

# CFIRUGÍA PARAGUAYA

English version

Vol. XLVI

Nº2

Agosto 2022

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Scientific body of the  
Paraguayan Society  
of Surgery  
(SOPACI)

ISSN 2070-8785

ISSN 2307-0420 (en línea)

# CIRUGÍA PARAGUAYA

Scientific body of the  
Paraguayan Society of Surgery

Founded on October 6, 1970

Volume XLVI  
Number 2  
August 2022

ISSN 2070-8785  
ISSN 2307-0420 (on line)

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## Publish in english in Paraguay

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English has established as the predominant language of publications, a *lingua franca*. Ninety per cent of all journals are published in English.<sup>(1)</sup> Therefore, researchers who want their studies or results to be publicized, are almost forced to publish in English in an effort to gain global recognition.

The production of high-quality articles in indexed journals to eventually achieve a greater number of citations or impact factor is often the assessment method used.<sup>(2)</sup>

Having said this, it would seem that these objectives can be achieved in publications abroad setting aside local journals as publication targets.

#### WHERE SHOULD I PUBLISH? ENGLISH

Publishing in English in foreign journals it would be possible to access a larger audience of colleagues whose mother tongue is English, but non-native users of the language as well, theoretically, to have a global scope.

We should mention here though that publishing in English is not a synonym for global access. Several cases have been described of Latinos with good papers published abroad with very little repercussions.<sup>(3)</sup>

Publishing only in English also makes it difficult to understand and spread publications for professionals who are not English-speakers.

#### WHERE SHOULD I PUBLISH? SPANISH

Publishing in one's native language facilitates greater ac-

cess to people who are not from the academic world: journalists, and research professionals, thus achieving greater access to the information on a local and national scale.

In addition, it would be very important when the studies can have greater relevance at the local level compared to the global one or, for example, when it comes to making decisions in the scope of local public health.<sup>(1)</sup>

Our country is already bilingual (Guarani and Spanish). English tends to be a third language, which makes its universal understanding difficult. Therefore, students and residents should have updated publications available in their mother tongue for better understanding and learning.<sup>(3)</sup> Also, the interest of publishing in our mother tongue lies in the importance of keeping an identity of our own.

#### REVISTA CIRUGÍA PARAGUAYA IN SPANISH OR IN ENGLISH

It has been confirmed that authors with greater skills in English have better results compared to those with fewer writing skills.<sup>(4)</sup> Therefore, we have decided to publish our journal *Revista Cirugía Paraguaya* in both Spanish and English to minimize that barrier local researchers have regarding global access. All articles will be published in both languages with no cost for the authors to give greater global access to the journal's manuscripts without having to renounce the identity of the journal.

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# Application of the parkland grading scale in video laparoscopic cholecystectomies

## Aplicación de la escala de parkland en colecistectomías videolaparoscópicas

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### ABSTRACT

**Introduction:** The Parkland grading scale is an intraoperative visual scale to prevent complications in video laparoscopic cholecystectomies.

**Materials and Methods:** it is an observational, descriptive, cross-sectional, temporarily retrospective study. The Parkland grading scale was applied in patients undergoing video laparoscopic cholecystectomies at the Hospital de Clínicas Surgery Unit (Paraguay) during the year 2021.

**Results:** 267 patients were studied who had undergone video laparoscopic cholecystectomy; 29.59% of them showed Grade I classification, 37.83% Grade II, 18.73% Grade III, 10.49% Grade IV, and 3.37% Grade V. The surgery performed was total video laparoscopic cholecystectomy in 95.13% of the cases, with a conversion rate of 4.49%. Having a past medical history obstructive jaundice of lithiasic origin, hyperbilirubinemia, elevated alkaline phosphatase levels, increased BMI, type of surgery (scheduled/emergency), diagnosis of acute cholecystitis, time of surgery, surgery performed, and use of cavity drainage increases the Parkland grades ( $p < .05$ ). **Conclusion:** The Parkland grading scale makes it possible to decide on the early surgical strategy in the intraoperative period and make comparisons of the results and reports of fairer rates of complications.

**KEY WORDS:** Parkland, cholecystectomy, minimally invasive, complications.

### INTRODUCTION

Video laparoscopic cholecystectomy is one of the most commonly performed surgical procedures worldwide and it is the treatment of choice for the management of symptomatic ve-

sicular lithiasis.<sup>(1)</sup> Although it is a very common procedure in surgery units, difficulty can vary from patient to patient due to factors such as comorbidities, anatomical variations or the presence of a significant inflammatory process in the intraoperative period.

Currently, the reported rate of complications of laparoscopic cholecystectomy is uniform, that is, it does not take into account the complexity of the case; therefore, a difficult emergency surgery with multiple adherences with greater chances of complications in the postoperative period is coded the same as a scheduled surgery in a patient without comorbidities, without a significant inflammatory process and whose estimated duration for extraction purposes could be around 30 min.<sup>(2)</sup>

Several preoperative scales have been developed in an attempt to predict both the intra- and postoperative results; however, few of these scales take into account intraoperative anatomical differences.<sup>(3-5)</sup> Also, they are not used much in the routine daily practice since they are complex, hard to remember, and do not allow effective comparisons of results to be made.

In view of these problems, the Parkland grading scale<sup>(6)</sup> emerges as a five-level grading system based on anatomical and intraoperative inflammatory changes. It is easy to implement and highly reproducible (Table 1). The characteristic trait of this classification is that it makes it possible to classify the degree of severity with an early vision when surgery begins, which

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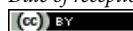
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Date of reception: 03/03/2022 - Date of approval: 12/05/2022

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is useful to change the early surgical strategy intraoperatively.<sup>(7,8)</sup>

Our objective is to use this scale and apply it to patients undergoing video laparoscopic cholecystectomy at Hospital de Clínicas, Paraguay during 2021, taking into account that many of the patients that come to our service lack healthcare access and knowledge on the disease, which leads to late medical consultation eventually leading to surgery with greater risk of complications and conversion.

We believe that, if it is determined that this scale is based on gallbladder anatomy and the degree of inflammation is valid and reliable, it will facilitate making result comparisons and reports on the rates of complications that are fairer.

## MATERIAL AND METHODS

This was an observational, descriptive, cross-sectional, temporarily retrospective study, which sought to apply the Parkland grading scale on video laparoscopic cholecystectomies performed at the Hospital de Clínicas Surgery Unit (Paraguay) during 2021. The inclusion criteria were patients > 18 years who had undergone video laparoscopic cholecystectomy at the Hospital de Clínicas Surgery during 2021. And the exclusion criteria were health records with a state of conservation that made them difficult to read. Data curation was conducted at Hospital de Clínicas General Archive Unit, where the records from all the patients who met the inclusion criteria were requested, so that later on, the records showing exclusion criteria could be discarded.

The variables considered were sex, age, BMI, comorbidities, evolution hours prior to surgery, type of surgery, prior history of acute biliary pancreatitis (ABP) or jaundice, white cell count, neutrophil count, liver profile, Parkland classification,<sup>(6)</sup> the surgery performed, conversion to open surgery, surgical time, postoperative complications, perioperative cholangiography, postoperative diagnosis, and hospitalization time.

The statistical software package SPSS 21\* was used for data study and tables were made on Microsoft Excel 365\*. The descriptive analysis used absolute frequencies, percentages, means, standard deviations, and medians. To evaluate the distribution of quantitative variables, the Kolmogorov-Smirnov test was used, considering  $P > .05$  as significant values. The chi-square test was used to compare proportions, and the Mann Whitney U test was used to compare ranges, in both cases  $P$  values  $> .05$  were considered statistically significant.

During the casuistry of the present study, bioethical principles were observed at all times. The mechanism by which the patients were given guarantees are listed below; the principle of Beneficence was respected when results were shown to the corresponding authorities so that eventually decisions could be made; the principle of Non-Maleficence, by not publishing or presenting each patient's results nominally, thus safeguarding the confidentiality of the data included in each patient's medical history; and ultimately, the principle of Justice, by giving all patients the opportunity to participate without discriminating anyone on the basis of race, sex, religion or political ideologies.

We should mention that patients whose records were used for this study came to the hospital free and voluntarily, and they underwent the surgical procedures after giving their corresponding consent, as part of their healthcare.

## RESULTS

A total of 267 patients were studied. These patients had undergone a video laparoscopic cholecystectomy during the year 2021 at the San Lorenzo Hospital de Clínicas Clinical Surgery Unit, Paraguay.

A total of 86.2% out of all the patients were women, with an overall mean age of 38.87 +/- 13.52 years; median, 37 years. The average body mass index was 28.19 +/- 6.56 Kg/m<sup>2</sup>; median, 26.25 years. The mean evolution before surgery was 41.16 +/- 36.23 hours; median, 24 hours; 68.05% of the surgeries were programmed, 18.18% had a history of ABP and 16.29% a history of obstructive jaundice of lithiasic origin.

A total of 36.88% of the patients had at least one comorbidity, the most common being high blood pressure and obesity, 54.64% and 47.42% respectively. Regarding the white cell count, we saw leukocytosis in 24.5% and neutrophil counts > 80% in 13.86% of the cases. Hyperbilirubinemia was present in 9%, elevated transaminase levels in 10.9%, and elevated alkaline phosphatase levels in 15.27%.

Regarding the Parkland classification, 29.59% had Grade I classification, 37.83% Grade II, 18.73% Grade III, 10.49% Grade IV, and 3.37% Grade V (Table 2). The surgery performed was total video laparoscopic cholecystectomy in 95.13% of the cases, conversion to open in 4.49% and opening and closing in 0.37%. Among the main causes for conversion, we can mention failure to identify Calot's triangle structures due to firm adhesions in 4 patients and inflammatory adhesions attached to other organs such as the colon, the stomach and/or the duodenum in 3 patients.

The mean surgery time was 88.61 +/- 42.5 min; median, 75 min. Cavity drainage was performed in 6.79%, there were complications in 3%, POC was performed in 12.86%, the postoperative diagnosis was acute cholecystitis in 34.7%, and hospitalization stay until discharge was 2.28 +/- 4.89 days; median, 1 day.

Regarding variable comparison, we should mention that all quantitative variables had a non-normal distribution; therefore, only non-parametric tests were performed. No significant differences were observed in the different Parkland classifications regarding proportions of sex or the presence of a history of ABP, or elevated transaminase levels or the presence of complications ( $P > .05$ ). No differences were observed among the ranges of age distributions either or in the days of evolution or in the hospitalization stay time ( $P > .05$ ) (Table 3).

However, significant differences were observed in the proportions of the type of surgery in the Parkland grades. It was seen that the greater the grades, the more emergency surgeries performed ( $P < .05$ ). The same is observed in the history of lithiasic obstructive jaundice, hyperbilirubinemia, and elevated levels of alkaline phosphatase, whose proportions grow as the Parkland grade increases ( $P < .05$ ) (Table 3).

Regarding the proportions of cavity drainage usage, conversion to open surgery, and the diagnosis of acute cholecystitis, we see that they go up in greater Parkland grades ( $P < .05$ ) (Table 3).

Significant differences were observed in BMI ranges and surgical times with respect to Parkland grades, observing greater indexes and times with greater grades ( $P < .05$ ) (Table 3).

## DISCUSSION

Video laparoscopic cholecystectomy is one of the most common surgical procedures worldwide.<sup>(1)</sup> Although it seems to be a simple procedure especially for beginner surgeons, it is often a delicate, difficult procedure even for the most experienced ones. Anatomical variability and the inflammatory process are factors that play a key role, and are associated with the need for conversion and surgical results.<sup>(6)</sup>

Several scales with preoperative risk factors have been described and validated so far; however, only a few scales such as that of Randhawa et al.<sup>(9)</sup> have taken in consideration intraoper-



ative factors; nevertheless, these scales are not very often used in the routine daily practice due to their complexity; in addition, they do not allow effective result comparisons.<sup>(10)</sup>

The scales that take into account intraoperative factors have the advantage that they make it possible to take the instantaneous decision of converting to open surgery or that the surgery can be performed by a more experienced surgeon to decrease the potential risk of intra- and postoperative complications.<sup>(11)</sup>

Considering our findings, we observe that most patients were categorized as Grade II within the Parkland Grading Scale, which is consistent with other studies,<sup>(12,13)</sup> and the least proportion of patients was categorized as Grades IV and V, findings similar to those published by other authors,<sup>(10)</sup> We believe, however, that when applying this scale surgeries should be subclassified as scheduled and emergency surgeries, since our study showed significant differences in the proportions of the type of surgery (scheduled or emergency) with Parkland grades, and it was observed that the greater the grade, the greater the proportion of emergency surgeries performed.

**Table 1.** Parkland Grading Scale

Grade	Description of severity
1	Normal appearance of gallbladder -without adhesences present
2	Smaller adhesences in the neck, other than that, normal gallbladder - Adherence limited to the neck or lower portion of the gallbladder
3	Presence of any of the following: -Hyperemia/ Pericholecystic fluid/Bodily adhesences/Gallbladder distension
4	Presence of any of the following: -Adhesences covering most of the gallbladder -Grade I-III with abnormal liver anatomy, intrahepatic vesicle or Mirizzi
5	Presence of any of the following: - Perforation/Necrosis/Inability to see the gallbladder due to adhesences

**Table 2.** Intraoperative findings in video laparoscopic cholecystectomies using the Parkland Classification. (n=267)

Parkland's Classification	Frequency	Percentage
I	79	29.59
II	101	37.83
III	50	18.73
IV	28	10.49
V	9	3.37
Total	267	100

Also, we verified a significant increase in the time of surgery, conversion to open surgery, and use of cavity drainage associated with greater grading scores. Moreover, Madni et al.,<sup>(10)</sup> in their prospective validation, showed longer surgical times, difficult surgeries, and need for subtotal cholecystectomies. However, they also found an association with longer hospital stays, which is not consistent with our study. This difference can be due to the fact that in our series of the postoperative complications we had, surgical site infections were confirmed at the outpatient follow-up. There were no reinterventions due to hemorrhage, 1 case of bile duct injury (Strasberg D) associated with Grade V in the Parkland grading scale diagnosed in the intraoperative period and eventually resolved. Also, there was only one case that required reintervention due to biliary peritonitis. The remaining patients were discharged on their first postoperative day with or without oral antibiotics depending on the postoperative diagnosis.

In a recent published study, Baral et al.<sup>(13)</sup> used the Parkland grading scale in a rural community of a developing country and found a significant increase of conversion to open cholecystectomy and longer surgical times which is consistent with our study. However, they also found an association with postoperative biliary leak with greater grades on the Parkland grading scale. In our series we only had 1 case of diagnosed postoperative biliary leak that required reintervention (a case of Grade I on the Parkland grading scale).

Lee et al.<sup>(12)</sup> confirmed that the grades on the Parkland grading scale and the degree of severity of acute cholecystitis according to the Tokyo Classification<sup>(14)</sup> were correlated with statistical significance and they concluded that the Parkland grading scale is useful to determine the severity of acute cholecystitis, and that patients with grade IV or grade V on the Parkland grading scale have a high risk of moderate or severe acute cholecystitis. Although we did not use the Tokyo classification in our study, we did observe significant differences in the proportions of the type of surgery in the Parkland grades, and it was observed that the greater the grade the greater the proportion of emergency surgeries and diagnosis of acute cholecystitis.

Among the limitations of our study, we can mention the small size of the sample and the fact that it is a one-center study. In addition, we did not have a strict follow-up of the patients after they were discharged.

Although the Parkland grading scale is made up of reasonable elements, some intraoperative factors have not been considered like Calot's triangle fibrosis, which is the leading cause for conversion to open surgery in our series or the presence of fistulae. These are conditions that complicate surgery and could have an impact on intra- and postoperative complications. If these factors were included in the scale, we believe that a more precise classification of intraoperative severity would be possible.

More validation studies together with multicenter data could outline the potential of the Parkland grading scale and confirm its reliability and applicability worldwide.

## CONCLUSION

A total of 86.2% out of 267 patients were women with an average general age of 38.87 years, and a BMI of 28.19. A total of 68.05% of the surgeries were scheduled. The most common comorbidities were high blood pressure (54.64%) and obesity (47.42%).

The surgery performed was total video laparoscopic cholecystectomy in 95.13% of the cases, with a conversion rate of 4.49%.

**Table 3.** Variables studied stratified according to Parkland's classification. n=267

Variable		Parkland's Classification					P
		I	II	III	IV	V	
Sex	Women	74 (93.7%)	87 (86.1%)	41 (82%)	21 (75%)	7 (77.8%)	.095
	Men	5 (6.3%)	14 (13.9%)	9 (18%)	7 (25%)	2 (22.2%)	
Age	Mean	35.63	39.63	41.18	39.50	41.11	.153
	SD	10.71	14.90	14.14	12.03	15.99	
BMI	Mean	27.88	27.43	28.37	28.63	37.01	.001
	SD	4.91	5.22	4.29	9.81	17.70	
Days of evolution	Mean	33.45	47.82	28.41	50.12	56.00	.161
	SD	24.11	42.20	24.21	43.93	36.66	
Type of surgery	Programmed	63 (79.7%)	70 (70.7%)	27 (54%)	14 (50%)	6 (66.7%)	.007
	Emergency	16 (20.3%)	29 (29.3%)	23 (46%)	14 (50%)	3 (33.3%)	
History of APB	Yes	11 (14.1%)	16 (16.2%)	9 (18%)	7 (25.9%)	4 (44.4%)	.166
	No	67 (85.9%)	83 (83.8%)	41 (82%)	20 (74.1%)	5 (55.6%)	
History of lithiasic obstructive jaundice	Yes	7 (8.9%)	14 (14.1%)	6 (12.2%)	12 (44.4%)	3 (33.3%)	.000001
	No	72 (91.1%)	85 (85.9%)	43 (87.8%)	15 (55.6%)	6 (66.7%)	
Hyperbilirubinemia	Yes	6 (7.6%)	5 (5%)	4 (8%)	6 (21.4%)	2 (22.2%)	.044
	No	73 (92.4%)	96 (95%)	-92%	22 (78.6%)	7 (77.8%)	
Elevated transaminase levels	Yes	7 (9%)	10 (10%)	4 (8%)	6 (21.4%)	1 (11.1%)	.394
	No	71 (91%)	90 (90%)	46 (92%)	22 (78.6%)	8 (88.9%)	
Elevated alkaline phosphatase levels	Yes	12 (15.4%)	9 (9.2%)	7 (14.3%)	9 (33.3%)	2 (22.2%)	.038
	No	66 (84.6%)	89 (90.8%)	42 (85.7%)	18 (66.7%)	7 (77.8%)	
Use of cavity drainage	Yes	1 (1.3%)	3 (3%)	4 (8%)	5 (18.5%)	5 (62.5%)	.000001
	No	77 (98.7%)	98 (97%)	46 (92%)	22 (81.5%)	3 (37.5%)	
Conversion to open surgery	Yes	0 (0%)	4 (4%)	2 (4%)	4 (14.3%)	2 (22.2%)	.002
	No	78 (100%)	97 (96%)	48 (96%)	24 (85.7%)	7 (77.8%)	
Surgical time	Mean	75.31	77.14	102.48	117.89	158.57	.0000001
	SD	30.32	36.69	43.63	47.07	49.56	
Complications	Yes	3 (3.8%)	2 (2%)	2 (4%)	1 (3.6%)	1 (11.1%)	.669
	No	76 (96.2%)	99 (98%)	48 (96%)	27 (96.4%)	8 (88.9%)	
Postoperative diagnosis	Acute Cholecystitis	2 (2.5%)	31 (30.7%)	37 (74%)	17 (60.7%)	6 (66.7%)	.000001
	Others	77 (97.5%)	70 (69.3%)	13 (26%)	11 (39.3%)	3 (33.3%)	
Hospitalization stay (time)	Mean	1.95	2.44	2.17	2.46	3.38	.922

When applying the Parkland classification, the most frequent grade was grade II with 101 patients. Grades I and II represent more than 2/3 of the patients.

When stratifying according to the Parkland scale grades, there were significant differences in the following variables: BMI, type of surgery (emergency vs scheduled), history of jaundice, hyperbilirubinemia, elevated alkaline phosphatase levels, surgical time, use of cavity drainage, conversion to open surgery, and diagnosis of acute cholecystitis in the operative piece.

All the authors participated equally preparing this study, and they did not declare any conflicts of interests.

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# Rate of early complications of endoscopic retrograde cholangiopancreatography at the Hospital Nacional de Itaugua, Paraguay from 2013 through 2017

## *Incidencia de complicaciones precoces de la colangiopancreatografía retrógrada endoscópica en el Hospital Nacional de Itauguá. Periodo 2013-2017*

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### ABSTRACT

**History:** Endoscopic retrograde cholangiopancreatography (ERCP) is a very widely used technique very efficient to treat biliary and pancreatic duct obstruction. However, it is no stranger to risks for the patient. **Objectives:** To find out the rate of ERCP-related complications in patients from the Endoscopy Unit at Hospital Nacional de Itauguá, Paraguay from 2013 through 2017. **Materials and methods** Descriptive, retrospective, and cross-sectional study conducted in 945 ERCPs performed from 2013 through 2017 at the Endoscopy Unit from Hospital Nacional de Itauguá, Paraguay. **Results:** The rate of early post-ERCP complications was 5.2%, acute pancreatitis—the most common one—3.38% followed by hemorrhage (0.95%), acute cholangitis (0.42%), and perforation (0.31%). **Conclusions:** The rate of post-ERCP complications at Hospital Nacional de Itauguá, Paraguay is low, being acute pancreatitis the most common complication and conservative management the most widely used. No deaths were reported in this study and no laparotomy was necessary.

**Keywords:** Endoscopic retrograde cholangiopancreatography, complications, choledocholithiasis.

### INTRODUCTION

Endoscopic retrograde cholangiopancreatography (ERCP) is an endoscopic technique used in the diagnosis and treatment of biliopancreatic conditions.<sup>1</sup> It is indicated in patients with cholestatic jaundice, when conventional diagnosis methods

such as ultrasound, contrast computed tomography scan, magnetic cholangio-resonance, and echoendoscopy are not enough to establish the cause<sup>1</sup> and to treat the following conditions:<sup>2</sup>

- Residual choledocholithiasis or with gallbladder in situ
- Stenosis or papillary dysfunction
- Acute cholangitis
- Dilatation of postoperative stenoses
- Dilatation of benign stenoses
- Placement of pancreatic prosthesis
- Hemobilia
- Biliary parasitosis
- Miscellaneous

It also plays a palliative role in irresectable neoplastic conditions of the main biliary duct and the pancreas, where it allows the placement of prostheses to improve jaundice resulting from stenosis due to irresectable neoplasms.<sup>3</sup>

ERCP-related complications can be classified into direct and indirect. Direct complications can also be categorized into early (acute pancreatitis, cholangitis, post-sphincterotomy hemorrhage, and duodenal perforation), and late ones (post-sphincterotomy papillary stenosis, prosthesis migration or rupture).<sup>4</sup>

Indirect complications occur in organs far from the site

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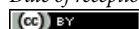
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Date of reception: 08/04/2022 - Date of approval: 02/07/2022

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where the technique is performed and are mainly of cardiopulmonary type. On many occasions they are associated with the sedative methods used and the patient's previous pathological condition.<sup>3,4</sup>

Sphincter manipulation of the biliary duct causes papillary edema, which occludes the pancreatic fluid outflow causing the activation of intracellular proteolytic enzymes, and consequently pancreatic inflammation.<sup>5</sup> Its severity can be classified based on Petrov's criteria.<sup>6</sup>

The same mechanism can cause an increased intracholedocal pressure and biliary flow stasis, which facilitates bacterial proliferation, contamination, and consequently ascending cholangitis.<sup>5</sup>

Bleeding observed during sphincterotomy is a common finding. However, it does not represent in itself an adverse result for the patient if there is no clinically significant blood loss.<sup>5</sup>

Regarding perforations, it is important to spot them early during the endoscopic act or within the first few hours after being performed since they can be managed with watchful waiting and only a few of them will eventually need surgery.<sup>7</sup>

At the Endoscopy Unit of Hospital Nacional de Itauguá, Paraguay, indications for therapeutic ERCP are limited, according to the predicting criteria established by the American Society for Gastrointestinal Endoscopy (ASGE) 2010 (see Figure 1).<sup>8</sup>

This study has the objective of getting to know the rate of ERCP complications in patients from the Endoscopy Unit at Hospital Nacional de Itauguá, Paraguay from 2013 through 2017.

## METHODOLOGY

Descriptive, observational, retrospective, cross-sectional study. A non-probabilistic sample of consecutive cases was conducted in all the patients with a diagnosis of obstructive jaundice of non-neoplastic origin who met all the ASGE 2010 predictive criteria to undergo an ERCP with diagnostic and/or therapeutic purposes due to the high chances of choledocholithiasis, at Hospital Nacional de Itauguá Digestive Endoscopy Unit from 2013 through 2017. Patients whose past medical histories were complete for the variables needed in the study were selected. A total of 945 records from patients who met the study inclusion criteria were included. The classifications used for the complications were for acute pancreatitis, the 2013 Petrov severity criteria,<sup>6</sup> for acute cholangitis the 2018 Tokyo classification criteria,<sup>9</sup> and for perforations, the 2000 Stapfer classification.<sup>10</sup>

Data collected were organized in a Microsoft Excel spreadsheet, and frequency (%) tables were used, as well as dispersion measurements (SD) and Flow Histograms.

Bioethical principles were respected: the information obtained was analyzed confidentially. Codes were used for each patient's records. Informed consent was not required because the data obtained were taken from the records. There was no risk of maleficence or discrimination. No conflicts of commercial interest were declared.

## RESULTS

Out of the 945 patients, sex prevalence was 41.9% men (396 patients), and 58.1% (550) women. The patients came from rural areas [68.5% (648)], and 31.5% (297) from urban areas. Regarding distribution by age groups, 3.4% (32) were between 15 and 24 years, 6.9% (66) between 25 and 34 years, 69.9% (660) between 35 and 44 years, and 19.8% (187) over 45 years. No patients > 60 years were reported in our series (see Table 1). The median age was 40 years with a SD of  $\pm$  3 years.

Out of the 945 patients, complications were reported in 5.3% (50) of the cases. No deaths were reported. Among the complications, the most common was acute pancreatitis in 3.4% (32 patients) followed by hemorrhage in 1% (9), acute cholangitis in 0.4% (4), perforations in 0.3% (3), and indirect complications in 0.2% (2) (See Table 2).

Out of 32 patients with acute pancreatitis categorized according to the 2013 Petrov criteria, most of the patients developed mild acute pancreatitis in 71.9% (23) followed by moderate in 15.6% (5), severe in 9.4% (3), and critical in 3.1% (1). In all of them computed tomography scans with control contrast between the fourth and fifth day after the ERCP were performed, mild pancreatitis received conservative management with analgesic drugs and fluid therapy. The moderate ones required antibiotic treatment; severe pancreatitis were treated with antibiotic therapy and percutaneous drainage, and those classified as critical needed—on top of antibiotic therapy and percutaneous drainage—in-hospital therapy. No deaths were reported. Out of the 9 patients with hemorrhage, all hemorrhages were treated with adrenalin during the procedure, with spontaneous resolution in all the cases; late bleeding was not reported in our series. Out of the 4 patients diagnosed with postoperative acute cholangitis, 75% (3) had the mild form of the disease, and the remaining 25% (1) the moderate form of the disease, which required biliary stent implantation. No cases of severe post-ERCP cholangitis were described, according to the 2018 Tokyo classification. Out of the 3 patients with a diagnosis of duodenal perforation 66.6% (2) had type II and 33.3% (1) type IV according to the 2000 Stapfer classification. None of them required surgical treatment. All of them received conservative management and no deaths were reported in our series.

PREDICTORS	
<b>VERY STRONG</b>	
<ol style="list-style-type: none"> <li>1. Choledocholithiasis</li> <li>2. Clinical cholangitis</li> <li>3. Bilirubin &gt; 4 mg/dL</li> </ol>	
<b>STRONG</b>	
<ol style="list-style-type: none"> <li>1. Dilated choledochus &gt; at 6 mm in gallbladder in situ and &gt; at 10 in cholecystectomized ones.</li> <li>2. Bilirubin between 1.8 and 4 mg/dL at the expense of the direct one</li> </ol>	
<b>MODERATE</b>	
<ol style="list-style-type: none"> <li>1. Alteration of liver enzymes in addition to bilirubin</li> <li>2. &gt; 55 years</li> <li>3. Acute lithiasic pancreatitis</li> </ol>	
RISK	
Presence of any very strong predictor	<b>HIGH</b>
Presence of 2 strong predictors	<b>HIGH</b>
No predictors	<b>LOW</b>
All the remaining patients	<b>INTERMEDIATE</b>

**Figure 1.** Predicting criteria of choledocholithiasis risk, ASGE 2010.

**Table 1.** Distribution of patients who underwent ERCP between 2013 and 2017 according to socio-demographic data (N = 945).

SOCIAL-DEMOGRAPHIC CHARACTERISTICS	FREQUENCY	RATE
<b>GENDER</b>		
Men	396	41.9%
Women	549	58.1%
<b>TOTAL</b>	<b>945</b>	<b>100%</b>
<b>ORIGIN</b>		
Rural	648	68.5%
Urban	297	31.5%
<b>TOTAL</b>	<b>945</b>	<b>100%</b>
<b>AGE</b>		
15 to 24	32	3.4%
25 to 34	66	6.9%
35 to 44	660	69.9%
Over 45	187	19.8%
<b>TOTAL</b>	<b>945</b>	<b>100%</b>

**Table 2.** Rate of complications in total number of patients who underwent ERCP between 2013 and 2017. (N = 945)

FINDING	FREQUENCY	RATE
Acute pancreatitis	32	3.4%
Hemorrhage	9	1.0%
Cholangitis	4	0.4%
Perforation	3	0.3%
Indirect complications	2	0.2%
No complications	895	94.7%
<b>TOTAL</b>	<b>945</b>	<b>100.0%</b>

## DISCUSSION

Among the patients that underwent ERCP, in our sample, it was found that there was predominance of women (58.1%) with a mean age of 40 years  $\pm$  3 SD; similar data were published by Gomez et al, who found a 2:1 woman-man ratio, with a mean age a little over 49 years.<sup>11</sup> In their work on ERCP complications regarding digestive emergencies where the mean age with which ERCP was performed, Olazábal et al. found different data with a mean age of 60 years and the predominant sex being women with 64.9%.<sup>13</sup> This is consistent with what was reported by the medical literature worldwide that indicates that women are more often affected by lithiasis, both vesicular lithiasis and that due to secondary gallbladder stones in the choledochus. That is why they have a higher risk of undergoing this procedure. The same thing happens regarding age with mild increasing tendencies being reported in other papers.<sup>1,3,5</sup>

Of the overall number of patients (n=945), complications were reported in 5.2% (50), a percentage that is greater compared to the study conducted by García L., which showed a 4% rate of complications.<sup>13</sup> And similar to Gómez, R's in Lima, Perú with a 5.9% rate of complications.<sup>11</sup> However, it was higher compared to the rate found by Reyes et al. at the Regional Hospital

**Table 3.** Classification of severity according to each complication described

Post-ERCP acute pancreatitis according to Petrov's classification		
FINDING	FREQUENCY	RATE
Mild	23	71.9%
Moderate	5	15.6%
Severe	3	9.4%
Critical	1	3.1%
<b>TOTAL</b>	<b>32</b>	<b>100</b>

Post-ERCP acute cholangitis according to the 2018 Tokyo criteria		
FINDING	FREQUENCY	RATE
Mild	3	75%
Moderate	1	25%
<b>TOTAL</b>	<b>4</b>	<b>100</b>

Post-ERCP perforation according to Stapfer's classification		
FINDING	FREQUENCY	RATE
Type I	0	0%
Type II	2	67%
Type III	0	0%
Type IV	1	33%
<b>TOTAL</b>	<b>3</b>	<b>100</b>

of Mexico between 2002 and 2011 in 1145 patients in whom the rate of complications was just 2.1%.<sup>14</sup>

The most common complication in all the patients was acute pancreatitis in 3.4%, data that are similar to those published by Gonzalez et al. in Guatemala where post-ERCP pancreatitis occurred in 3.26%,<sup>15</sup> and Gómez R., with an overall rate of post-ERCP acute pancreatitis of 3.4%.<sup>11</sup> Our numbers are higher compared to those reported by Garcia et al. in a study conducted among 11 497 patients in Mexico over a period of 12 years where acute pancreatitis occurred in 2.6%.<sup>13</sup>

Of the total number of patients that had complications with post-ERCP pancreatitis, 71.9% had mild pancreatitis whose management was conservative with analgesic drugs and fluid therapy. A total of 15.6% had moderate pancreatitis that required antibiotic treatment. A total of 9.4% of the patients had severe complications that required antibiotic therapy and percutaneous drainage. In 3.1%, pancreatitis was critical and required in-hospital therapy. No deaths were reported. These results vary in proportion from those published by Kochar et al. who, among 8857 patients with post-ERCP pancreatitis, found a 58.8% rate of mild pancreatitis with a similar therapeutic management, a 34% rate of moderate pancreatitis with antibiotic management, and a 7.2% rate of severe pancreatitis that required antibiotics

(carbapenem) and percutaneous drainage.<sup>16</sup>

Post-papillotomy bleeding occurred in 1% of the patients. This figure is greater to that reported by García et al. where hemorrhages occurred in 0.3% of the patients.<sup>16</sup> While Olazábal et al. reported a 2% rate bleeding in 114 procedures.<sup>12</sup> Regarding management, all the cases were classified as mild hemorrhages, and they were resolved with adrenalin infiltration. In all the cases control endoscopic vision was required. This management is similar to the one reported by F. J. Gallego-Rojo, performed by the Andalusian Society of Digestive Diseases who, in cases of mild bleeding, follow a wait-and-see approach and if the bleeding becomes persistent, they perform adrenalin infiltration or sclerosis.<sup>17</sup>

The rate of cholangitis reported in our study was 0.4%, a figure that is lower compared to that reported by Macías C. in his report on complications at the Buenos Aires Italian Hospital, Buenos Aires, Argentina where it occurred in 2% to 4% of the complications.<sup>18</sup>

Of the total number of patients with complications with post-ERCP cholangitis, the most common form of presentation was mild cholangitis in 75% (3), which required antibiotic treatment. This follows the Tokyo guidelines.<sup>9</sup> When moderate cholangitis occurred in 25% of the cases (1) the management required by the patient was biliary stent implantation. In our series no severe post-ERCP cholangitis was reported.

Perforations (open windows) had an incidence rate of 0.3% (3). This rate is low compared with that described by Retuerta J et al. at the Navarra Hospital facility in Navarra, Spain. Over a period of two years, they found 12 cases of post-ERCP perforations, numbers that are quite large.<sup>19</sup> According to Stapfer's classification, 66.7% (2) of these complications were papillary perforations, Stapfer's Type II while the remaining 33.3 % (1) were Stapfer's perforations Type IV. They all required conservative management with good clinical evolution.<sup>10</sup> An experience that is similar to that described by E. Perea del Pozo et al. who described a 9.4 % mortality rate in type II perforations without surgical treatment and a 38% mortality rate in those who did receive surgical treatment.<sup>20</sup>

This study has limitations: the size of the sample compared to other studies in the region is very small. Therefore, the results cannot be generalized; additionally, patients with jaundice of neoplastic etiology or suspected neoplastic etiology were not considered, which would increase the rate of complications. On the other hand, this was a retrospective study conducted in one center only. Moreover, there was no mid- or long-term follow-up of the patients, which would have enabled us to evaluate complications away from post-ERCP, and the evolution of the complications.

Different research lines are recommended, with a longitudinal and analytical approach, to better correlate the variables, and with a larger sample that would enable us to generalize the results to the population.

## CONCLUSION

Of the 945 ERCPs performed at the Hospital Nacional de Itauguá during the years 2013-2017 the most prevalent sex regarding complications was females and the mean age was 40 years.

The rate of early post-ERCP complications is low with 5.2%, acute pancreatitis being the most common, 3.38% followed by hemorrhages, 0.95%, acute cholangitis, 0.42%, and perforations, 0.31%. Most pancreatitis are mild. Hemorrhages during the procedure are mild and most of them are easy to be taken care of with hemostatic control. Post ERCP cholangitis have mild evolution in 75% of the cases. Perforations are rare and most of them do not require surgical treatment.

In view of the onset of any post-ERCP complication, conservative non-surgical management with analgesic drugs, fluid therapy, sclerosis, and antibiotic therapy was not associated with deaths.

**Conflicts of Interest:** the authors declare that there are no conflicts of interest among the authors and that they respect ethical conducts and good publishing practices. No external financial support was received.

## Authors' contributions:

**MAAW:** he provided substantial contributions to the conception or design of data collection and analysis, and was involved in the bibliographic search, drafting of the paper and reviewing it critically looking for relevant intellectual content, and final approval; he was responsible for all the aspects of the article to guarantee that questions having to do with the precision or integrity of any part of the paper were properly looked into and eventually resolved.

**GIPG:** he provided substantial contributions to the conception or design of data collection and analysis, and was involved in bibliographic search, drafting of the paper and its final approval.

**CPB:** she provided the study idea, data analysis, and created graphics and tables, design and drafting of the paper and its final approval.

**CRAG:** he provided substantial contributions to the original idea and was involved in the methodological design of the study; the critical review of the content, and also made significant intellectual contributions, critical reviews, and the manuscript final approval.

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# Efficacy of the Alvarado scale in patients with a diagnosis of acute appendicitis at the General Surgery Unit at hospital regional de Ciudad del Este, Paraguay

*Eficacia de la escala de Alvarado en pacientes con diagnóstico de apendicitis aguda, en el Servicio de Cirugía General del Hospital Regional de Ciudad del Este*

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## ABSTRACT

**Objective:** Evaluate the efficacy of the Alvarado score in the diagnosis of acute appendicitis in patients at the General Surgery Unit at Ciudad del Este Hospital Regional, Paraguay. **Materials and methods:** observational, descriptive, cross-sectional study. The past medical histories of patients with preoperative diagnosis of acute appendicitis were included in the study, the Alvarado score was applied, and the score was associated with its subsequent macroscopic postoperative finding. Patients were operated on at the General Surgery Unit of the HR-CDE from January 2020 through September 2020. **Results:** a total 100 patients were included; 61% of whom were men. The Alvarado score was applied, and they were categorized into 4 groups, low risk (16%), possible risk (23%), probable risk (39%), and high risk (22%). According to the macroscopic postoperative finding they were categorized into congestive (14%), phlegmonous (42%), gangrenous (35%), and perforated appendicitis (8%). An 86% sensitivity rate, and a 29% specificity rate were obtained for this study. **Conclusion:** the Alvarado score is a simple tool, easy to apply, and a useful support in the diagnosis of this condition.

**Keywords:** acute appendicitis, Alvarado score, acute surgical abdomen.

## INTRODUCTION

Abdominal pain is the most common cause for consultation at the emergency room: one in every 20 patients who go the emergency services have this symptom, being acute appendicitis (AA) one of the most common diagnostic suspicions.<sup>1,2</sup> The medical literature reports that 7% of the world population will have appendicitis in their life time, with an incidence peak between 10 to 30 years of age.<sup>3,4</sup> Despite of this, its diagnosis is

no easy task since the typical chronology of symptoms or the recurring lab results are in 20% to 33% of the patients on average, which can often be seen in a rate of false positives of 30%.<sup>1</sup>

Early diagnosis of AA is considered as the most significant therapeutic measure to decrease the morbidity and mortality rates. It has been reported that the delay or failure in its diagnosis can lead to complications like cecal appendix perforation (40% to 5%), surgical site infections (15% to 8%), formation of intraabdominal abscesses (6% to 2%), even sepsis and death (5% to 0.5%). This leads to longer hospital stays with the corresponding higher costs at public healthcare level. Diagnosis of AA is mainly clinical through physical examination and the use of additional methods. However, it lacks uniformity of criteria given the irregularity of the symptoms and signs with which it presents.<sup>5</sup> That is why diagnostic scores like the Alvarado score (AS), RIPASA, and others are useful tools that can contribute to the early detection of AA cases.<sup>6</sup> The application of this score as an auxiliary method in the diagnosis of AA has contributed to decrease the percentage of non-therapeutic appendectomies in 8% and lower hospital costs in 10%.

Back in 1986, Dr. Alfredo Alvarado conducted a retrospective study that analyzed the signs and symptoms of 305 patients treated with surgery due to acute appendicitis. He found 8 predictive factors to develop a score used when a case was suspected and facilitate the diagnosis of AA. This score consists of three symptoms, three signs, and two lab results. (See Figure 1). According to the score obtained, patients can be categorized in

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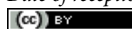
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Date of reception: 16/03/2022 - Date of approval: 01/08/2022

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four groups: Low risk of developing AA (0-4 points), possible AA (5-6), probable AA (7-8), and high risk of AA (9-10).<sup>2</sup> In patients with up to 4 points, it is considered that less than 5% will develop acute appendicitis. Should this be the case, they can be discharged after being reassessed 24 hours later or in case of disease progression. With an AS score between 5 and 6, around 35% of the patients will have AA, which is why the patient's hospitalization is indicated and the use of auxiliary methods suggested to gain diagnostic certainty. With scores > 7, sensitivity goes up to 78% in women and 94% in men being immediate surgery indicated. Also, < 10% of all laparotomies will show an appendix without any alterations.<sup>4,6</sup> The AS is the most widely accepted score by emergency services worldwide, with an overall 68% sensitivity rate, and a 87.9% specificity rate.<sup>2</sup>

The objective of this paper was to assess the efficacy profile of the AS in patients hospitalized with suspected AA at the General Surgery Emergency Services at the Hospital Regional de Ciudad del Este (HR-CDE), Paraguay from January 2020 through September 2020.

## MATERIALS AND METHODS

Observational, descriptive, and cross-sectional study that reviewed the patients' past medical histories at the HR-CDE General Surgery Unit from January 2020 through September 2020. The data provided by the patients as kept anonymous and confidential. The study included all the patients with a preoperative diagnosis of AA who met the admission criteria, surgical procedure, and the postoperative hospital stay at the HR-CDE General Surgery Unit, and with macroscopic postoperative findings within the evolutionary stages of AA. The study excluded patients admitted to units different from the Surgical Unit and/or who underwent surgery at our unit and then were referred to a different healthcare center.

They were grouped based on the following variables: sex, age, length of treatment, and the AS applied consisting of 8 variables to which a score is assigned. Based on the score obtained, the patients were categorized into 4 different risk groups: low risk (0 to 4), possible risk (5 to 6), probable risk (7 to 8), and high risk (9 to 10). Based on the macroscopic postoperative finding described in the surgical technique, patients were categorized into congestive, phlegmonous, gangrenous, and perforated AA. The anatomopathological study of cecal appendix was not added since it was never conducted at our unit, which is why most patients did not have results.

Data were loaded onto an Excel 10 electronic spreadsheet where the statistical analysis was conducted based on sex, age, evolution time, points obtained in the Alvarado score, and the macroscopic finding, presented in the results of this research.

The case was considered positive in patients with an evolution stage higher than congestive AA, without any other surgical findings, and with an Alvarado Score > 5. These data were loaded onto a 2 x 2 table to estimate the sensitivity and specificity rates of this auxiliary method.

## RESULTS

A total of 100 patients were included, 61% of whom were men with ages from 14 to 70 years old. The most common finding were young males between 14 and 26 years of age (54%) (see Table 1), with an evolution time from symptom onset until the moment they saw the doctor of a mean 36.2 hours. The time between consultation and the surgical act was 8.2 hours approximately.

A mean score of 6 and a mode of 7 were obtained in the AS (see Table 2). In addition, regarding aspects, it was seen that

decompression pain, leukocytosis, and deviation of formula to the left were the most common represented aspects (see Table 3) with rates of 85%, 83%, and 82%, respectively.

All these patients underwent surgery based on the clinical examination and signs without considering the score obtained on the Score and based on the macroscopic postoperative finding. They were categorized into congestive, phlegmonous, gangrenous, and perforated AA. The most common finding was phlegmonous AA in 42% of the cases (see Table 4), followed by gangrenous AA (32%), congestive AA (14%), and perforated AA (8%). These data were associated with the score obtained in the Alvarado Score (see Table 4). Among the complications resulting from a delayed diagnosis of AA, we should mention the appendicular plastron. Only 1 out of the 100 cases reviewed was categorized with this postoperative diagnosis and an AS score of 8.

Regarding congestive AA (see Table 5), 5 cases (35.7%) obtained a concomitant finding with cecal appendix inflammation, all of them in fertile women. Three of them were associated with inflammatory pelvic disease (60%) with AS scores of 2, 4, and 9. One case (20%) was associated with right adnexitis with a score of 9 and another case (20%) with a ruptured right ovarian cyst with a score of 2 in the Alvarado Score. Regarding phlegmonous AA, distribution within the AS shows vast predominance within the possible risk group with 30.9% and 38.1% of the cases respectively. Out of the overall number of cases reviewed, only 1 obtained the top score (10 points), which is included in this group. (See Table 5).

Within gangrenous AA, score distribution is also seen homogeneously, with a slight prevalence of the probable risk group (34.3%) followed by 28.6% of the cases with high risk. Of all the

**Figure 1.** Alvarado Score for the clinical diagnosis of acute appendicitis

ASPECT	CLINICAL MANIFESTATIONS OR LABORATORY	SCORE
Symptoms	Migration of pain to the right iliac fossa	1
	Anorexia	1
	Nauseas and/or vomiting	1
Signs	Pain to the right iliac fossa	1
	Decompression pain to the right iliac fossa	2
	Fever	1
Laboratory	Leukocytosis (> 10 000 cells/mm <sup>3</sup> )	2
	Neutrophilia (>70%)	1
<b>Total score</b>		<b>10</b>
<b>Score reached for the diagnosis of AA</b>		
< 4	Low chances	<b>Low</b>
5-6	Consistent but not diagnostic	<b>Possible</b>
7-8	High chances	<b>Probable</b>
9-10	Almost certainty of appendicitis	<b>High</b>

**Table 1.** Distribution based on the age of patients diagnosed with acute appendicitis (N = 100)

AGE	FREQUENCY	PERCENTAGE
14 - 26	54	54%
27 - 59	41	41%
> 60	5	5%
<b>Total</b>	<b>100</b>	<b>100%</b>

**Table 2.** Distribution based on the score obtained in the Alvarado Score of patients with a diagnosis of acute appendicitis (N = 100)

AS Score	Risk	N	%
< 4	Low	16	16%
5-6	Possible	23	23%
7-8	Probable	39	39%
9-10	High	22	22%
<b>Total</b>		<b>100</b>	<b>100%</b>

**Table 3.** Distribution based on the Alvarado Score parameters of patients diagnosed with acute appendicitis (N = 100)

AS aspects	N	%
Decompression pain	85	85%
Leukocytosis	83	83%
Deviation to the left (neutrophilia)	82	82%
Pain migration	77	77%
Anorexia	69	69%
Nauseas and/or vomiting	69	69%
Pain in RIF	36	36%
Fever	18	18%

**Table 4.** Distribution based on the macroscopic finding and AS score of patients diagnosed with acute appendicitis (N = 100)

Macroscopic finding	N	%	AS score			
			< 4	5-6	7-8	9-10
Congestive AA	14	14%	4	2	5	3
Phlegmonous AA	42	42%	4	13	16	9
Gangrenous AA	35	35%	6	7	12	10
Perforated AA	8	8%	2	1	5	0
Appendicular Plastron	1	1%	0	0	1	0
<b>Total</b>	<b>100</b>	<b>100%</b>	<b>16</b>	<b>23</b>	<b>39</b>	<b>22</b>

cases reviewed, 8 reported perforated AA as the postoperative finding, *none of the cases attained the top AS score and evolutionary stage within the AA associated with most cases of probable risk.* (See Table 5)

Regarding the estimate of sensitivity and specificity, the following parameters were used: patients with a more advanced evolutionary stage compared to congestive AA were considered “true positive” cases, not associated with other postoperative findings, and scored > 5 points in the AS. Those cases with concomitant findings to congestive AA and scores < 5 were considered “true negative cases.” Cases with scores > 5, but with macroscopic findings consistent with congestive AA, were considered “false positives” and those with score < 5, but with macroscopic findings consistent with advanced AA stages were considered “false negative” regarding the AS. With these data, in this manuscript, we obtained an AS sensitivity rate for AA diagnosis of 86% and a 26% specificity rate (See Table 6).

## DISCUSSION

A total of 100 patients were included for this study. Patients admitted to the HR-CDE General Surgery Unit with a preoperative diagnosis of acute appendicitis (61%) were men while 39% were women, a relatively homogeneous distribution, which is consistent with the medical literature that shows a prevalence of masculine sex.<sup>2,4,7,8</sup> The age range showed a mean 28.6 years and a mean age of 31.8 years, which is consistent with the medical literature that describes a prevalence under 40 years.<sup>2,4,7,8</sup>

Our study observed that the prevailing signs and symptoms associated with AA were pain to decompression in the right iliac fossa and leukocytosis with significant neutrophilia, unlike different reference sources where aspect distribution was found in a variable way. Therefore, we confirmed the lack of criteria uniformity regarding the clinical diagnosis of this condition and the tremendous irregularity of symptoms and signs at its presentation.<sup>4,7</sup> Delayed diagnosis leads to the onset of postoperative complications and longer hospital stays. One of the factors that predisposes to this delay is consultation delays. This study saw a mean 36.2 hours of disease progression from symptom onset until consultation compared to several other studies with means between 10.2 hours and 16 hours.<sup>1,2</sup>

To facilitate diagnosis, several support scores were implemented like the Alvarado Score. Regarding the scores obtained, in this study it was reported that the possible and probable AA risk groups were predominant, representative of 62% of the cases.

**Table 5.** Distribution based on the score obtained in the Alvarado Score according to the macroscopic finding of AA

AS score	Congestive AA		Phlegmonous AA		Gangrenous AA		Perforated AA	
	N	%	N	%	N	%	N	%
< 4	4	28.6%	4	9.5 %	6	17.1 %	2	25 %
5-6	2	14.3 %	13	30.9 %	7	20 %	1	12.5 %
7-8	4	28.6 %	16	38.1 %	12	34.3 %	5	62.5 %
9-10	4	28.6%	9	21.4 %	10	28.6 %	0	0
<b>Total</b>	<b>14</b>	<b>100%</b>	<b>42</b>	<b>100 %</b>	<b>35</b>	<b>100 %</b>	<b>8</b>	<b>100 %</b>

**Table 6.** Estimate of Sensitivity and Specificity of the Alvarado Score (N = 100)

	Positive for AA	Negative for AA
<b>Positive for AS</b>	74	10
<b>Negative for AS</b>	12	4
<b>Total</b>	86	14

It is estimated that, in the routine clinical practice, high scores within the Score are associated with advanced stages of the disease and could be associated with cecal appendix perforation.<sup>1</sup> In our study, 39% of the patients scored between 7 and 8 being the most common postoperative finding phlegmonous AA. Within the group with scores between 9 and 10, gangrenous appendix was the most common postoperative finding. We observed that, in cases of congestive AA, the score distribution within the Alvarado Score was similar, not so in the case of perforated AA, where there is a large prevalence of higher scores. Still, none of the cases obtained the top score within the Alvarado Score, which would be equivalent to the fact that the evolution time of the clinical picture does not condition disease progression, and that the score obtained within the Alvarado Score is not associated with the inflammatory stage of the cecal appendix, which is similar to what has been reported in the medical literature reviewed.<sup>1,8</sup>

Several authors conclude that the best cut-off value to consider positive cases within the Alvarado Score are scores > 5 points.<sup>2,3,8,9</sup> In view of this, it was decided to consider as positive cases all those patients with scores >5 points and macroscopic findings consistent with phlegmonous AA onwards since 35.5% of the cases of congestive AA were associated with other conditions of an origin different than appendicular and we didn't have anatomopathological confirmation for the remaining cases. With these data we obtained 86% sensitivity and 29% specificity rates for the Alvarado Score, a huge difference compared to other bibliographic references where rates are significantly higher considering that such studies had anatomopathological confirmation of acute appendicitis in most cases.<sup>1,7,10</sup>

## CONCLUSION

Men and young patients were prevalent, with a mean evolution time of 36 hours and an 8.2 hour wait for the surgical act.

The AS was applied and we saw that predominant aspects were pain to the right iliac fossa, leukocytosis and neutrophilia, aspects that are characteristic of but not exclusive to AA. Therefore, we turned something as subjective as physical examination into something objective. Most subjects studied were positioned in the probable risk group within the AS, and we saw that postoperative finding most often described was phlegmonous AA.

Therefore, we concluded that, though AA is one of the most common conditions seen at the General Surgery Unit, strictly clinical diagnosis and subsequent timely surgical treatment is still challenging due to the wide variability of clinical presentations. Therefore, we suggest using support in auxiliary Scores to facilitate diagnosis.

The application of simple diagnostic scores that are easy to apply like the Alvarado Score, are a reliable alternative to facilitate diagnosis. Also, we suggest using scores > 5 as the cut-off value in the decision to implement immediate surgical treatment without delaying its application any longer.

With this paper we can conclude that the Alvarado Score is a useful method when used as a backup for the diagnosis of AA that we should not rule out.

As a bias, we should mention that we do not routinely have pathological anatomy in our hospital. Therefore, it could not be included as a study variable.

The authors did not declare any conflicts of interests associated with this study, and they all have contributed equally to the study.

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# Mechanochemical intravenous ablation (MOCA) of saphenous vein with the Clarivein® Catheter. First experience at Centro Paraguayo de Varices (CEPAVA), Paraguay. Report of the first 3 cases

*Ablación mecánico química (MOCA) de la vena safena con el Cateter Clarivein®. Primera experiencia en Paraguay en el Centro Paraguayo de Várices (CEPAVA). Reporte de tres primeros casos.*

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## ABSTRACT

Currently, thermal intravenous procedures are the procedures of choice to treat varices due to saphenous vein insufficiency. However, these techniques require tumescent anesthesia, which increases discomfort and pain during the procedure. In addition, heat causes postoperative discomfort and is associated with a risk of neurological and skin lesions. Since mechanochemical ablation with the ClariVein® catheter does not use tumescent anesthesia or heat, it is associated with a low rate of pain during and after the procedure, less risk of neurological and skin lesions, and anatomical occlusions, and better rates on the severity and quality of life scales similar to those of thermal ablation techniques in the short term. We describe the results of the first three patients treated at Centro Paraguayo de Varices.

*Keywords: intravenous procedures, varices, saphenous vein, mechanochemical ablation, ClariVein catheter*

## INTRODUCTION

Intravenous ablation of saphenous insufficiency through minimally invasive thermal intravenous procedures such as EVLA laser and radiofrequency have become the treatments of choice for the management of varices with 90% occlusion rates. As a matter of fact, since 2005, it has been performed at the Centro Paraguayo de Varices (CEPAVA) with few complications, minimal scarring, and short recovery times.<sup>(1-3)</sup> The need for tumescent

anesthesia in these procedures increases the patient's discomfort during the procedure. Also, there are times that the thermal effect in both procedures has been associated with neurologic and skin damage as potential complications during the postoperative period.<sup>(4)</sup> Ultrasound-guided intravenous chemical ablation (EVCA) is another tool in the therapeutic armamentarium to treat venous insufficiency that does not require tumescence, but does require several sessions and it has worse results compared to thermal procedures.<sup>(1,2,5-6)</sup>

The MOCA procedure with the ClariVein® catheter does not require tumescent anesthesia and it prevents nerve and skin lesions since it does not require thermal energy, with occlusion rates between 94% and 97%.<sup>(7)</sup> The objective of this article is to present the early experience with MOCA with the three first cases performed in Paraguay at CEPAVA.

## CASE PRESENTATION

The patients were previously assessed at the Centro Paraguayo de Varices (CEPAVA) and Hospital de Clínicas de la Facultad de Ciencias Médicas de la Universidad Nacional de Asunción, both based in Paraguay. All patients were examined with lower limb venous color Doppler ultrasound in the dorsal recumbent and

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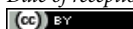
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Date of reception: 09/02/2022 - Date of acceptance: 10/04/2022

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standing positions. After that, three female patients between 28 and 37 years of age were selected. One of them had congenital aphasia with a diagnosis of venous insufficiency of internal saphenous vein with reflux > 1 second both at the saphenofemoral junction and the saphenous trunk up to the distal third of the thigh unilaterally. The size of the saphenous trunk went from 7 mm to 10 mm as maximum diameters.

The procedure was performed at the CEPAVA. All punctures were ultrasound-guided, after marking and locally anesthetizing the puncture site, with a 16 G needle and introduction of a 5-Fr catheter using Seldinger technique. The catheter of the previously armed ClariVein® device is introduced and ultrasound-guided until its tip is positioned 2 cm away from the SFJ. Tumescence anesthesia is not used here. The device is activated (fig. 1) with a maximum spinning speed of 3500 rpm and removed at a speed of 1 cm every 6 to 7 seconds as 2% liquid polidocanol is instilled across the entire trajectory of the vein treated with a dose of 10 cc (fig. 2).

At the end of the procedure the target limb is wrapped up with an elastic bandage and the patients are discharged 30 minutes later with indications to keep the elastic bandage on for 48 hours, which will be later exchanged for 20-30 mmHg elastic compression socks for 2 weeks. Also, patients are instructed to

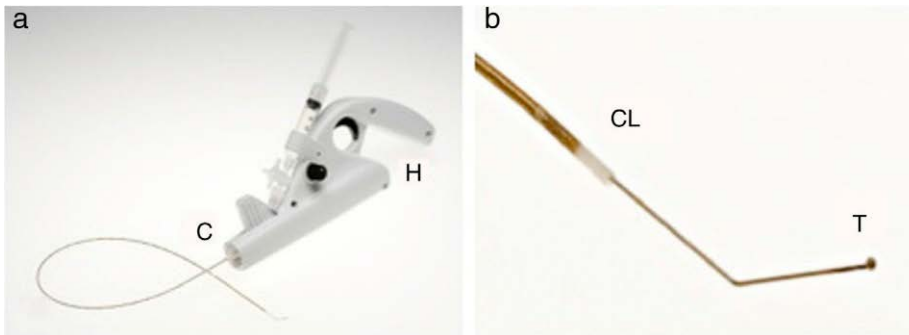
come back for follow-up examinations in this period of time and take common analgesic drugs if they feel discomfort.

Patients were controlled 24 hours, 72 hours, and 1 month after the procedure with ultrasound controls. No major complications were reported (deep vein thrombosis [DVT], pulmonary thromboembolism [PTE]). Mild ecchymosis was reported at the puncture site. The patients reported grade 1-2 pain on a scale of 10 during the procedure. None of the three patients used analgesic drugs in the postoperative period or presented with nerve or skin lesions.

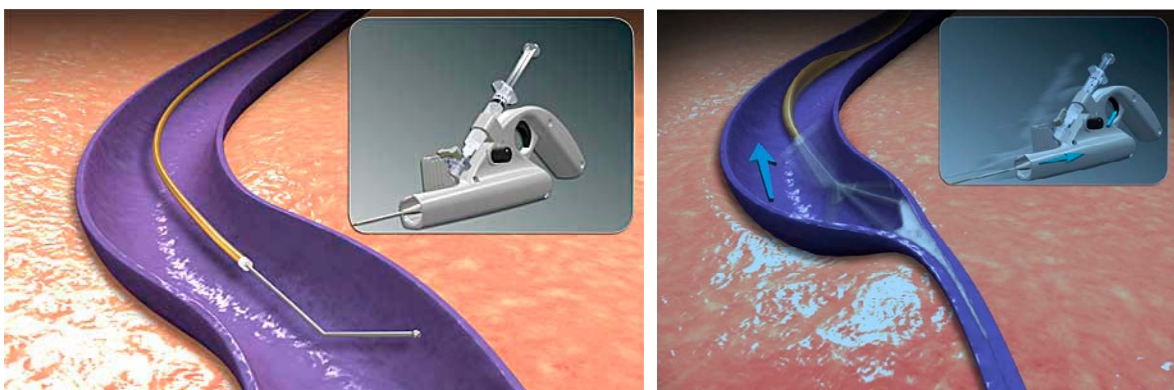
Three months after the procedure, it was reported that the three patients showed total occlusions of the saphenous trunk.

## DISCUSSION

The need to include minimally invasive techniques to treat varices, as well as the huge success reported with thermal techniques using local anesthesia like intravenous laser and radiofrequency made us go on with our research with this new method: MOCA with Clarivein® catheter that happens to be highly effective and requires no tumescence anesthesia, adding 2 different types of venous lesions in the treatment; 1) mechanical damage caused by the tip of the catheter rotating inside the



**Figure 1.** Panel a: the ClariVein® device consists of a motor (H) and an infusion catheter (C). Panel b: metal guidewire distal border—the sclerosant agent spreading element—protrudes outside the catheter (CL) with an angled tip (T)



**Figure 2.** Rotation of the metal guidewire and simultaneous infusion of the sclerosant agent during catheter removal.

vein, and 2) chemical sclerosis.

Many studies have confirmed the efficacy and safety profile of the MOCA treatment with occlusion rates above 94%/97%,<sup>(1-4,7)</sup> not only for the great saphenous vein (GSV), but also for the small saphenous vein (SSV). No major complications like DVT, PTE or nerve lesion were reported. Procedural time and pain during and after the procedure are significantly smaller compared to RF and EVLA.<sup>(7)</sup> In the largest study published to this date,<sup>(3)</sup> Van Eekeren et al. assessed 268 incompetent limbs of 210 GSV, 44 SSV, and 14 anterolateral tributaries. The occlusion rate was 99% at 6 weeks and 94% at 6 months. Superficial thrombo-

phlebitis was reported in the target vein, and hematomas in the venous access in 21% and 26% of the cases, respectively.<sup>(3)</sup> No major complications were reported, although thrombophlebitis, indurations, localized hematomas, and mild hyperpigmentation were reported at the puncture site.<sup>(4)</sup> Mechanochemical ablation has been associated with less postoperative pain and faster recovery times compared to thermal intravenous techniques.

All the authors participated equally drafting this manuscript and declared no conflicts of interest whatsoever. In addition, they claim ownership on the copyrights for the publication of the images being used.

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# Antibiotic therapy as first step in the step-up approach. Case report

*Antibioticoterapia como primer paso del step up approach. Reporte de un caso.*

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## ABSTRACT

The objective of this study is to describe the case report of a patient with infectious pancreatic necrosis who was treated conservatively. Results: Although the first step of the step-up approach is percutaneous drainage, in selected cases, patients could be managed with medical treatment. Conclusion: antibiotic therapy is indicated if the presence of an infection is confirmed. In selected patients, it could be the only treatment. Still, further validation studies are needed.

*Keywords: Infectious pancreatic necrosis, antibiotic treatment.*

## INTRODUCTION

Pancreatic necrosis can occur in 10% of the patients with acute pancreatitis and it is associated with a mortality rate from 15% to 20%. In confirmed infectious pancreatic necrosis, patients benefit from a minimally invasive approach focused on percutaneous drainage and/or endoscopic debridement (step-up approach). In selected cases of patients without multiorgan failure, antibiotic and conservative treatment can be used. This is the case report of infectious pancreatic necrosis where conservative treatment was performed.

## CASE REPORT

Thirty-seven-year-old obese male patient. Consultation due to epigastric pain and neurovegetative syndrome. Physical examination: jaundice. Blood testing: total bilirubin levels of 5.46 mg/dL, direct bilirubin levels of 3.28 mg/dL. Amylase 3000 IU. Abdominal ultrasound: multiple vesicular lithiasis, mobile, biliary pathway and pancreas not evaluable due to pain. Computed tomography scan: edematous pancreas. At 72 hours: persistent epigastric pain, bilirubin of 22mg/dL. Magnetic resonance cholangiopancreatography: slim biliary duct, contrast passage to duodenum, free biliary duct not confirmed (Figure 1). Endoscopy and papillotomy are performed, and biliary sludge and

murky bile are extracted. Partial remission of pain, oral pathway reintegrated, torpid evolution. At 21 days epigastric pain and fever reoccur, with rising leukocytes. Computed tomography scan shows necrotic collection located in the epiploic transscavity, in the anterior sector of the pancreas from head to tail, there appears to be gas inside. Magnetic resonance imaging show necrotic collection of heterogeneous content (Figure 2). The watchful waiting approach is maintained based on antibiotic treatment with meropenem for 14 days, oral pathway suspended, parenteral nutrition, and proper pain management. Infectious humoral parameters within normal ranges. Control computed tomography scan at 6 weeks reports small collection in the pancreatic tail, further cholecystectomy and cholangiography without any inconveniences.



**Figure 1:** Magnetic resonance cholangiopancreatography. Intra and extrahepatic billiary duct can be seen, contrast passage to duodenum, free biliary duct not confirmed.


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Date of reception: 01/12/2021 - Date of acceptance: 01/05/2022

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**Figure 2:** Magnetic Resonance imaging. Extensive necrotic collection spreading from the head to the tail of the pancreas.

## DISCUSSION

Infectious pancreatic necrosis should be treated in a joint multidisciplinary approach with a gastroenterologist, surgeon, interventional radiologist, intensivist, infectologist, and nutrition team.<sup>2</sup> The infection pathogenesis is cause for debate although multiple pathways are considered, hematogenous, biliary, enteral, and bacterial translocation.

Antibiotic therapy is indicated in the presence of an infection or when there is imaging suspicion (eg. gas in necrotic collection) antibiotics with good pancreatic penetration if there are no other gastrointestinal alterations: the intestinal mucosa barrier is maintained and it prevents bacterial translocation, reduces infectious complications, organ failure, and mortality.<sup>2</sup> When it is not possible, enteral nutrition can be performed through a nasogastric/jejunal or total parenteral feeding tube.

In infectious pancreatic necrosis the first step of treatment begins with antibiotic therapy and percutaneous drainage delaying surgery. Its disadvantage is a higher risk of pancreaticocutaneous fistula. Drainage of early mini-invasive Wall of Necrosis has a Level of Evidence 1A; 1C to know when it is timely indicated, and 2C for sterile necrosis.<sup>2</sup>

Step #2 is minimally invasive necrosectomy, which can be through endoscopy, video endoscopy (VARD Technique) or

laparoscopy.

Pancreatic debridement should be avoided in the early acute stage (first 2 weeks because it increases both morbidity and mortality), and delayed until week#4.<sup>1</sup>

The definition of pancreatitis severity both in the acute and in the early phase depends on organ failure. A prospective observational cohort study that analyzed organ failure and infection obtained an OR of 16.72; 95%CI, 7.04–32.56.  $P < .001$ . as opposed to pancreatic necrosis (OR, 1.73; 95%CI, 1.14–2.98.  $P = .008$ ), multiorgan failure having the greatest impact on mortality.

In our patient, given the clinical situation (hemodynamically stable and without organ failure), medical treatment was maintained in the intermediate care unit, antibiotic therapy was started, enteral nutrition, fluid resuscitation, and pain control. Clinical improvement was observed at 24–48h. We should mention that our patient never had organ failure, which is why we chose to start antibiotic therapy and keep watchful waiting. The opportunity to perform a cholecystectomy in the presence of severe pancreatitis should be taken after week #6 or with evidence of imaging resolution.<sup>3</sup>

The authors declared no conflicts of interest, and that they contributed equally to producing this work.

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# Incidental intraoperative finding of subcapsular liver hematoma post-ERCP. Case report

## *Hallazgo incidental intraoperatorio de hematoma subcapsular hepático post CPRE. Reporte de un caso*

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### ABSTRACT

The presence of a subcapsular hepatic hematoma (SHH) after an endoscopic retrograde cholangiopancreatography (ERCP) is an uncommon complication of this procedure; only a few dozens of cases have been reported to this date. This is the case of a 28-year-old woman in whom a very large hepatic hematoma was incidentally found during cholecystectomy after an ERCP due to choledocholithiasis. The hematoma was treated conservatively with subsequent percutaneous drainage in an outpatient context.

**Keywords:** subcapsular hepatic hematoma, ERCP, cholecystectomy

### INTRODUCTION

The complications of an endoscopic retrograde cholangiopancreatography (ERCP) have a prevalence of approximately 10% being the most common of all digestive hemorrhages, pancreatitis, cholangitis or perforation. The presence of a SHH after an ERCP is a rare complication of this procedure, only a few dozen cases having been reported to this date. Treatment depends on the form of presentation, which can occur as a contained hematoma, or as a ruptured hematoma, which should be considered a true surgical emergency. This study presents the case of a finding of a contained SHH following an ERCP treated in a conservatively.

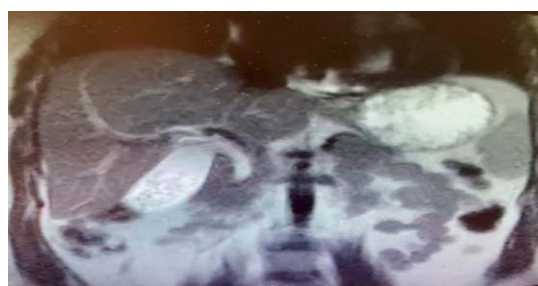
### CASE REPORT

This is the case of a 28-year-old woman without a past medical history of interest, who came to the ER with epigastric pain of 12-hour evolution that radiated to her right hypochondrium—of colic type—of moderate intensity that partially subsided with common analgesic drugs. The patient also had nausea and vomits on several occasions plus choluria, without acholia. The blood testing performed at admission revealed: white blood cells (WBC) 7300 IU; neutrophils (N), 81%; hemoglobin (HB), 11.7 g/dL; total bilirubin (TB) 3.76 mg/dL; direct bilirubin (DB), 2.80 mg/dL, alkaline phosphatase (AP), 518 mg/dL; aspartate transferase alanine (AST), 103 IU; alanine aminotransferase (ALT), 445 IU; and gamma glutamyl-transferase (GGT), 921 IU. The

abdominal ultrasound performed revealed the presence of a gallbladder with multiple lithiasis, large caliber choledochus with image suggestive of lithiasis inside of it. The magnetic cholangio-resonance revealed the presence of several non-dilated intrahepatic biliary ducts, common hepatic and choledochus duct of 7 mm in caliber, a 4 mm image of signal void at choledochus orifice level. This examination showed a liver without abnormalities. (See Figure 1)

In view of these findings, it was decided to present the case to the Digestive Endoscopy unit with an indication for ERCP. It revealed topical papilla and biliary duct cannalization. Comparatively, it was confirmed that choledochus had a stone of approximately 9 mm inside of it. Guided papillotomy was performed without complications with removal of the choledochal stone with a balloon extractor and control cholangiography with free biliary duct. At the end it bleeding was reported that was controlled by injecting diluted peripapillary adrenalin.

It was decided to schedule a laparoscopic cholecystectomy 24 hours after the procedure where hematic fluid was observed in 150 cc approximately distributed in the right paracolic gutter, subcapsular hepatic hematoma of, approximately, 15 cm in



**Figure 1.** Coronal view of the cholangio-resonance prior to the ERCP. It shows the unharmed liver. Also, it shows a 4 mm image of signal void at choledochus orifice level.

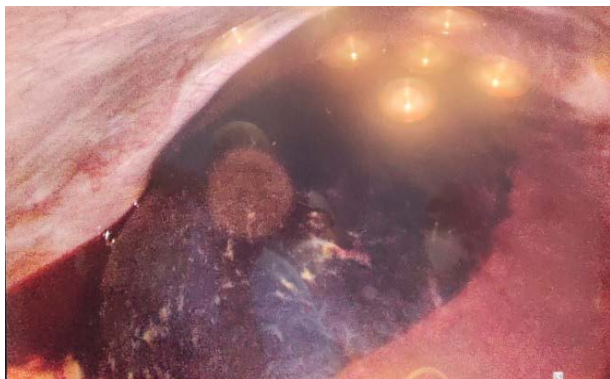
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Date of reception: 18/02/2022 - Date of acceptance: 19/07/2022

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**Figure 2.** Intraoperative incidental finding of SHH.



**Figure 3.** Tomographic imaging of SHH.

diameter, located in the hepatic surface at segment VII and segment VIII level which appeared to be unharmed, distended gallbladder with thin walls with multiple infra-centimetric stones, thin and long cystic duct. Choledochus appears to have a preserved caliber. (See Figure 2). In view of this finding, it is decided to perform a laparoscopic cholecystectomy that was executed without complications and follow watchful waiting of surgical treatment of hepatic hematoma at that moment. Tubular drainage was left in the right paracolic gutter.

Following surgery, the patient had a torpid evolution, with HB dropping from 11.7 gd/dL down to 8 gd/dl, requiring blood transfusions, in addition to daily fever peaks. Therefore, on day 9 after the surgery, a computed axial tomography scan with double contrast was indicated. It revealed that the liver had increased in size measuring 185 mm in the AP in the right lobe, inhomogeneous parenchyma with extensive hematoma probably subcapsular, dense, and heterogeneous, with fluid level measuring 200 mm x 185 mm x 98 mm with an approximate volume of 1800 cc. It raises the diaphragm to the right and displaces the kidney caudally in the absence of biliary duct dilatation. (See Figure 3). It was decided to follow conservative treatment and antibiotic therapy completing 9 days of intravenous amoxicillin/sulbactam and then 8 days on intravenous cefotaxime/metronidazole. Twenty days after surgery, an abdominal ultrasound was performed that revealed a smaller liver compared to the previous image (1000 cc of subcapsular fluid approximately). In view of this report and due to the patient's clinical improvement, it was decided to discharge the patient on oral antibiotic therapy.

During the outpatient control 10 days after discharge, it was confirmed that fever and asthenia persisted, which is why the case was referred to the percutaneous surgery unit, where it was decided to place multipurpose drainage via percutaneous access. A total of 1400 cc of dark hematic fluid was removed. Twenty-four hours later the patient was discharged with drainage slope and outpatient control, which is the state in which the patient remains to this date.

## DISCUSSION

ERCP is a procedure that is commonly performed to treat biliary disease and it is useful both diagnostically and therapeutically. Its main indications are choledocholithiasis, malignant conditions of biliary or pancreatic origin or benign biliary adhesions.<sup>(1,2)</sup>

The rate of procedural complications goes from 2.5% to 8% when the procedure is performed by an experienced professional team. The most common complication is acute pancreatitis

(1%-to-7%) followed by acute cholangitis (1-4%), bleeding (1%), and duodenal perforation (less than 1%). The procedural mortality rate following an intervention is 0.2%. Other rarer complications are the formation of hepatic abscesses, paralytic ileus, pneumothorax, pneumomediastinum, and SHH.<sup>(3,4)</sup>

SHH is among the rarest complications of this procedure, only 62 cases have been reported by the medical literature to this date.<sup>(5)</sup> The mechanism of this complication is not yet fully understood. The main hypothesis on how the biliary duct lesion is caused is the use of the guidewire when the choledochus is being cannulated, which may be damaging the hepatic parenchyma and tearing the adjacent blood vessels, thus causing the hematoma. Another hypothesis would be that the lesion is due to the traction exerted by the balloon extractor, which ruptures both the biliary canaliculi and the blood vessels consequently causing the hematoma.<sup>(6)</sup>

A total of 14 out of the 62 cases reported presented with ruptured hematoma, a complication often occurring as a surgical emergency starting with abdominal pain, low blood pressure and hypovolemic shock resulting in death in 4 of the cases reported (7.5%).<sup>(5)</sup>

Another form of presentation is the one that occurred in the present case, which was an incidental finding during a post-ERCP laparoscopic cholecystectomy showing symptoms 48 hours after the endoscopic procedure. Symptom onset in the medical literature was variable; the case of most delayed onset described was 15 days after the ERCP.

Treatment depends on each case. Hemodynamically stable patients can be treated conservatively. This case was treated with antibiotic therapy and percutaneous drainage. Cases that present with hemodynamic instability like ruptured hematoma should be treated with emergency surgery.<sup>(7)(5,6)</sup>

## CONCLUSION

SHH after an ERCP is a potentially fatal complication that should be taken into account as differential diagnosis regarding procedural complications.

## CONFLICTS OF INTEREST

None whatsoever.

## AUTHORS' CONTRIBUTIONS

Dr. Pablo Schaerer, and Dr. Andrea Ramirez had the idea for the study, drafted the manuscript, conducted the bibliographic search, and its final review.

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## Prognostic factors for colorectal cancer survival and relapse

### *Factores pronósticos de supervivencia y recurrencia en cáncer colorrectal*

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#### ABSTRACT

Colorectal cancer is an entity that has been gaining greater epidemiological importance in Latin America on a daily basis. Multiple factors have been described that help predict the prognosis of patients and determine their treatment.

**Keywords:** Colorectal carcinoma; Microsatellite instability; Histopathology; Prognostic factors.

#### RESUMEN

El cáncer colorrectal es una entidad que cada día cobra una mayor importancia epidemiológica en América Latina, se han descrito múltiples factores que ayudan a predecir el pronóstico de los pacientes y a determinar el tratamiento de los mismos.

**Palabras clave:** Carcinoma colorrectal; Inestabilidad microsatelital; Histopatología; Factores pronósticos.

#### To the Editor:

After meticulously reading and making a critical review of the article "Surgical treatment of colon cancer at Central Military Hospital of the Armed Forces in Asunción, Paraguay from February 2017 through February 2019," the fact that the rate of neoplastic colon lesions has increased lately at the doctor's office—both in outpatient care and emergency services—is undisputed. Currently, the use of diagnostic methods make it possible to determine the stage of the disease in terms of local compromise or spread to other structures, which helps establish oncologic management plans based on surgery associated with adjuvant and neoadjuvant therapy that extends the disease-free interval, and eventually the patient's survival.<sup>[1]</sup> Although the authors mention the presence of novel diagnostic aids and prognostic factors, they did not include them in their study despite the fact that they have a considerable number of patients. The analysis of these data would have been interesting if we think that colorectal cancer (CRC) is the fourth leading cause of death associated with cancer worldwide with a significant prevalence in male patients regarding mortality and incidence rate. Epidemiologically, around 77/1000 patients die every year for this reason world-

wide. In Colombia, it is the third leading cause of death due to cancer followed by prostate and lung carcinomas.<sup>[2]</sup>

Among the main prognostic factors that can be assessed through the existing new technologies to determine risk of disease relapse and overall survival of patients, the following stand out: Histological findings: Compromise of resection borders, compromise of radial border (mainly in rectum cancer), high mitotic activity, high histological degree, signet-ring cell morphology, lymphovascular and/or perineural invasion, macroscopic tumor perforation, tumor implants into the abdominal cavity; all these intrinsic factors of the lesion determine a more unfavorable prognosis in patients who have them.<sup>[3]</sup>


Intratumor lymphocyte inflammatory Infiltrate: the presence of a high tumor infiltrating lymphocyte (TILs) count is established as a positive prognostic factor in many malignant neoplasms including colorectal carcinoma. In 2014, the TIL International Work Group (ITWG) proposed a standardized methodology to evaluate TIL early in the context of breast cancer. The ITWG system to assess the density of stromal TIL is categorized into 3 groups based on their count: low (0% to 10%), intermediate (15% to 50%), and high (55% to 100%). Survival increases with higher lymphocyte count; with a mean of 53, 67, and 75 months, respectively in each subgroup.<sup>[4]</sup> Mutation of the KRAS/NRAS: the RAS signaling pathway, also called the chromosomal instability pathway, shows deregulation in, at least, one gene in over 70% of colorectal carcinomas, Kras-activating mutations were found in 30% to 40% associated with a deficient response to anti-EGFR therapies in primary or metastatic disease. The state of the KRAS/NRAS mutation modifies the management of the patients, the updated clinical practice guidelines of the National Comprehensive Cancer Network (NCCN) in oncology recommend that the tumors of all the patients with stage IV disease should be analyzed to detect the KRAS gene and only patients whose tumors have normal Kras (wild type) should receive cetuximab and panitumumab.<sup>[5]</sup>

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Date of reception: 22/03/2022 - Date of acceptance: 05/05/2022

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Microsatellite instability: it is significant that in patients with colorectal cancer the hereditary component and the association with genic repair defects known as microsatellite instability are accompanied with a greater predisposition to develop colorectal carcinoma, and extracolonic ones due to mutations in genes MLH1, MSH2, MSH6, and PMS2. The study of instability is conducted through immune-histochemistry and PCR; the most common mutations are those of MSH2 and MLH1 with rates of 40% to 60%, and 40% to 50%, respectively. The other two genes have smaller rates given by MSH6 (10-20%) and PMS2 (2%). Approximately 80% of the CRC with instability are due to hypermethylation of MLH1 while 20% is associated with germinal mutations of MMR genes (mismatched repair).<sup>[6]</sup>

Patients with microsatellite instability have proven to have better prognosis as opposed to those who don't, above all, thanks to the therapy targeting the PD-1 receptor (nivolumab, pembrolizumab) with good rates of residual disease-free time

12 months after treatment. However, in patients who show loss of some of the microsatellites, BRAF mutations should be studied because these patients are going to have a lower therapeutic response to treatment therapies aimed at the epidermal growth receptor (EGFR).<sup>[7]</sup>

Considering the above, the analysis of these variables in patients suffering from colorectal cancer could predict their prognosis, as well as guide the treatment and actions to follow as part of a comprehensive approach. Local studies are necessary where these factors are evaluated to determine the behavior of this entity in our environment and establish healthcare strategies to overcome this disease that is gaining greater epidemiological significance by the hour. Therefore, we suggest including these variables in upcoming studies.

**The author declares** that this work has not been published and is of his own authorship. Also, that there are no conflicts of interest. There was no external financing conduct this study.

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