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Laparoscopic Splenectomy in Children: Safety of Ligasure Usage

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ABSTRACT

Introduction: Laparoscopic splenectomy started to be more popular and nowadays it is the first choice for splenectomy in children. The main advantages of laparoscopic splenectomy over open approach are the shorter hospital stay, low complications and the cosmetic results despite the main concern of long operative time and the intra operative bleeding. **Aim:** The aim of this study was to report our experience with laparoscopic splenectomy in children's with hematological diseases using ligasure regarding vascular control safety, efficacy and complications rate. **Methods:** A retrospective study was carried out at Queen Rania Al-Abdullah Hospital for Children over the period from January 2017 to February 2019. Total number of 18 patients with hematological diseases underwent laparoscopic splenectomy using ligasure. Demographic data, complications and outcomes were collected to assess the advantages of ligasure usage for vascular control safety. **Results:** Out of 18 patients underwent laparoscopic splenectomy using ligasure (10 with spherocytosis, 4 with immune thrombocytopenic purpura [ITP], 3 with sickle cell anemia, 1 with hemangioma), from which number, 8 patients were males and 10 were females. Mean age was 6.7 years (ranges from 4.3 to 13.7 years). Mean operative time was 107 minutes (ranges from 70-180 minutes). There was no conversion to open splenectomy and no mortality. Intra operative blood loss was insignificant. **Conclusion:** Laparoscopic splenectomy using ligature is safe with excellent results in decreasing operative time, less complications and decrease incidence of intraoperative bleeding.

Keywords: Laparoscopy, ligasure, splenectomy.

1. INTRODUCTION

Laparoscopic splenectomy was performed primarily by Carroc, Philips and Semal in 1992 (1).

Since that time laparoscopic splenectomy started to be more popular and nowadays it is the first choice for splenectomy in children (2). The main advantages of laparoscopic splenectomy over open approach are the shorter hospital stay, low complications and the cosmetic results despite the main concern of long operative time and the intra operative bleeding (3, 4).

Many techniques were used to decrease the operative time and to control splenic vascularity like clips, suture ligature, ultrasonic shears, endovascular staplers and ligasure (5).

2. AIM

The aim of our study is to evaluate our experience in laparoscopic splenectomy in children using ligasure regarding it is effectiveness and safety in controlling blood vessels and decreasing operative time.

Also, the aim was to report our experience with laparoscopic splenec-

tomy in children's with hematological diseases using ligasure regarding vascular control safety, efficacy and complications rate.

3. METHODS

A retrospective study was conducted at Queen Rania Al Abdullah Hospital for Children, Amman, Jordan from January 2017 till February 2019. Laparoscopic splenectomy using ligasure was done for 18 children, out of this number of cases 10 patients were with spherocytosis, 4 with immune thrombocytopenic purpura (ITP), 3 with sickle cell anemia and 1 with hemangioma.

All of those patients had splenic span less than 15 cm. Pneumococcal vaccine was given to all patients at least 2-3 weeks before surgery.

A consent form was signed by parents after explanation the risk of surgery and possible complications.

Demographic data, results and outcome were analyzed for all patients to review our experience in using ligasure in laparoscopic splenectomy in children.

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Author	Publication year	Number of patients	Mean age in years	Mean operative time (min.)	Conversion rate
Khirallah [5]	2016	60	10.2	120	2
Gelmini [11]	2006	74	32.8	137	5
Misawa [12]	2009	30	47	143	2
Schaarschmidt[13]	2002	23	9.8	86	nil
Canda [14]	2009	14	NA	84.7	nil
Yuney [15]	2005	10	36	93	nil
Machado [16]	2010	12	28	126	nil
Aydin [17]	2008	19	37	107	3
Wang [18]	2008	32	36	70	nil
Barbaros [19]	2007	29	35	71.3	1
Our author	Not yet	18	6.7	107	Nil

Table 1. Reviewing the previous studies regarding using ligasure in laparoscopic splenectomy

Research ethics:

Approval was obtained from Ethical committee in Royal Medical Services (Ref. 3/2019, date 18/3/2019).

Surgical technique:

All patients were put on supine position with left side elevation of 45 degree. 5 mm port placed at umbilicus after creation of pneumoperitoneum using veress needle. We used 30 degree camera through this port. Second 5 mm. port at midway between umbilicus and right subcostal margin, and third port at epigastrium to elevate stomach, and forth 10 mm. port at left iliac fossa midway between umbilicus and anterior superior iliac spine.

At the beginning we open the lesser sac after stomach elevation to expose the distal pancreas and reaching the distal splenic vessels, and after identification the splenic artery we use ligasure to control and sealing it using two step technique by doing sealing at long segment and to transect the vessel distally. If the diameter of splenic artery more than 7 mm. we will go more distally. After splenic vessels transection we will transect short gastric vessels using ligasure with spleen mobilization from gastro splenic ligament then division of splenocolic ligament will be done. Splenic mobilization from lateral abdominal wall and diaphragm by ligasure. Spleen extraction by retrieval bag through left iliac fossa port where we can extend the wound to bring the spleen out from the abdominal cavity.

4. RESULTS

Out of 18 patients underwent laparoscopic splenectomy using ligasure. 10 patients with spherocytosis, 4 ITP, 3 sickle cell anemia and 1 with hemangioma. Nearly, 8 (44%) patients were male and 10 (56%) were female. Mean age was 6.7 years (range from 4.3 to 13.7 years). Mean operative time was 107 minutes (range from 70 to 180 minutes). No conversion to open. No intra operative bleeding. Nasogastric tube was removed on first day post-surgery and all patients started feeding and discharged to home on second or third day post-surgery.

5. DISCUSSION

Nowadays laparoscopic approach for splenectomy is the preferred method in the management of pediatric patients with benign hematological diseases requiring splenectomy due to the advantages of this approach over

the traditional open method such as shorter hospital stay, cosmesis and post-operative pain (6, 7). The main challenge in laparoscopic approach is the conversion rate and vascular control in highly vascularized and especial organ like spleen (8) Many modalities were developed to control splenic vascularity such as clips, endovascular staplers and bipolar vessel sealing devices (9). The use of ligasure as only modality in laparoscopic splenectomy aimed to leave nothing behind after splenectomy such as clips or staplers and also to decrease operative time with safer vascular control (10). Ligasure provides a combination of pressure and energy to fuse permanently vessels up to 7 mm. in diameter with average cycle of 2 to 4 seconds. Seals withstand up to three times normal systolic blood pressure (5). Bai Ji (10) reported in his series two step technique to control splenic vessels by applying ligasure at long segment and to transect vessels distally aimed for more safety, in our series we used the same way to provide more safety in vascularity control and we did not report any case of intra operative bleeding or delayed bleeding.

Romano (6) reported in his study a successful laparoscopic splenectomy using ligasure with no significant intra operative bleeding, in our series there was no intra operative blood loss and this is the main issue encourage us to continue using ligasure as the best choice in vascular control and splenic mobilization safely and quickly.

Gelmini (11) reported a 63 cases of laparoscopic splenectomy by ligasure with conversion rate of 7.9% but in our series we did not report any case of conversion and this is mostly due to the advancement of ligasure technology as we used the advanced Maryland type in addition to our experience in laparoscopy. During ligasure usage we did not report any case of vessels sharing or injury to pancreas tail and this is a major privilege over other modalities like endovascular staplers where we need to position the device in proper way over the hilar vessels which may lead to cause vessels sharing or injury to pancreas tail as it may be retained between the two jaws of stapler (12). The main advantage of ligasure is leaving nothing behind as Khirallah (5) reported in his study without the potential complications of clips or staplers. We can find an 11 studies including our study in literature about finishing splenectomy laparoscopically using ligasure as the only modality, and just 4 of these studies including our

study in pediatric age group (Table 1) (5, 11-19). Aydin (17) reported a mean operative time of 103 minutes and in our series we reported a mean operative time of 107 minutes which is shorter than usage of other modalities as Aydin mentioned in his study and this is due to usage the same device for sealing, dissection and cutting.

6. CONCLUSION

Ligasure usage in laparoscopic splenectomy is effective, safe, low complication rate and shorter operative time. Laparoscopic splenectomy in children using ligasure is safe for vascular control with advantage of minimal blood loss.

- **Author's ontribution:** W.M, S.K, G.K, A.Q, B.A gave substantial contributions to the conception or design of the work in acquisition, analysis, or interpretation of data for the work. W.M, A.R, N.S, A.G had a part in article preparing for drafting or revising it critically for important intellectual content, and W.M, S.K, A.R gave final approval of the revision to be published and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated
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