Outcome of Laparoscopic Splenectomy in Treatment of Idiopathic Thrombocytopenic Purpura

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ABSTRACT

Background*: Idiopathic thrombocytopenic purpura (ITP) is one of the most serious diseases that might be life threatening and in most centers gains a priority in urgent evaluation and management. Steroids and immunosuppressant are the 1st line therapy for ITP and splenectomy is considered an alternative solution for unresponsive cases. In last decades laparoscopic splenectomy was suggested to be a safe and a convenient procedure for patients with ITP.* ***Objective:*** *To assess the response of platelet count to laparoscopic splenectomy in patients with idiopathic thrombocytopenic purpura and to record any intraoperative or postoperative bleeding or complications.* ***Patients and Methods:*** *This Prospective study included 25 patients with ITP (6 males& 19 females) with a mean age of 32.8 ± 16.2 years. They were admitted to the surgical department at Al Maadi Armed Forces Hospitals after failure of 1st line medical treatment. Mean platelet count preoperatively was 32,070 ± 15,810. All patients had increased megakaryocytes in bone marrow aspirate and normal spleen size by ultrasonography. Pneumococcal, meningococcal and haemophilus influenza vaccines were given to all patients 2 weeks prior to surgery. Intraoperative and postoperative bleeding or complications were recorded and platelet count was measured immediately, one week and four weeks postoperatively.* ***Results:*** *The mean platelet count rose on the first operative day in all patients to be 135.680 ± 41.230/ml. Patients were divided into good responders (nineteen patients where platelet count was >100,000) and poor responders (six patients where platelet count was <100,000). One patient (4%) developed significant intraoperative bleeding and the procedure was converted to open surgery with good postoperative course. No postoperative bleeding was recorded. One week later, the platelet count rose to be in the range of 240,000-365,000/ml in good responders (76%). In poor responders (24%) the platelet count showed rapid drop with a range of 34,000-41,000/ml and they were referred to the hematology department for further management.* ***Conclusion:*** *Laparoscopic splenectomy was found to be a safe and effective procedure in a considerable number of patients with idiopathic thrombocytopenic purpura after failure of medical treatment. A short hospital stay and a low intra-operative& postoperative complications were recorded.*

Keywords: *Idiopathic thrombocytopenic purpura, platelet, splenectomy, bleeding.*

INTRODUCTION

Idiopathic thrombocytopenic purpura is an autoimmune disease resulting in increased platelet degradation with a platelet count less than 100,000/ml in the absence of etiological factor with a well functioning bone marrow [(11& 13).]

A widely accepted mechanism of development of ITP is the opsonization of the platelets by autoantibodies followed by engulfment and subsequent degradation of platelets by the macrophages mainly in the spleen [(1).]

ITP affects 4 per 100,000 people per year and the patients usually present with subcutaneous (petechiae, purpura and bruising) or orificial bleeding (epistaxis, gastrointestinal or urinary), life threatening hemorrhage may occur and death rate due to severe bleeding was found to range from 1.6 to 3.9% per year [(2).]

The aim of treatment is to achieve a safe platelet count for each patient. The intention is not to normalize platelet count and full assessment of patient lifestyle, occupation, bleeding history, and other comorbidities should be done. Initial first line of treatment remains unchanged for decades and comprises steroids, intravenous immunoglobulin (IVIG) and other immunosuppressants [(2)]. However, a long term response is seen in only 20-40% of patients [(13)]. Therefore, splenectomy is considered a second line therapy for patients who are steroids resistant or dependent. The early response rate after splenectomy was 85-88% so, splenectomy was considered the backup therapeutic method for ITP

and laparoscopic operation was suggested to be safe and more feasible for those patients [16].

Proper preoperative preparation is mandatory to ensure sufficient platelet count to avoid intraoperative bleeding and to achieve a good postoperative outcome[8].

AIM OF WORK

To assess the response of patients with ITP after laparoscopic splenectomy by measuring early and late postoperative platelet count and to record any intraoperative bleeding, postoperative bleeding or complications.

PATIENTS AND METHODS

This is a prospective study that included 25 patients (6 males& 19 females) with ITP who underwent laparoscopic splenectomy after failure of non surgical treatment.

Patients were referred to the Surgical Department at Al Maadi Armed Forces Hospitals in the period between June 2016 and March 2018. The mean age of the patients was 35.1±13.3 years, platelet count was ranging from 17,000 to 46,000/ml with a mean of 31,500±15.8 and the duration of preoperative steroid therapy ranged from one to six month with a mean of 3.16 ± 1.67 month.

All patients included in the study were subjected to thorough history, proper clinical examination and basic preoperative investigations including complete blood count, prothrombin time, partial thromboplasin time, liver and kidney functions, blood glucose and electrolytes. Platelet count was assessed 24 and 8 hours before the operation and patients with platelet count less than 20,000/ml received platelets transfusion one hour before the operation. Informed written consent was obtained from all patients after being informed by average operative time, bleeding risk, and possibility of any intra-operative or postoperative complications. Platelet count was measured immediately, one and four weeks after the operation. The length of hospital stay and postoperative complications were recorded.

Operative technique:

Patient position

The patient is placed in right semilateral decubitus position with pillows between legs, the operation table is flexed 30 degrees at the flank. The operating surgeon and the camera operator stand on the right of the patient while the assistant stands on the left. Open laparotomy set was also prepared for potential conversion.

In all patients nasogastric tube was inserted in the stomach to decompress it after endotracheal intubation.

Access and port placement

Pneumoperitoneum was created using carbon dioxide that was insufflated using veress needle inserted through the umbilicus. The first port 12 mm (camera port) was inserted using visiport. Another three ports were placed , two of them 5 mm, one just to the left of midline (5-mm) and the other at midaxillary line while the third one was placed in between (12-mm). **(Fig 1).**

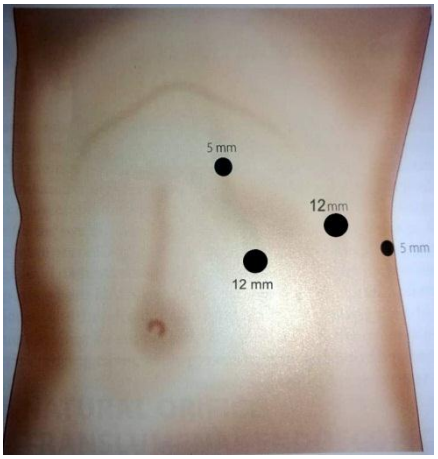

Fig. (1): Port placements for laparoscopic splenectomy

Division of ligamentous attachments

With the patient in Trendelenburg position the splenocolic ligament is dissected carefully to avoid injury of spleen or colon **(Fig. 2)**

Fig. (2): Dissection of splenocolic ligament

Splenorenal ligament is divided along the entire length of the spleen **(Fig. 3).**

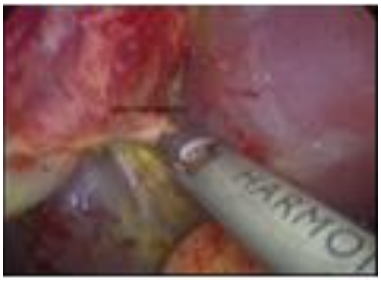

Fig. (3): Dissection of splenorenal ligament

An ultrasonic coagulator is used to divide the gastrosplenic ligament containing short gastric vessels along the greater curve of the stomach and finally the splenophrenic ligament is taken down to ensure full mobilization of the spleen. **(Fig. 4)**

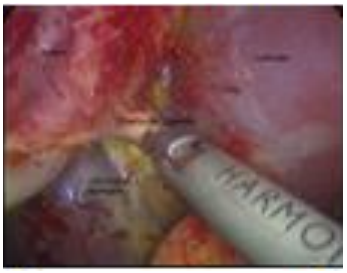

Fig. (4): Dissection of splenophrenic ligament

Dividing the splenic hilum

After splenic mobilization, the assistant retracts it to expose the hilum and determine its relation to the pancreatic tail. The vessels are then divided using endoscopic linear stapler with a vascular load (2.5 mm staples) **(Fig. 5)**.

Fig. (5): Securing splenic pedicle

The resected spleen was then placed in the retrieval bag, then the bag was partially pulled out through the 12 mm port and the spleen was crushed and removed **(Fig. 6)**

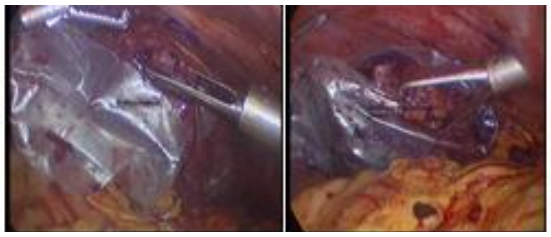

Fig. (6): Specimen of spleen in endobag

One drain was placed at the splenic bed and pneumoperitoneum was evacuated, all the trocars were removed under visual control. Trocar sites of 12 mm were sutured at the deep muscular level with Vicryl zero. In the recovery room the nasogastric tube was removed.

Post-operative:

After recovery, the patients were transferred to the ICU overnight for close monitoring. Feeding started 6 hours post-operative with early ambulation. Cefepime one gram every eight hours was given to all patients during the hospital stay. Diet started on the first postoperative day and advanced as tolerated.

Patients were discharged 3-4 days postoperatively and during this period they were observed for any postoperative bleeding, wound infection, fever, lung or abdominal complications. After discharge, they were followed up at outpatient clinic one and four weeks after the operation.

Statistical Analysis:

Patient's data was tabulated and processed using SPSS (17.0) statistical package for Windows 7.

Numerical data were expressed as mean ± SD.

P value >0.05 was considered insignificant

P value <0.05 was considered significant

RESULTS

The platelet count rose on the first operative day to be in the range between 74.000-217.000/ ml with a mean of 135.680 ± 41.230/ml. Patients were divided into good responders (nineteen patients where platelet count was >100,000) and poor responders (six patients where platelet count was <100,000). One patient (4%) developed significant intraoperative bleeding and the procedure was converted to open surgery,

received two units of blood with good postoperative course.

No postoperative bleeding was recorded.

One week later, the platelet count rose in good responders (76%) reaching 240,000-365,000/ml while the poor responders (24%) showed rapid drop in platelet count with a range between 34,000 and 41,000/ml and they were referred to the hematology department for further management.

Table (1): Demographic data of patients studied

Variable	
No of Patient	25
Gender	6 males (24%) 19 females (76%)
Age in years Range Mean ± SD	 17 - 47 32.8 ± 16.2

Table (2): Preoperative characteristics of the studied patients

Variable	Min.	Max.	Mean ± SD
Total leucocytic count ($10^{3)}$	4.9	10.2	6.2±1.5
Prothrombin concentration (%)	88%	97%	90.5±2.1
Fasting blood glucose (mg/dl)	82	105	93±10.5
S. creatinine (mg/dl)	0.7	1.12	0.9± 2.1
Potassium (mEq/L)	3.8	4.5	4.15±1.7
Sodium (mEq/L)	138	144	140±2.3
Aspartate transaminase (U/L)	19	35	26±8.3
Alanine transaminase (U/L)	16	37	25±10.2
Hemoglobin (gm%)	10.1	12.6	11±1.5

Table (3): Preoperative platelet count& duration of preoperative steroid therapy

Variable	Range	Mean ± SD
Platelet count on admission (10^{x3})	17 - 46	32.07±15.81
Duration of steroid therapy before operation (months)	1- 6	3.16±1.67

Table (4): Intraoperative data among the patients studied

Parameter	Range	Mean±SD
Operative time (in minutes)	80 - 100	90.96±9.65
Intra-operative blood loss (ml)	90 - 130	110 ± 20
Hospital stay in 24 patients (in days)	3 - 4	3.5 ± 0.5

Table (5): Platelet transfusion intraoperative and conversion to open surgery

Variable	No of patients	%
Platelet transfusion intra-operatively	6	24%
Conversion to open surgery	1	4%

Table (6): Comparison of platelet count pre and post-operative

Platelet count (10^3 ml) / **Time**	**Range**	Mean ± SD	**P value**
Preoperative	17 - 46	32.07 ± 15.81	0.0001
Operative day	74 - 217	135.68 ± 41.23	
One week postoperative (good responders 76%)	240 - 365	293.8 ± .43.7	
Four weeks postoperative (good responders 76%)	285 – 423	346.6 ± .39.2	

Poor responders were six patients (24%) who showed rapid decline of the platelet count one week after the operation to be in the range of 34,000- 41,000 and they were referred to the hematology department.

DISCUSSION

Idiopathic thrombocytopenic purpura is a disease characterized by destruction of platelet by autoantibodies leading to bleeding that ranges from little to severe and life threatening [(4)]. Treatment of ITP is indicated in patients with platelet count less than 30,000 with no bleeding, patients with platelet count 50,000 with mucosal bleeding or patients at risk of bleeding as peptic ulcer disease[(7).] The first line therapy is corticosteroids and patients usually respond initially but only 20% get a curable remission [(12).] Splenectomy is the second line therapy and usually induces a long lasting response [(15).] Laparoscopic splenectomy for ITP started at 1992 and the most challenging issues were the intraoperative bleeding from the splenic hilum but with the extended experience in operative technique, it is now considered a safe and feasible option for splenectomy in patients with ITP and its superiority over open technique with attributed to less postoperative hospital stay and early recovery[(11& 2).]

In the present study, we demonstrated a good platelet response in 76% of patients after laparoscopic splenectomy and this goes with the results of a previous study by Kojouri et al [(5)] and Kumar et al [(6)] who reported that the durable response rate was in the range of 50-70% according to the studied group and duration of follow up on the other hand, Qu et al [(10)] reported a higher response rate (91.3 %).

The mean hospital stay in the present study was 3.5 days in twenty four patients while one patient remained in the hospital for 8 days because the operation was converted to the open technique after considerable bleeding from splenic hilum. This short period of hospital stay was lower than that reported by Fernadale et al.[(3)] who reported that mean hospital stay was 4 days.

The mean operative time in present work was 90.96 ± 9.65 minutes and this is less that previously recorded by Rui et al [(14)] who reported a mean operative time of 146 minutes & Muhammed et al [(9)] where the operative time recorded was 150 ± 45 minutes.

Also intraoperative blood loss in the present study was in the accepted range (90-110 ml) except for one patient who bled significantly and the operation was converted to the open technique and this patient received two units of blood& 12 units of platelet intraoperative with stable postoperative course and full recovery. This mean blood loss was lower than the report of Rui et al[(14)] who said that mean blood loss in their patients was 200 ml. On the other hand, the blood loss in the present study was higher than that recorded by Yikun et al [(16)] who reported a blood loss of only 45 ml.

There was no postoperative complications and no deaths in present study and this supports the opinion that laparoscopic splenectomy is a safe option of ITP treatment. Also, the introduction of ultrasonic dissector and linear laparoscopic vascular stapler, skilled surgical and anesthetic techniques improved the procedure and make the operation much safer and intraoperative blood loss decrease significantly [(18).]

CONCLUSION

The present study showed that laparoscopic splenectomy is safe and effective treatment for ITP after failure of medical therapy. A short postoperative hospital stay, an accepted operative time& blood loss with absent postoperative complications makes laparoscopic splenectomy a good option in treatment of ITP. Non responders in the present study were less than 25% and were referred to the hematology department for further management.

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