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ORIGINAL RESEARCH

Pediatric laparoscopic splenectomy: A 10-year single-center retrospective study.

Jenny Arboleda-Bustan[1], Eduardo Zambrano[1], Paúl Astudillo[2]
https://orcid.org/0000-0003-4448-2083 https://orcid.org/0000-0001-8380-6103

1. Department of Urology, Baca Ortiz Pediatric Hospital, Ministry of Public Health, Quito, Ecuador.
2. Department of Pediatrics, Metropolitan Hospital, Quito, Ecuador.

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Abstract

Introduction: Splenectomy is a standardized treatment in children with thrombocytopenia. In this manner, the laparoscopic method minimizes post-operative complications and its application has become widespread in the scientific community. The objective of this study was to describe the practice and usefulness of laparoscopic splenectomy in children with hematological pathology.

Methods: This retrospective, observational study was conducted at the Baca Ortiz Pediatric Hospital. We reviewed the medical records from the past 10 years of patients with an indication for surgical splenectomy. Demographic, clinical and outcome variables were analyzed using descriptive statistics.

Results: Fourteen patients who had undergone laparoscopic splenectomy were included in the study. Most of these patients were female with hematological pathologies such as spherocytosis and idiopathic thrombocytopenic purpura (ITP). In 50% of the cases, cholecystectomy was performed in addition to splenectomy. The surgical time ranged from 60 to 120 minutes.

Conclusions: Laparoscopic splenectomy is considered a complex technique within laparoscopic procedures, but it is ideal for patients with hematological pathology; thus, it should be the technique of choice. The advantages of laparoscopic splenectomy include shorter recovery time and hospitalization along with smaller surgical wounds.

Keywords: laparoscopic splenectomy, hematological disease, laparoscopic cholecystectomy, laparoscopy, splenectomy, children.

* Corresponding author.

Email: elizabethab2011@gmail.com (Jenny Arboleda-Bustan1) / Telephone: +593 99 807 2912. Colon Ave. and 6 de Diciembre Ave., Baca Ortiz Pediatric Hospital, Department of Pediatric Surgery. Postal code 170120

Introduction

The spleen is an intraperitoneal organ located in the upper left quadrant of the abdomen and is fixed in position by the splenorenal, splenocolic, splenophrenic and gastrosplenic ligaments. Its normal measurements are 11 centimeters on its major axis with a weight of 150 grams (75-150g). Surgical removal of the spleen for the treatment of hematological diseases has been established in multiple studies [1 -4] and the laparoscopic technique is considered the procedure of choice in many centers.

According to the medical literature, the first splenectomy was performed by Adrian Zacarelli in 1549 on a 24-year-old woman due to splenomegaly. Likewise, Nicolaous Mathias performed the first splenectomy due to trauma in the 17th century on a spleen that protruded through the flank [5]. Later in the 20th century, studies on splenic function were conducted allowing for greater security when performing the surgical procedure for hematological diseases such as spherocytosis and idiopathic thrombocytopenic purpura (ITP) [6].

Surgical splenectomy was not used for many years, mainly due to concerns about it representing a very invasive open surgical procedure. Now, with the laparoscopic technique in which a cholecystectomy can also be performed in the same surgical act, this procedure is being utilized more often.

The first laparoscopic splenectomy was described by Delaitre and Maignien in 19916. The procedure in children was described by Rothenberg in 1998 [7, 8]. This minimally invasive technique has many advantages and has become the procedure of choice for patients whose hematologic conditions require splenectomy. The largest series of laparoscopic splenectomy in pediatric patients with hematological diseases was published by Kuhne [9].

According to recommendations from the literature, it is advisable to wait until the patient is at least 6 years old before performing splenectomy. In cases of ITP diagnosis, the recommendations are to wait for one year of clinical treatment without response before performing this procedure.

Although the literature recommends surgery for patients with at least 50,000 platelets per milliliter [10–11], it should be noted that in the initial Rothenberg study, splenectomy was contraindicated when patients had less than 20,000 platelets per milliliter [7].

The objective of this study is to report our experience in the management of patients with hematological diseases who were candidates for splenectomy with a laparoscopic approach.

Population and methods

Study design

The study design is observational, cross-sectional, and retrospective.

Stage

The study was conducted in the Department of Pediatric Surgery at the Baca Ortiz Pediatric Hospital in Quito, Ecuador. The study period was from January 1, 2010 to May 30, 2020. The field period was considered as the recruitment and exposure period. The monitoring of results was closed on July 7, 2020 and the period of data collection ended on July 17, 2020.

Participants

We performed a database search for the medical records of patients with hematological diagnoses who had an indication for splenectomy. Patients with complete data in their clinical history and who had undergone the laparoscopic splenectomy procedure in the institution's Surgery Department were selected.

Variables

The variables were descriptive and demographic. They included clinical variables, such as indication for splenectomy and days of hospitalization, in addition to surgical variables, such as the type of procedure.

Data Sources / Measurement

For each variable, the institutional software for the registration of clinical records was used as a data source. Also, the electronic clinical records and physical records were consulted. The data were compiled in an electronic sheet and later transferred to the statistical software.

Surgical technique

There are two acceptable ways to approach the spleen during surgery: the supine position and the right

lateral decubitus with a roll under the left flank added to the lateral rotation of the surgical table until a 45-degree position is achieved with inverted Trendelemburg. Subsequently, the placement of 4 ports is performed (see Fig. 1), the pneumoperitoneum is generated, and the zero-degree lens is used for a wide-vision search for accessory spleens. The stomach is retracted to the right and the gastrosplenic ligament is evaluated, followed by the gastrocolic, the greater omentum, and the splenophrenic (see Fig. 2). Then, it is important to review the left side of the mesentery, the mesocolon, the pelvis, the area of the left inguinal ring, and the left annex. By opening the gastrosplenic ligament, the splenic pedicle behind the tail of the pancreas can be assessed.

Fig. 1 Placement of trocars. Note the triangular arrangement

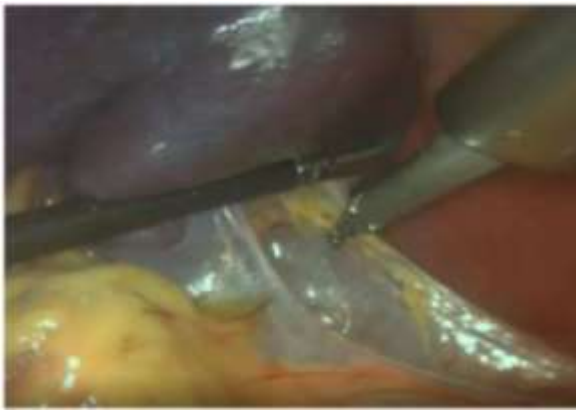

Fig. 2 Dissection of the gastrosplenic ligaments.

The dissection has five steps: dividing the short gastric vessels, sectioning of the splenocolic ligament, ligation of the inferior polar vessels, control of the hilum, and division of the splenophrenic ligaments. It is necessary to use the harmonic scalpel several times to achieve sectioning of the short vessels. The splenocolic ligament is sectioned, leaving a small segment to fractionate.

Dissection of the splenorenal ligament follows, and then the inferior polar vessels are cut. Vascular staples are placed in the splenic artery and vein. At this point, dissection of the short vessels and phrenic ligaments is completed. The spleen is removed by morcellation into a plastic bag. Special care must be taken to avoid fracture of the spleen or intracavitary dissemination to prevent the appearance of splenosis. In any case, the anterior approach is considered to have more advantages than risks and is the most widely used (shown in Fig. 1).

Control of sources of bias.

Medical records with incomplete data were excluded so the imputation of lost or excluded data was avoided. The protocol of this study was pre-approved by the Institutional Teaching Committee.

Study size

The sample was non-probabilistic, in which all potentially eligible cases from the Pediatric Hospital were included.

Management of quantitative variables

The quantitative variables, in scale, are presented with averages and standard deviations. Nominal quantitative variables are presented as frequency and percentage.

Statistical Methods

Descriptive statistics were used. The statistical package used was SPSS v.22 for Windows.

Results

Participants

The number of patients included in the study was 14 cases. The cases that were not included in the study are presented in Figure 3.

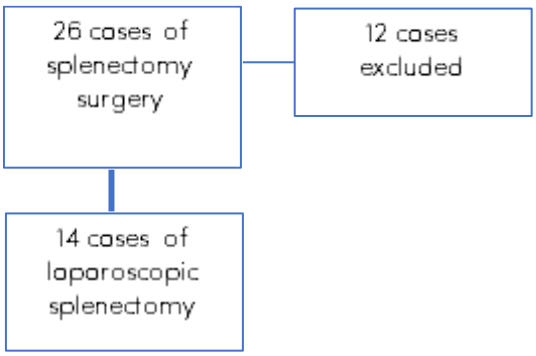

Fig. 3 Flowchart of the sample population.

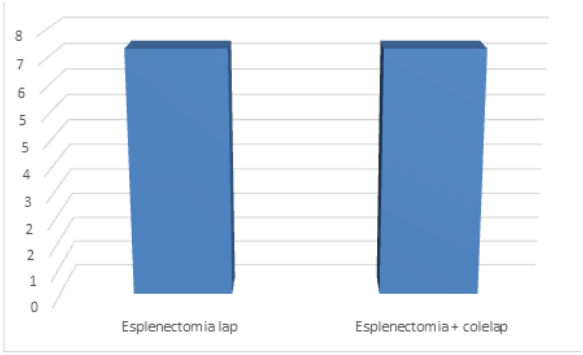

Fig. 4 Bar chart of the type of surgery.

Characteristics of the sample population

There were 14 cases, of these, 12 cases (86%) were female and 2 cases (14%) were male. The age of the patients ranged from 8 to 13 years. The children's schooling was primary school.

Main results

The indication for splenectomy was spherocytosis in 10 cases (71.4%) and idiopathic thrombocytopenia purpura in 4 cases (28.6%). Of the spherocytosis patients, 60% were black. All patients had received vaccines against pneumococcus and Haemophilus influenzae. Additionally, benzathine penicillin was administered to all patients during the preoperative period. A single criterion for admission to surgery was platelets >20,000 per milliliter.

All patients were operated on in the same position and with the same technique. Cholecystectomy was performed in 7 of the patients alongside splenectomy (Figure 4). The surgical times ranged from 60 to 120 minutes. When a cholecystectomy was also performed, the surgical time was 120 minutes. There were no complications. No patients in this study required open surgery. There was no mortality in the study group.

Discussion

In recent years, many pediatric abdominal surgical procedures that use conventional techniques could be performed using laparoscopy. The benefits are well known. The main advantages are less post-surgical pain, shorter hospitalization times, and better cosmetic results. In the present study, most of the intervened patients had a hospital stay of 24-36 hours. The largest previous study of laparoscopic splenectomy in pediatric patients with hematological diseases was published by Kuhne [9].

In this report, we followed the recommendations of Rothenberg [7] so our patients had a platelet number greater than 20,000 per milliliter before their operation [11].

Laparoscopic splenectomy is considered a complex technique within laparoscopic procedures and requires a long period of training. According to Delaitre [3], 15 laparoscopic splenectomies are required to complete the learning curve. The conversion rate to open surgery varies greatly, from 3.4% to 44%, with an average of 8.8%, and the main cause for this conversion was bleeding. Conversion to open surgery is more common when there is bleeding greater than 30 milliliters or when a trans-surgical transfusion is required.

The best candidates for laparoscopic spleen surgery are those patients without splenomegaly, although its presence is not a contraindication.

It is important to conduct an internal search for accessory spleens during this surgery. Miles, Rothenberg and Murauski13 all report that for experienced surgeons the surgical time is between 100 and 120 minutes, which can be compared with the average time in this report. It should be taken into account that in this study a cholecystectomy was also performed in 50% of the cases due to gallstones. This rate is similar to those reported by Patkowski and Rescorla [12-13].

As seen in other studies, spherocytosis and ITP were the indications for the procedure [4].

The published overall mortality ranges from 0 to 14%. The published perioperative mortality is less than 1%. In this report, operative or perioperative mortality was not observed [13].

Conclusions

Laparoscopic splenectomy is considered a complex technique within laparoscopic procedures, but it is ideal for patients with hematological pathology; thus, it should be the technique of choice. The advantages of laparoscopic splenectomy include a shorter recovery time and hospitalization period, along with smaller surgical wounds.

Abbreviations

ITP: Idiopathic Thrombocytopenic Purpura.

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Authors' contributions

JAB: Research idea, article writing, critical analysis, editorial corrections.
EZ, PA, Data compilation, literature review.
PA critical analysis, editorial corrections.
All authors read and approved the final version of the manuscript.

Authors information

Jenny Arboleda- Bustan, Physician from the National University of Loja, Specialist in Pediatric Surgery from the International University of Ecuador, Master in Medical Emergencies from the University of Guayaquil, Master in Pediatric Urology. Medical Surgeon Urologist - Pediatrician of the Baca Ortiz Pediatric Hospital, Ministry of Public Health of Ecuador. Email: elizabethab2011@gmail.com https://orcid.org/0000-0002-6605-5173
Eduardo Zambrano, Pediatric Surgeon, head of Pediatric Surgery from Baca Ortiz Pediatric Hospital.
Paúl Astudillo, Pediatric Surgeon, Pediatric Surgeon from the Metropolitan Hospital.

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Availability of data and materials

The datasets generated and/or analysed during the current study are not publicly available due participant confidentiality but are available from the corresponding author on reasonable request.

Ethical statements

Protection of persons

The authors declare that the procedures followed were in accordance with the ethical standards of the responsible human experimentation committee and in accordance with the World Medical Association and the Declaration of Helsinki.

Confidentiality of the data

The authors declare that they have followed the protocols of their work center on the publication of patient data.

Consent for publication

The authors have obtained the informed consent from the guardians of the patient referred to in the article. This document is in the possession of the corresponding author. The parents have signed the authorization for publication of this case.

Competing interests

The authors have no competing interests to declare.

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