

Laparoscopic Splenectomy using a Single Incision Access

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ABSTRACT

Conventional laparoscopic splenectomy is now considered standard in splenectomy. The superior cosmetic result of single incision laparoscopic surgery (SILS) has seen an increasing interest in all areas of surgery, including splenectomy. Literature search was done, and 26 cases reported in literature were reviewed. Age of the patient, position, access technique, duration of surgery, intraoperative complications, postoperative hospital stay, cosmetic and patient/parents satisfaction were noted. Age range was from 7 months to 73 years with satisfactory outcome.

Conclusion: Single incision splenectomy can be performed safely in patients of all ages. Immediate indicators show superior cosmetic outcome compared to conventional laparoscopic splenectomy, however, bigger series with long-term follow-up are required.

Keywords: Laparoscopy, Single incision, Splenectomy.

INTRODUCTION

The spleen forms part of the reticuloendothelial system of the human body (Fig. 1). It is located in the posterolateral aspect of the left hypochondrial area of the abdominal cavity closely related to the stomach, tail of pancreas, splenic flexure of the colon and the diaphragm in the posterosuperiorly¹ (Fig. 2).

Diseases of the spleen and trauma may lead to the need for the removal of the spleen which warrants a surgical procedure.

Common indications for splenectomy include: Hematologic diseases, such as hereditary spherocytosis, thalassemia major, idiopathic thrombocytopenic purpura (ITP), thrombotic thrombocytopenia and unresponsive hairy cell leukemia. Hodgkin's disease staging for malignancies and iatrogenic (intraoperative) splenic trauma.^{1,2}

Surgery of the spleen traditionally was by open method, which required a big incision in the abdominal wall, followed by long hospital stay and subsequent disfiguring scar. The developments in minimal access surgery, which started in the

late 80s and early 1990s, have led to laparoscopic splenectomy as a standard operation for small and medium size spleen and hand-assisted laparoscopic surgery (HALS) for big spleens in selected patients.^{1,4} In standard laparoscopic splenectomy,^{4,5} access ports are used, whereas in HALS, an additional minilap incision which is fitted with a special devise (LapDisc /Omniport) is used to allow a nondominant hand to be passed without loss of pneumoperitoneum.

The benefits of laparoscopic over open surgery included shorter hospital stay, less wound pain, quick return to work, less tissue trauma and related wound complications and better cosmetic results.²⁻⁴ Of recent single incision laparoscopic surgery (SILS) (Fig. 3) also known as single port access (SPA), single port surgery (SPS), laparoendoscopic single site (LESS), single port incisionless conventional equipment-utilizing surgery (SPICE), natural orifice transumbilical surgery (NOTUS), embryonic natural orifice transumbilical endoscopic surgery (E-NOTES), one port umbilical surgery (OPUS), has gained popularity among laparoscopic surgeons. In this technique, a



Fig. 1: Anatomy of spleen

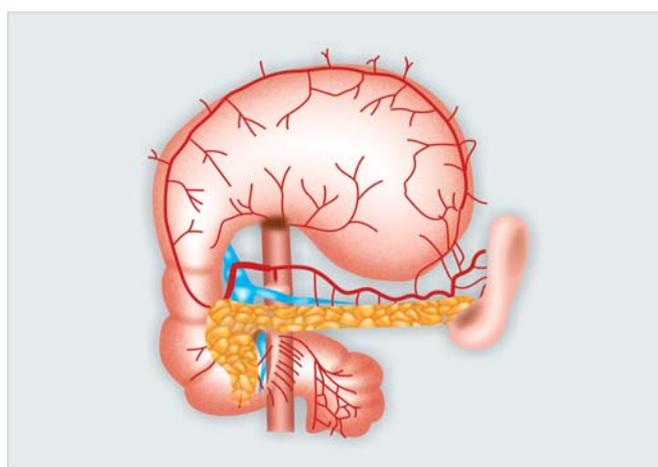


Fig. 2: Important vasculatures around spleen

special port is used in a single small open incision of about 2 to 3 cm through umbilicus and all instruments passed through it for performing an intra-abdominal operation (Fig. 4). However, the anatomical position of the spleen coupled by the limited and compromised ergonomics theoretically poses some challenges to the operating surgeon as the instruments are more delicate and manipulation angle small.^{1,5}

This study is aimed at reviewing the experience of SILS in performing splenectomy and its outcome.

AIMS AND OBJECTIVES

To review cases of single incision/single port splenectomy reported in the literature and analyze the outcome and complications. Specific objectives were to look at the access technique, duration of surgery, intraoperative complications, conversion rate, postoperative pain, postoperative hospital stay, cosmetic outcome and patient/parents acceptability.

MATERIALS AND METHODS

Literature search was done using Google, HighWire Press, Medscape, SAGES website and Hinari. All papers in which

splenectomy was done using single incision were found and included in the review. Other papers that had relevant literature to help in the review, such as series of comparative study between open and conventional laparoscopy, were also reviewed. Parameters of particular concern are:

Position of the patient, abdominal access technique, intra-operative complication, time of surgery, weight of the spleen, conversion, postoperative pain, duration of hospital stay and patient satisfaction.

RESULTS

A total of nine articles were found that were specific for single incision splenectomy, most were case reports and one small series of eight patients (Table 1). There was one series of 20 patients in a review of experience with single incision splenectomy in which six patients had splenectomy. In this review, total of 26 patients underwent splenectomy. Age of patients ranged from 7 months¹⁶ to 73 years.⁷ There were three conversions (11.56%), time of surgery ranged from 64 to 195 minutes (average of 129.5 minutes), 22 patients had access



Fig. 3: One of the ports (SILS) used for single incision laparoscopic surgery



Fig. 4: SILS port applied in the abdominal wall

Table 1: Single incision splenectomy cases

Author	Year	No. of patients	Age range	Access	Duration of surgery (mins)	Intraoperative complication	Blood loss	Conversion	Spleen weight	Hospital stay (days)
Rottaman S	2004	1	36	Umbilicus	NR	–	NR	NO	NR	–
Mallardi P	2009	1	24	LUQ	130	–	NR	NO	NR	–
Barbaros U	2009	2	25	Umbilicus	110,150 (130)	–	NR	NO	NR	2.5
Erica R	2009	2	–	Umbilicus	190	Adherent pancreatic mass	NR	1	NR	2
Dutta S	2010	6	8	Umbilicus	90	–	NR	NO	NR	2.5
Targoma EM	2010	8	26-73	Umbilicus	60-170 (97)	–	–	2	340-590 gm	2.5
Hansen N	2010	1	5	Umbilicus	84	–	Minimal	NO	NR	2
You YK	2010	3	38	ULQ	125-195 (151)	Gastric perforation	NR	NO	NR	NR
Srinkanth G	2011	1	20	Umbilicus	130	–	NR	NO	NR	2
Joshi Manishi	2011	1	7 months	Umbilicus	–	–	NR	NO	NR	4

through the umbilicus and four through the left quadrant along the anterior axillary line at the level of the umbilicus. Time of hospital stay was 2 to 5 days (average 3.5 days), weight of the spleen was reported only in one study of eight patients and ranged from 340 to 590 gm (average 485 gm).⁷ One intraoperative complication in which iatrogenic gastric perforation was reported but was managed laparoscopically.⁹ All reported good cosmetic outcome and patient/parents satisfaction.

DISCUSSION

Laparoscopic splenectomy (LS) is now considered a gold standard in splenectomy due to its superior benefits to the patient, namely small incision, minimal postoperative pain, short hospital stay, quick return to work, less infection rates and superior cosmetic outcome when compared to open splenectomy.^{2,5,6} The search for better cosmetic outcome has seen single incision laparoscopic surgery (SILS) gaining ground in many areas of surgery, including splenectomy. In SILS splenectomy, the patient is placed in supine semi left lateral position and the surgeon stands on the right side of the patient. Access port generally recommended at 5 cm lateral at the level of the umbilicus, however, this should take into consideration the size of the patient and the spleen, and should follow the base ball diamond concept for maximum task performance.^{1,4}

There is no randomized comparative study reported to date comparing conventional 4 to 5 port laparoscopic splenectomy (LS) to single incision laparoscopic (SILS) splenectomy. In this review, 26 patients that were reported, they were mainly case reports and small series of eight and 20 patients.^{7,8} The left lateral position was used by all surgeons, although in three cases, a change to supine position had to be adopted during conversion.^{7,9} The umbilicus was used for access by eight surgeons while two surgeons preferred left quadrant lateral to the umbilicus as this provided better visualization of the upper dorsal area especially in big spleens.^{9,18} I did not come across an agreed standard mode of reporting specifically laparoscopic splenectomy complication both intraoperative and post-operative. Using classification that was recommended for surgical operations by Clavien (Clavien Classification of Surgical Complication, 1992) and modified 2004,^{10,11} most of the reported complications in this review fall in grade I and only one patient was grade IIA as he required postoperative transfusion^{10,11} (Tables 2 and 3). The conversion rates depend on among other factors, the experience and level of confidence of the surgeon. In this review, the conversion rate was 11.5 (3 patients). In a comparison study between open (OS) and conventional laparoscopic splenectomy (LS), in which 25 patients had LS and 27 had OS, Maurus et al found almost a similar conversion

Table 2: Clavien classification of surgical complications

Grades	Complication
I	Alteration from the ideal postoperative course, non-life-threatening, no long lasting disability. Do not prolong hospital stay
II	Potentially life-threatening but without residual disability or requiring hospitalization more than twice the median stay for the procedure a. Only medical and noninvasive intervention b. Require invasive intervention
III	Life-threatening with residual disability, e.g. organ resection or persistence of life-threatening condition
IV	Death of a patient

Table 3: Modified Clavien classification of surgical complications

Grades	Description of complication
I	Any deviation from the normal postoperative course without the need for pharmacological treatment or surgical, endoscopic and radiological interventions Allowed therapeutic regimens are: Drugs as antiemetics, analgesics, antipyretics electrolytes and physiotherapy. Includes wound infection open at bed side
II	Requiring pharmacological treatment with drugs other than those allowed for grade I complications. Blood transfusion and total parenteral nutrition (TPN) included
III	Requiring surgical, endoscopic or radiological intervention a. Intervention not under general anesthesia b. Intervention under general anesthesia
IV	Life-threatening (including CNS), requiring IC/ICU management a. Single organ dysfunction (including dialysis) b. Multiorgan dysfunction
V	Death of a patient
Suffix "d"	If patient suffers from a complication at the time of discharge suffix "d" (for disability) is added to the respective grade of complication

of 8% (2 patients).¹² The duration of surgery ranged from 60 to 195 minutes which does not differ from what was found in two comparison studies by Maurus and Cogliandolo in LS.^{4,5,12} Some of the reasons that contributed to long operating time included inexperience of the surgeon, need to do combined procedure and iatrogenic gastric injury that was managed endoscopically.^{8,9} Exposure is one of the challenges in SILS splenectomy, Srinanth found that using a suture on the stomach helped to retract the stomach away and improve exposure of the splenic hilum.¹⁵ Short hospital stay is one of the advantages of laparoscopic procedures over open, in this review the median stay was 2.5 days which compares well with conventional LS.^{4,5,12} There was no good way of reporting pain, most surgeons reported moderate postoperative pain, Barbaros and Hansen reported postoperative pain of 2/10.^{13,14} Spleen retrieval was done by putting the spleen into an endo bag and morcellating with forceps except when the spleen was required for histopathology whereby an incision was extended to remove it in block.^{17,19} This predisposes the port site for possible future hernia as seen in the study of Erica in a 24 months follow-up of patient who underwent SILS surgery.¹⁹ Patient satisfaction with the cosmetic outcome at discharge and in the immediate postoperative period was reported to be very satisfactory by all.

CONCLUSION

Single incision laparoscopic splenectomy is gaining popularity, the review indicates it is a feasible procedure that can safely be done in patients of all ages with low morbidity and clear superior cosmetic outcome, at least in the immediate postoperative period. Additional exposure of the hilum of the spleen can be obtained by use of percutaneous suture to hold the stomach. The operating time is expected to continue to drop as surgeons get more confidence and used to the new and delicate instruments meant to compensate for the compromised ergonomics. The standard way of reporting on laparoscopic complication is lacking, the advantages of single incision splenectomy over LS need a well-balanced prospective cohort study with long term follow-up, before firm conclusions can be drawn.

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