drained patients, with no statistical difference (p=0.88) between the two groups.

With the increasing adoption of laparoscopic splenectomy, the use of surgical drains have been re-discussed [8]. With the laparoscopic approach for removal of the spleen, it has been reported an increased risk of bowel and pancreatic tail injuries, not recognized during the operation [3]. Especially in massive large spleen, laparoscopic splenectomy could be technically demanding and gastric or colic undetectable injuries might occur during gastro-colic or spleno-colic ligaments divisions.

Moreover, splenic hilum vessel control might be challenging as it could happen if enlarged lymph nodes make difficult the isolation of splenic main artery and vein. In these cases we usually occlude the splenic artery by clipping it on the superior aspect of the pancreatic tail, in order to prevent bleedings in the following steps of vascular hilum vessels control. This approach could cause an ischemia to the pancreatic tail, which could result in a glandular injury. This might be responsible of a transient pancreatic effusion, which can be observed after splenectomy and usually disappears in few days. Probably, this is what happened in some of our patients, where we were forced to leave longer the drain in place, removing it later than usual, and in this way probably preventing subphrenic abscess complications.

The data presented in our study represents at our knowledge, one of the largest retrospective series that analyses the role and the complications related to the use of surgical drain in laparoscopic splenectomised patients.

In our experience, the use of drains in the left subphrenic fossa after laparoscopic splenectomy could prevent the risk of post-operative infectious complications. In addition, the use of surgical drains after laparoscopic splenectomy is in our experience important to detect early post-operative bleeding, allowing a prompt and efficacious treatment.

Riassunto

BACKGROUND: L'utilizzo di drenaggi chirurgici dopo splenectomia tradizionale sono stati in gran parte discussi e diversi Autori sono stati favorevoli al loro impiego. Con l'avvento della splenectomia laparoscopica, il loro ruolo è stato nuovamente dibattuto. L'aumento del rischio di di lesioni iatrogene misconosciute del pancreas, stomaco o del colon nella rimozione laparoscopica dello stomaco difficile, hanno indotto alcuni chirurghi a riconsiderare i vantaggi connessi al loro uso.
METODI: In questo studio sono stati esaminati centodiciassette pazienti consecutivi sottoposti a splenectomia laparoscopica con apposizione routinaria di drenaggio chirurgico. Sono stati analizzati retrospettivamente le indicazioni per il trattamento chirurgico, la durata dell'intervento chirurgico, la giornata post-operatoria in cui veniva rimosso il drenaggio, e le complicanze post-operatorie.
RISULTATI: La splenectomia laparoscopica è stata eseguita per la porpora trombocitopenica idiopatica in 77 pazienti (65,8%), linfoma della milza in 11 pazienti (9,4%), sferocitosi ereditaria in 12 pazienti (10,2%), β-talassemia in 6 pazienti (5,1%), altre malattie in 11 (9,4%) casi. La conversione a chirurgia open è stata necessaria in 11,1% dei casi. I drenaggi sono stati rimossi 2-3 giorni dopo l'intervento chirurgico in 95,8% dei casi, entro 10 giorni in 3,4% dei casi, ed entro 2 mesi nello 0,8% dei casi. In 2 casi un sanguinamento post-operatorio, rilevato attraverso il drenaggio, ha richiesto il re-intervento. Un paziente con mielofibrosi e massiccia splenomegalia aveva sviluppato un ascesso subfrenico nel tardo periodo post-operatorio, ed era stato trattato con successo con un drenaggio percutaneo.
CONCLUSIONI: Nell'esperienza degli Autori, l'uso del drenaggio dopo splenectomia laparoscopica ha aiutato a individuare precocemente il sanguinamento post-operatorio. I drenaggi chirurgici potrebbero anche avere ridotto l'incidenza delle raccolte fluide e delle infezioni intra-addominali. Il loro uso dovrebbe essere raccomandato dopo approccio laparoscopico, in particolare nelle procedure chirurgiche tecnicamente impegnative.

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