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Psychological safety in the operating room

Seguridad psicológica en el quirófano

Abilene Cirenia Escamilla-Ortiz,[*,‡] Josefina Serrano-Pérez[*,§]

Leaders must remember that an emotionally intelligent group does not necessarily result in an emotionally intelligent group. Vanessa Urch mentions that team members must feel that they work better together than individually, so leadership must generate trust and a true sense of group identity, and rules must be established that favor awareness and management of emotions within and outside the team.[1]

Understanding psychology within the OR is important, mainly because of the emotional burden and stress experienced within the OR; psychological knowledge can significantly improve the quality of communication. OR leaders should always consider hiring personnel with psychological knowledge to contribute to the success of the group or team.[1]

Interpersonal difficulties are common in the operating room. However, if anyone has the skills, he/she can achieve respect and success by communicating effectively and overcoming the situation's problems.[1]

If questions are not allowed inside the operating room, reporting errors or making any observations, receiving only criticism can make the environment more stressful and harm the functioning of the operating room and the patient.[2]

These situations are the basis of why the operating room environment must be psychologically safe; this safe working environment in which open communication between the entire team provides quality patient care and reduces stress.[2]

When psychological safety is combined with discipline and shared responsibility, better outcomes, problem-solving, a learning environment, adaptability, and psychological health for the entire surgical team can be achieved.

Dr. Harry T. Papaconstantinou, a coloproctologic surgeon, states that it is best to have a safe psychological environment; it is okay to take risks, express ideas or concerns, admit mistakes, and ask questions, all without negative consequences. One must have the ability to speak up without being judged.[2] If the entire operating room staff feels empowered to point out a possible error, the result will be a decrease in these errors, and they may even be corrected so that they do not happen again.[2]

Dr. Edmondson says that psychological safety means not hesitating at all if a team member has a remote suspicion that the surgeon is about to do something wrong; the psychologically safe environment fosters openness, and openness requires courage and honesty.[2] She mentions that work is more engaging and meaningful if it is believed that matters and the voice is expected and welcome.

Team members who interrupt a surgery with out-of-place, irrelevant, and unhelpful comments should be spoken to and, if necessary, removed from the operating room.[2]

A psychologically safe operating room is a learning environment where there should be mutual professional respect, open communication, and no judgment. Operating room teams that demonstrate higher levels of psychological safety can implement new technologies.[2]

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Psychological safety supports these conditions that contribute to making work meaningful and engaging:[2]

1. Purpose and significance
2. Culture and community
3. Growth and development

If no one listens, and the input is not well received, working in harmony will be lost.

Dr. Edmondson says that if someone is in surgery and is not in learning mode, the job will not be doing as well as it should be.

A psychologically safe environment relieves the surgeon of some of his or her burden; it has been shown that mistakes can be made when the surgeon does not feel secure and does not have his or her team. Surgeons can help create a psychologically safe environment because they are the leaders in the operating room and can ask their team for suggestions and feedback.[2]

Self-awareness is fundamental in surgeons; they must know how they are perceived to model the desired behavior.

Dr. Papaconstantinuou states that how the surgeon poses questions and responds determines whether team members can ask questions. The surgeon should be prepared to handle emotions in the operating room.

What should the surgeon do to create psychological safety?

Set the stage: the surgeon should tell the team that they are not infallible and that if they see a mistake being made, they should give notice and be humble.

Seek feedback: ask questions and involve the team.

Respond appropriately: do not make gestures if someone does not agree with an answer, thank contributions in a positive way, and control when comments are not helpful.

Dr. Papaconstantinou states that trust helps create an environment of mutual professional respect essential for psychological safety.

Working with the same team is better. Staff rotation should be avoided; the team must be consistent.

Changing the culture of psychological safety within the operating room requires attacking from several points. Surgeons and other managers must learn more about this concept and include it in the education and training programs of residents and staff involved in the operating room.

Creating a safe environment will lead to better outcomes and is fundamental to patient safety.

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Surgical management of pancreatic pseudocyst assisted by Da Vinci robot initial experience in a Third Level Center

Manejo quirúrgico del pseudoquiste pancreático asistido por robot Da Vinci experiencia inicial en un Centro de Tercer Nivel

Enrique Jiménez-Chavarría,* Iván Francisco Fernández-Alvarado,* Samuel Arnulfo Pimentel-Meléndez*

Keywords: pancreatic pseudocyst, robot-assisted drainage, pancreatitis, cystogastroanastomosis.

Palabras clave: *pseudoquiste pancreático, drenaje asistido por robot, pancreatitis, cistogastroanastomosis.*

ABSTRACT

Introduction: the incidence of pancreatitis has increased worldwide, but despite improvements in diagnosis and treatment, it is still associated with high morbidity and mortality. **Objective:** to present the surgical experience of treating minimally invasive pancreatic pseudocysts assisted by the Da Vinci robot in a third-level medical center. **Material and methods:** a retrospective, descriptive study was performed in which the records of 28 candidates for Da Vinci robot-assisted surgical management were analyzed from November 2014 to October 2018. Statistical analysis was performed with SPSS and GraphPad Prism software. **Results:** in our series of 28 patients with pancreatic pseudocyst and pancreatic necrosis, 15 (54%) underwent cystogastroanastomosis plus cholecystectomy, in six patients (39%) cystogastroanastomosis plus necrosectomy and cholecystectomy; and in seven patients (25%) only cystogastroanastomosis was performed. All surgeries were assisted with the Da Vinci Xi robot. The coupling of the robot (docking) lasted an average of 5.8 minutes, an average surgical time of 210 minutes, an average bleeding of 99 mL, a hospital stay of 72 hours, morbidity of 7%, no conversions, and no patient-required reintervention. **Conclusions:** little evidence exists in the literature on a robot-assisted approach for treating pancreatic pseudocysts and necrosis. In the experience acquired at the Hospital Central Militar in the robot-assisted surgical management of pancreatic pseudocyst and pancreatic necrosis, good results were obtained, including prompt recovery, short hospital stay, and a lower rate of complications.

RESUMEN

Introducción: *se ha incrementado la incidencia de pancreatitis a nivel mundial, pero a pesar de las mejoras en el diagnóstico y en el tratamiento sigue asociada a una alta morbimortalidad.* ***Objetivo:*** *presentar la experiencia quirúrgica en el tratamiento del pseudoquiste pancreático de mínima invasión asistido por robot Da Vinci en un Centro de Tercer Nivel.* ***Material y métodos:*** *se realizó un estudio retrospectivo, descriptivo, en el que se analizaron los expedientes de 28 pacientes que fueron candidatos a recibir manejo quirúrgico asistido por robot Da Vinci, de noviembre 2014 a octubre 2018. El análisis estadístico se realizó con los programas SPSS y GraphPad Prism.* ***Resultados:*** *en nuestra serie de 28 pacientes con pseudoquiste y necrosis pancreáticos, a 15 (54%) se les realizó una cistogastroanastomosis más colecistectomía, en seis pacientes (39%) se realizó cistogastroanastomosis más necrosectomía y colecistectomía, en siete pacientes (25%) sólo se realizó cistogastroanastomosis, todas las cirugías asistidas con robot Da Vinci Xi. El acoplamiento del robot (Docking) con una media de 5.8 minutos, tiempo quirúrgico promedio de 210 minutos, con una media de sangrado de 99 ml, estancia hospitalaria de 72 horas, morbilidad de 7%, sin conversiones y ningún paciente requirió reintervención.* ***Conclusiones:*** *hay poca evidencia en la literatura sobre abordaje asistido por robot para el tratamiento del pseudoquiste y necrosis pancreáticos. En la experiencia adquirida en el Hospital Central Militar en el manejo quirúrgico asistido por robot del pseudoquiste y necrosis pancreáticos se obtuvieron buenos resultados, pronta recuperación, corta estancia hospitalaria y menor tasa de complicaciones.*

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Abbreviations:

OF = organ failure
PA = acute pancreatitis
PP = pancreatic pseudocyst
SIRS = systemic inflammatory response syndrome.

INTRODUCTION

Worldwide, an increase in the incidence of acute pancreatitis (AP) has been noted; despite improvements in diagnosis and access to care, acute pancreatitis is still associated with significant morbidity and mortality; it can vary from a mild and self-limited disease that requires no more than supportive measures, to one with severe life-threatening conditions.[1] Acute pancreatitis is the most common pancreatic disease globally, with an estimated incidence of 4.9 cases per 100,000 people. The incidence varies in different geographical regions, depending on alcohol consumption and the frequency of biliary lithiasis. In Mexico, the most frequent cause of AP is biliary origin in up to 66% of cases and alcohol in 15.9% of cases, with hypertriglyceridemia as the third cause in 7.8% of cases.[2] AP results from the premature activation of digestive enzymes released by the exocrine pancreas, mainly trypsinogen to trypsin, within the acinar cells, causing self-digestion and the potent stimulation of macrophages that induce the production of proinflammatory cytokines such as IL and TNF-a, key events in the pathogenesis of AP.[3]

In 80-85% of cases, AP presents as a mild condition, and 15-20% of cases may present as severe cases with a mortality of up to 50%. There are two types of pancreatitis, interstitial or edematous pancreatitis, which occurs in 80-90% of cases and is characterized by acute inflammation of the pancreatic or peripancreatic parenchyma without identifiable necrotic tissue that usually resolves early and is self-limited, and necrotizing pancreatitis which is the inflammation associated with pancreatic and/or peripancreatic necrosis and is the more aggressive form. Pancreatitis has two mortality peaks and is usually associated with its two phases, the first or early phase, which occurs in the first week and is associated with systemic inflammatory response syndrome (SIRS) and/or organ failure (OF) and the second or late phase which lasts weeks or months and is characterized by systemic signs of inflammation, local and systemic complications and/or persistent organ failure.[4]

The Atlanta classification defines *mild AP* as occurs without organ failure, local or systemic complications that are usually resolved within the first week, and mortality is very rare; *moderately severe AP* is characterized by the presence of transient FO or local or systemic complications that may be resolved in the first 48 hours, which does not require prolonged specialized care. Sterile pancreatic necrosis without FO, resolving in week 2 or 3 with morbidity and mortality of less than 8%. Severe AP is characterized by persistent organ failure (single or multiple) and one or more local or systemic complications; it occurs early with a mortality of 36 to 50%.[5]

In this paper, we will focus on the management of local complications of acute pancreatitis, which are clinically suspected by persistent abdominal pain or recurrent pain accompanied by increased pancreatic enzymes, persistent FO, and the presence of SIRS. These local complications are confirmed by a CT scan, a study that describes the complications based on location, content, and wall thickness; it is recommended to be performed 48 hours after the onset of acute symptoms.

Computed tomography (CT) scan is a non-invasive diagnostic tool to detect collections following acute pancreatitis. There are four types of collections: *acute liquid collection*. Most are sterile, usually homogeneous collections of dense fluid, not encapsulated, and within the peripancreatic fascia associated with edematous AP without necrosis, with spontaneous resolution; its management is conservative. *Acute necrotic collection*s can be sterile or infected; in its initial phase, this collection is a mixture of solid and semi-solid tissue, and it is encapsulated. These are usually managed conservatively and only require treatment in case of obstruction of the duodenum or biliary tract; in the absence of symptoms, surgical intervention is deferred for at least four weeks. Suppose the patient

presents SIRS or a septic picture that causes instability or aggravation. In that case, it is recommended to drain the collection percutaneously to stabilize the patient and to complement the definitive treatment through the administration of antibiotics and a minimally invasive debridement called necrosectomy; this can be through percutaneous, endoscopic, laparoscopic, or assisted retroperitoneal approach. A limited number of patients, which must be well selected, can be treated only with antibiotics.[6] The *pseudocyst* is an oval or rounded collection encapsulated with a fibrous wall and well-defined granulation tissue that may contain necrotic tissue. This lesion has progressive growth, usually consolidates, and is detected during the fourth week. Usually, they are asymptomatic or with non-specific symptoms; if asymptomatic, it is managed conservatively since more than 50% of these resolve spontaneously; if the patient has symptoms, becomes infected, or size increases, drainage is recommended for minimal invasion. After four weeks, encapsulated collections may become infected in up to 80% of cases, and these patients may present complications secondary to sepsis or form abscesses. *Abscesses* are heterogeneous and encapsulated, and more than 80% of deaths associated with acute pancreatitis are attributed to septic complications with bacterial infection.[7-10]

Pancreatic pseudocyst (PP) is a well-recognized complication of AP. It is usually surrounded by a wall of granulation tissue lacking true epithelium, located mainly in the transcavity of the omentum, adherent to the pancreas and communicating or not with the pancreatic duct. It is present in 2-10% of AP and 10-30% of patients with chronic pancreatitis.[11-13]

The treatment of local complications depends on their characteristics and response to conservative management. Surgical management is recommended for PP that does not resolve or decreases in size and presence of symptoms, as well as encapsulated and infected pancreatic necrosis. The preferred procedure can be open, percutaneous drainage, endoscopic, or minimally invasive. Drainage can be divided into internal drainage, external drainage, and resection.[14]

The treatment choice may depend on the complications associated with pancreatic pseudocysts, such as infection, intestinal and biliary tract obstruction, bleeding, and spontaneous rupture; this depends on the importance of adequate and timely treatment for each patient.[15] The treatment of PP has changed and continues to evolve. Before 2013, drainage was recommended for lesions larger than 6 cm or if they persisted beyond six weeks. Asymptomatic PP can be managed conservatively regardless of size, location, or extension to neighboring structures, and it is advisable to treat those that are complicated or symptomatic due to lesion or extension.[16]

When PP presents clinical symptoms, the most frequent, regardless of their origin, are abdominal pain (75%), nausea (50%), febrile syndrome, and weight loss; palpable masses are frequently found in clinical examinations, usually in the epigastrium, and less regularly jaundice.[17]

Different techniques are available to establish therapeutic management, from external percutaneous drainage, open surgery, and endoscopic approach to laparoscopic surgery (intraluminal cystogastrostomy, anterior cystogastrostomy). Percutaneous drainage, alone or in combination with other minimally invasive techniques, continues to be an essential therapeutic strategy in unstable patients who would not support a transmural endoscopic approach. Percutaneous drainage is successful in 35% of cases. It is only recommended to stabilize the patient and improve his general condition, prolonging the time to allow maturity and thickening of the PP wall.[18,19]

A disadvantage of performing this procedure is related to the length of time the drain is maintained. Unfortunately, the open or closed drain is inserted for over seven days. In that case, it can be complicated by a cutaneous pancreatic fistula, which is, by definition, communication of the PP with the patient's skin at the site where the puncture was performed, allowing pancreatic fluid to leak through the wound.[20]

The recommended surgical treatment where internal drainage is performed using a

cystogastroanastomosis, cystojejunoanastomosis, or cystoduodenoanastomosis, depending on where the PP is located. This procedure has a mortality of 5-9%, with an average complication rate of 11-24% and a recurrence rate of 5-8%. Wound seroma and sepsis, as well as pneumonia, are the three main postoperative complications of the open approach.[21-23]

Endoscopic drainage can be performed by transmural drainage by accessing the pseudocyst through the stomach or duodenum wall and leaving a drain or by transpapillary route draining the PP into the pancreatic duct. These techniques are satisfactory in 90% of cases, with a morbidity rate of 10-15% and a recurrence rate of 10%.[24-29]

The minimally invasive laparoscopic approach can be performed by conventional, hand-assisted, and Da Vinci robot-assisted laparoscopy.[30] During the nineties, interest in the development of minimally invasive approaches was awakened, describing various internal drainage techniques with laparoscopic approaches such as posterior cystogastroanastomosis, anterior or transgastric cystogastroanastomosis, cystogastroanastomosis with endogastric approach and Roux-en-Y cystojejunoanastomosis. In 2007, Aljarabah and Ammori[31] reviewed the literature reporting a complication rate of 4.6%, mortality of 0%, and a reported recurrence of 0% in patients with PP treated by laparoscopic approach.[32-35]

Sharing the experience in this publication opens a treatment option of PP and allows to expose the usefulness of the Da Vinci robot, a platform that has contributed to the surgical management in complex gastrointestinal procedures. With this platform, an anterior or posterior approach to performing a cystogastroanastomosis by using instruments that allow manipulation with seven degrees of freedom can be done, having a great advantage to performing anastomosis with suture; it offers better ergonomics, more precision, and speed compared to conventional laparoscopic surgery, offers a three-dimensional view and magnification of the images, allows better coordination, eliminates the surgeon's tremor, facilitates the operation in narrow spaces and angles that are not possible in conventional laparoscopy, allowing a more precise suture, eliminating the need for staplers, which many times are not useful due to the thickness of the gastric wall that makes the procedure difficult. There are few reports on these approaches, and few authors have attempted them. So far, this is the most extensive series in Mexico describing this Da Vinci Xi robot-assisted approach.[36-39]

A large body of evidence has shown that minimally invasive surgery is superior to an open approach, as it is associated with less postoperative pain, a shorter hospital stay, early discharge of the patient, early recovery, and fewer complications associated with the surgical procedure.[40,41]

Surgical technique

All surgeries were performed entirely with the Xi model of the da Vinci surgical system *(Intuitive Surgical, Inc.)* by a hepatopancreatobiliary surgeon with accumulated experience, performing more than 280 robot-assisted procedures. The patients were placed in an inverted Trendelenburg position with an open technique; the Hasson trocar was placed in the umbilical scar, which will be the camera port (C), the pneumoperitoneum was established at 14 mmHg. Under direct vision, three 7 mm trocars were placed, which correspond to the robot arms; the port for the first robot arm (R1) is placed 10 cm from the midline of the patient's left side, 5 cm above the umbilical scar, the second port (R2) is placed 10 cm from the midline on the patient's right side, 5 cm above the umbilical scar. The port (R3) is placed 10 cm from trocar R2 below the costal border on the mid-axillary line on the right side. A 12 mm accessory port is placed 5 cm from the midline between trocar R1 and the camera, 2 cm below the umbilical scar *(Figure 1)*. Once the trocars are placed, the docking of the robot arms is performed; in all patients, a retro gastric approach is performed, starting with the opening of the gastrocolic ligament with an ultrasonic scalpel to enter the lesser sac exposing the anterior surface of the pancreas, usually observing inflammatory tissue and fibrosis in intimate contact with

the posterior face of the stomach. With the ultrasonic scalpel the opening of the PP is performed, The contents are aspirated, which commonly have a cloudy grayish aspect and sometimes purulent yellow; necrosectomy is performed by debriding the free tissue, avoiding forcing or tearing the tissue to prevent bleeding, then proceed to perform the opening of the posterior aspect of the stomach of similar dimensions to the opening of the anterior wall of the PP; hemostasis is controlled. With a continuous suture, a V-Loc™ barbed suture with a 2-0 bearded suture is done to reinforce the vertexes. Then, it follows with a continuous suture on the anterior aspect with barbed suture in two planes, continually monitoring hemostasis, placing a safety drain, removing the trocars under direct vision and closing the access sites of the trocars, taking special care to close the aponeurosis in the umbilical scar and the site where the accessory trocar enters *(Figures 2-4)*.

Objectives: to share our experience in the surgical treatment of PP and complications associated with pancreatitis that do not respond to conservative management and are susceptible or have the surgical indication to be drained by minimally invasive surgery

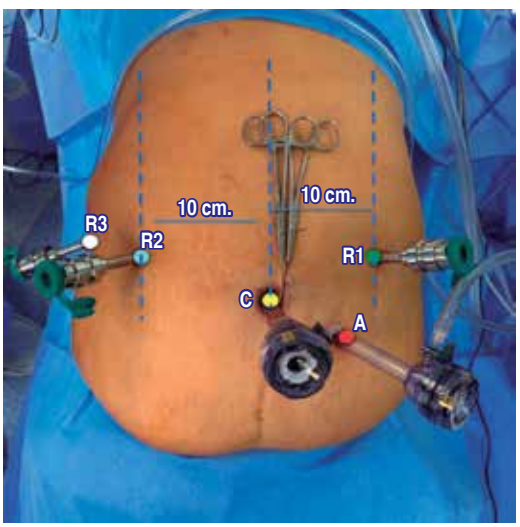

Figure 1: Port placement site and marking distances before surgery.
Image from the author's personal archive.

Figure 2: Necrosis of the pancreas, abundant grayish secretion, debridement with harmonic scalpel.

Figure 3: The open pseudocyst and the posterior aspect of the stomach are visible, ready to perform the barbed continuous suture for the cystogastroanastomosis.

Figure 4: Ninety percent of the pancreatic body is necrosed, and high mortality is associated with *Acinetobacter baumannii*.

assisted with the da Vinci Si robot platform in a third-level center.

MATERIAL AND METHODS

An observational, descriptive, retrospective, and cross-sectional study was performed, analyzing the clinical records of 28 patients who suffered pancreatitis and presented complications associated with the disease, who did not resolve with medical management and attended for the presence of symptomatology related to intra-abdominal lesions, and who had imaging studies confirming the presence of PP and pancreatic necrosis. They underwent a surgical referral and were assisted with a Da Vinci robot in a third-level center from November 2014 to October 2018; the statistical analysis was performed using SPSS and GraphPad Prism software.

RESULTS

Twenty-eight files of patients with a diagnosis of pancreatic pseudocyst and infected and non-infected pancreatic necrosis of biliary, alcoholic, or metabolic origin who met the criteria for surgical treatment, who underwent cystogastroanastomosis, necrosectomy plus minimally invasive cholecystectomy assisted by Da Vinci robot, after diagnosis by dynamic computed tomography of the pancreas were reviewed. Of these, n = 13 (46.4%) were female and n = 15 (53.6%) males, with a minimum age of 15 years and a maximum of 91 years with a mean of 45.5 years. Their minimum weight was 40 kg, with a maximum of 116 kg and a mean of 68.1 kg, a minimum height of 1.44 m, a maximum of 1.77 m, with a mean of 1.61 m. The surgical indication was the diagnosis of PP greater than 6 cm in 22 (78.5%) patients and n = 6 (21.4%) for pancreatic necrosis. Three (10.7%) patients presented infected pancreatic necrosis. It should be noted that radiological criteria with dynamic computed tomography of the pancreas were used for the diagnosis.

Regarding the etiology of BP, 21 patients were diagnosed with pancreatitis of biliary origin, and seven were due to other causes, including alcohol, metabolic, and drug toxicity *(Table 1)*. From our series, nine (32%) patients presented multiple comorbidities such as obesity, type 2 diabetes, high-blood pressure, hypothyroidism, and chronic kidney disease *(Table 2)*. Of the surgical procedures performed, 15 patients (54%) underwent pseudocyst drainage with cystogastroanastomosis plus Da Vinci robot-assisted laparoscopic cholecystectomy, six patients underwent necrosectomy plus cholecystectomy, and seven patients (25%) underwent only pancreatic pseudocyst drainage plus cystogastroanastomosis, performing only 21 cholecystectomies concomitantly out of the 28 patients considered *(Table 3)*.

Table 1: Etiology of pancreatitis (N = 28).

Etiology	n (%)
Biliary	21 (75)
Intoxication (Brazil seed)	1 (3.57)
Alcoholic	4 (14.2)
Metabolic	2 (7.1)

Table 2: Comorbidities associated with the complication of pancreatitis (N = 28).

	n (%)
No comorbidities	19 (67.9)
HBP	2 (7.1)
T2D	1 (3.6)
T2D/hypertriglyceridemia	1 (3.6)
T2D/obesity	1 (3.6)
HBP/obesity	1 (3.6)
HBP and ERC	1 (3.6)
HBP/T2D/hypothyroidism	1 (3.6)
Obesity grade II	1 (3.6)
Total	28 (100)

T2D = type 2 diabetes. CKD = chronic kidney disease. HBP = high blood pressure.

The robot docking time was a minimum of 5 minutes and a maximum of 11 minutes, with a mean of 5.8 minutes; surgical time was a minimum of 105 minutes and a maximum of 360 minutes, with an average of 210 minutes. During the surgeries, there was a maximum bleeding of 700 ml in one procedure, and it was quantified as a minimum of 10 ml with a mean of 99 ml. The hospital stays ranged from a minimum of three days to a maximum of 20 days associated with comorbidities, with a mean hospital stay of seven days. Two patients (7%) presented complications. One patient developed in the late postoperative period a biloma secondary to distal obstruction of the common bile duct in its intrapancreatic portion, associated with inflammation of the pancreatic tissue, after having undergone a cystogastroanastomosis plus cholecystectomy; this case was resolved by placing percutaneous drainage decreasing the collection once the inflammation of the pancreatic parenchyma decreased. The second patient presented bleeding secondary to erosion of small branches of the pancreatic parenchyma, minimal bleeding without hemodynamic repercussions that self-limited without the need for reintervention. The first patient was classified as Clavien-Dindo IIIa and the second as Clavien-Dindo II. In our series, a patient who presented morbid obesity with necrosis of 90% of the pancreatic tissue died. The patient had a persistent fever of up to 42° centigrade, which did not respond to antipyretic drugs or physical therapy. Percutaneous drainage was performed without improvement according to the protocol for managing infected pancreatitis. The patient continued with systemic inflammatory response and fever; in the absence of response, it was decided to perform a necrosectomy and drain the collection by advanced laparoscopy, obtaining purulent liquid; the purulent secretion was sent for culture and evidence of an infection associated with *Acinetobacter baumannii* was obtained. After a stay of more than a week in the intensive care unit, the patient continued with fever, with no response to antibiotics; the patient died secondary to the infection associated with the underlying condition and not to the surgical procedure.

Table 3: Surgical procedure performed.

Procedures	n (%)
Necrosectomy plus cystogastro-anastomosis plus cholecystectomy	6 (21)
Cystogastro-anastomosis plus cholecystectomy	15 (54)
Cystogastro-anastomosis	7 (25)
Total	28 (100)

DISCUSSION

A meta-analysis showed that the endoscopic approach has high success rates;[42] however, it has a recurrence rate of up to 14.4% compared to the laparoscopic approach of 2.5%.[43-45] Mohammad Khreiss and colleagues reported in a cohort study 20 cystogastroanastomosis secondary to pancreatic pseudocyst by laparoscopy and robot-assisted; a complication rate of 20% in which bleeding, perforation, and infection are noted, also reported having performed a concomitant cholecystectomy in 60% of the patients in the series. In our series, the complication rate was 7%; we also performed 22 concomitant cholecystectomies (71%) due to the diagnosis of pancreatitis secondary to biliary etiology.[7]

Parekhet et al. reported a series of 19 patients with a mortality of 19%; in our series, there was only one death due to the progression of the disease associated with a microorganism classified as Gram-negative pathogenic coccobacillus, which is associated in reports with a mortality of 100%; in this case, the mortality was not related to the surgical procedure. There is little evidence in the literature of this procedure; there are only reports of cases of cystogastroanastomosis for pancreatic pseudocyst and laparoscopic necrosectomy

assisted by da Vinci robot, this series being the first reported in our country.

Alexa Cárdenas and associates,[39] Russell C. Kirks Jr and his team,[37] and Parekh D and colleagues[38] describe the robot-assisted laparoscopic approach with cystogastroanastomosis. However, they do not report the surgical time; in our series, we report an average time of 210 minutes and average bleeding of 100 ml, with an average hospital stay of seven days, presenting excellent results compared to the series reported for conventional laparoscopy.[46-48]

The Da Vinci robot-assisted laparoscopic procedure is a safe and reliable approach, improves vision, and facilitates complex procedures such as gastrocystic anastomosis, with a lower rate of complications, less bleeding, and shorter hospital stay in the treatment of PP and necrosectomy, allowing safe debridement of encapsulated necrosis and infected necrosis. This report shows us a preliminary initial series, so it is necessary to increase the number of patients to be able to make strong statements; however, it is the first step in offering this therapeutic strategy.

CONCLUSION

Robot-assisted laparoscopic surgery has contributed to minimally invasive surgical management in complex gastrointestinal procedures; it is useful and favors the resolution of complications associated with pancreatitis and facilitates definitive drainage of the PP and necrosectomy. AP with encapsulated and infected pancreatic necrosis allows drainage of the collections. It complements the definitive treatment using cystogastric or retrogastric cystogastric anastomosis. This procedure allows better visualization, facilitating adequate aspiration of the liquid and debridement of the necrotic and infected tissue, making it possible to perform a cystoenteric anastomosis more easily, in addition to performing other additional procedures associated with the condition to facilitate definitive surgical treatment.

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Prevalence of burnout syndrome in physicians of the Mexican Association of General Surgery

Prevalencia del síndrome de burnout *en médicos de la Asociación Mexicana de Cirugía General*

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Keywords:
burnout, surgeons, surgery, psychological stress.

Palabras clave:
burnout, *cirujanos, cirugía, estrés psicológico.*

ABSTRACT

Introduction: the burnout syndrome represents a psychosocial phenomenon with important repercussions for health professionals. **Objective:** this study aimed to estimate the prevalence of burnout among physicians who are members of the Mexican Association of General Surgery and explore some factors associated with its development. **Material and methods:** a digital survey was applied to physicians associated with the Mexican Association of General Surgery, collecting sociodemographic variables related to current professional activity, predisposing or attenuating factors of this syndrome, and the Maslach Burnout Inventory. The prevalence of burnout syndrome and the dimensional profiles of the syndrome present in the respondents were estimated. Additionally, the collected variables were contrasted between associates with burnout syndrome and those without the diagnosis. **Results:** a total of 1,398 associates answered the survey. The estimated prevalence of burnout was 49.3%. The most frequent dimensional profiles were low personal accomplishment in isolation (32.2%), followed by high levels of emotional fatigue, high levels of depersonalization, and low levels of personal accomplishment (24%). In the bivariate analysis, the female sex ($p < 0.001$) and younger age groups ($p < 0.001$) presented a higher proportion of respondents with a diagnosis of burnout. The variables related to a higher prevalence of burnout syndrome were the younger age group, lower academic degree, and less time invested in exercise, family, and hobbies. **Conclusion:** the prevalence of burnout is high in the sample studied. Strategies to prevent and mitigate the effects of this disorder should be considered in the activities of the Mexican Association of General Surgery directed to its associates.

RESUMEN

Introducción: *el síndrome de* burnout *representa un fenómeno psicosocial con importante repercusión en los profesionales de la salud.* ***Objetivo:*** *el objetivo de este trabajo fue estimar la prevalencia de* burnout *entre los médicos miembros de la Asociación Mexicana de Cirugía General, así como explorar algunos factores asociados al desarrollo de éste.* ***Material y métodos:*** *se aplicó una encuesta digital a los médicos asociados a la Asociación Mexicana de Cirugía General, recolectando variables sociodemográficas, relacionadas a la actividad profesional actual, factores predisponentes o atenuantes de este síndrome y el Inventario de* Burnout *de Maslach. La prevalencia del síndrome de* burnout*, así como los perfiles dimensionales del síndrome presentes en los encuestados fueron estimados. Adicionalmente las variables recolectadas fueron contrastadas entre el grupo de asociados con síndrome de* burnout *y aquellos sin el diagnóstico.* ***Resultados:*** *un total de 1,398 asociados contestaron la encuesta. La prevalencia estimada de* burnout *fue de 49.3%. Los perfiles dimensionales más frecuentes fueron: baja realización personal aislada (32.2%), seguido de la combinación de altos niveles de fatiga emocional, altos niveles de despersonalización y bajos niveles de realización personal (24%). En el análisis bivariado el sexo femenino ($p < 0.001$) y los grupos etarios más jóvenes ($p < 0.001$) presentaron mayor proporción de encuestados con diagnóstico de* burnout*. Las variables relacionadas con mayor prevalencia de síndrome de* burnout*, fueron: grupo etario más joven, menor grado académico, menos tiempo invertido en ejercicio, familia y pasatiempos.* ***Conclusión:*** *la prevalencia de* burnout *es alta en la muestra estudiada. Estrategias para prevenir y mitigar los efectos de este trastorno, deben ser consideradas en las actividades de la Asociación Mexicana de Cirugía General, dirigidas a sus asociados.*

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INTRODUCTION

The term burnout was coined in 1970 by the American psychologist Herbert Freudenberg to describe the impact of stress, ambition, and high expectations in caring professions.[1] Despite being a recognized entity, there is no single definition for burnout, so different tools have been developed for its diagnosis and measurement, the most widely used being the questionnaire developed by Maslach. Maslach's published work defines burnout as the combination of emotional exhaustion, depersonalization, and low personal fulfillment related to professional practice.[2] After its recognition, due to its growing prevalence and impact on those who suffer from it and on the outcomes of the care activities performed by these individuals, in 2000, it was recognized by the World Health Organization as an occupational hazard.[3]

One of the groups most affected by burnout is the medical profession. This results from multiple factors, including overwork, late gratification during training and practice, work-life imbalance, and the challenges associated with patient management. When this condition affects medical personnel, it has been shown to directly impact patient care, associated with a higher incidence of medical errors, lower patient satisfaction, and longer patient recovery times.[4]

The overall prevalence reported in the literature is variable, around 50%, like what has been reported in Mexican physicians. According to a study published in 2008 on medical residents, the prevalence of burnout was 40% of those surveyed, and the main risk factors identified were working shifts longer than 12 hours, coexistence of depressive disorder, being in the first or second year of residency, male gender and as marital status, being single.[5] Other risk factors identified in national and international literature include the year of training and the work environment, highlighting that burnout is more frequent in those trained in public hospitals.[6]

In the most recent literature reports, it is observed that the medical specialties with the highest prevalence of burnout are emergency medicine (60%), critical medicine (51%), rheumatology (50%), infectious diseases (49%), and urology (49%). It was also observed that the gender most frequently affected is female and that the mechanisms most frequently used by physicians to deal with this disorder are exercise (45%), isolation (45%), shared conversation with family and/or friends (41%), sleep (41%) and alcohol consumption (24%).[4,7,8]

This study aimed to determine the prevalence of burnout syndrome in physicians associated with the Mexican Association of General Surgery (AMCG) and identify factors associated with this disorder within this cohort.

MATERIAL AND METHODS

During May and September 2021, physicians associated with the Mexican Association of General Surgery (AMCG) were invited to answer anonymously in an electronic survey based on the SurveyMonkey online platform. The invitation was made seven times during this period, using the database of AMCG associates as a non-probabilistic recruitment strategy by convenience. The first mission of the survey was to collect demographic variables (sex, age group, type of professional activity performed, academic degree, institution of affiliation, time spent in professional activities, time spent in physical activity, recreational activities, and family life, as well as smoking history). In addition, the associates were invited to answer the 22 items of the Maslach burnout inventory that make up the evaluation of the three domains that make up the syndrome: emotional fatigue, depersonalization, and poor personal fulfillment. A burnout diagnosis was defined as a respondent who independently or concomitantly presented high levels of emotional fatigue (> 27 points), high levels of depersonalization (> 10 points), and/or low levels of personal accomplishment (< 33 points).

For the descriptive analysis of data, frequencies, and percentages were used to express nominal and dichotomous variables. For dimensional variables, mean and standard deviation or median and

interquartile range were used depending on the statistical distribution of the variable. For inferential analysis, Fisher's χ^2 or exact test was used to contrast nominal or dichotomous variables; Student's t-test (one-way ANOVA) or Mann-Whitney U test (Kruskal-Wallis) was used to contrast dimensional variables, depending on the statistical distribution of the variables and the number of groups to be compared. For correlation analysis, Pearson's r was calculated for variables with normal distribution and Spearman's rho for variables with nonparametric distribution. For the multivariate analysis of data to identify factors associated with burnout, binary logistic regression was used, taking the presence of the syndrome as the outcome variable. Any p-value < 0.05 or 5% (type I error or alpha error) was considered statistically significant for two-tailed hypothesis tests.

Statistical analysis was performed with IBM SPSS© software Version 26 (IBM Corp, Armonk, NY), and graphs were produced with Apple's Numbers software©.

RESULTS

From May to November 2021, 1,398 associates answered the survey; 76.02% (1,059) of the respondents were male, 23.76% (331) were female, and 0.22% (8) preferred not to answer. The distribution by age group was as follows: 354 (25.39%) belonged to the 30-40 age group, 334 (23.96%) to the 50-60 age group, 253 (18.15%) to the 40-50 age group, 271 (19.44%) to the 60-70 age group, 132 (9.47%) to the 20-30 age group and finally 50 (3.59%) belonged to the over 70 age group.

The proportion of respondents who perform one or more health care, academic, or research activities as part of their professional practice is shown in *Figure 1*. Of the total number of respondents, 1,204 (73.46%) worked in a medical service, 113 (8.11%) were retired physicians, 45 (3.23%) were fourth-year students in general surgery residency, 34 (2.44%) were third-year students, 39 (2.8%) were second-year students, and 39 (2.8%) are second-year students.11%) are retired physicians, 45 (3.23%) fourth-year general surgery residency students, 34 (2.44%) third-year students, 39 (2.8%) second-year students, 31 (2.22%) first-year students, and 7 (0.36%) undergraduate students. The distribution of the associates about the health system to which they are affiliated as workers is shown in *Figure 2*.

Of the total, 943 (67.65%) engaged in physical activity, and only 143 (10.26%) smoked. A total of 374 (26.8%) respondents presented scores compatible with high levels of emotional fatigue, 293 (21%) presented high levels of depersonalization, and 555 (39.8%) had low levels of personal accomplishment. The estimated prevalence of burnout syndrome in respondents was 687 out of 1,393 who completed the Maslach Burnout Inventory, representing a prevalence of 49.3%. The most frequently identified profiles were low levels of personal accomplishment (32.2%) and emotional fatigue, depersonalization, and low levels of personal accomplishment together (24%). The complete distribution of respondents with burnout syndrome, about the profile of the three dimensions affected, is shown in *Figure 3*. Through correlation analysis, we identified a moderate negative correlation between emotional fatigue scores and age group (Spearman rho -0.450, $p < 0.01$), academic grade (rho Spearman -0.294, $p < 0.01$), time spent with family (rho Spearman -0.346, $p < 0.01$) and time spent in hobbies (rho Spearman -0.205, $p < 0.01$). Likewise,

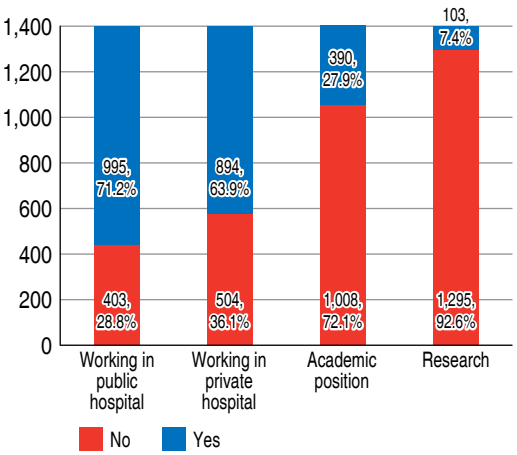

Figure 1: Proportion of respondents who perform care, academic, or research activities professionally.

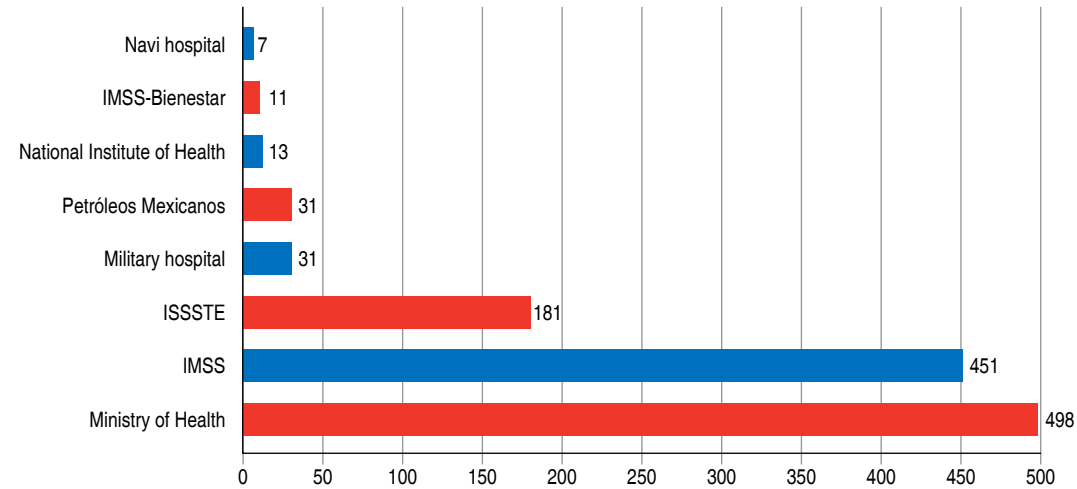

Figure 2:

Distribution of respondents according to the hospital of assignment.

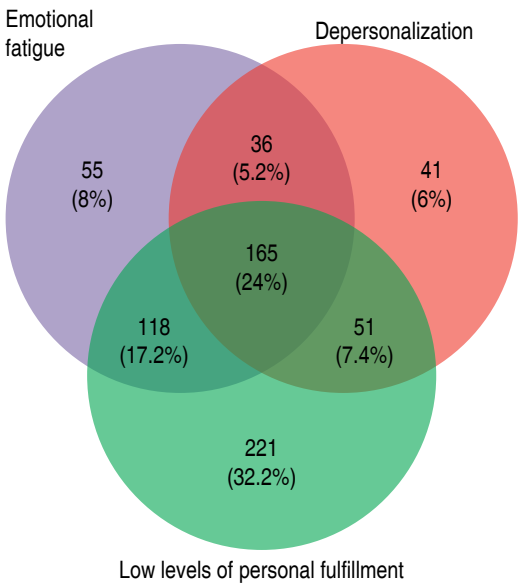

Figure 3: Proportion of associates diagnosed with burnout according to their psychological profile.

there is a slight negative correlation between time spent exercising (Spearman rho -0.170, $p < 0.01$) and a moderate positive correlation with time spent at work (Spearman rho 0.277, $p < 0.01$). The depersonalization score had a moderate negative correlation with age group (Spearman rho -0.425, $p < 0.01$), academic grade (Spearman rho -0.295, $p < 0.01$), time spent with family (Spearman rho -0.293, $p < 0.01$) and time spent on hobbies (rho Spearman -0.223, $p < 0.01$), as well as a slight negative correlation with time spent exercising (rho Spearman -0.147, $p < 0.01$) and a moderate positive correlation with time spent at work (rho Spearman 0.280, $p < 0.01$).

Finally, a similar behavior but in the opposite direction was identified for the personal fulfillment score, identifying a moderate positive correlation with age group (Spearman rho 0.382, $p < 0.01$), academic grade (Spearman rho 0.248, $p < 0.01$), time invested in family (Spearman rho 0.240, $p < 0.01$), time spent on hobbies (Spearman rho 0.223, $p < 0.01$); as well as a slight positive correlation with time spent exercising (Spearman rho 0.131, $p < 0.01$) and a slight negative correlation with time spent at work (Spearman rho -0.152, $p < 0.01$).

During bivariate analysis, female sex was associated with a higher risk of burnout syndrome (OR 2; $p < 0.0001$; χ^2), as were younger associates ($p < 0.0001$; χ^2). In the multivariate analysis, the age group (younger age, higher risk) and academic grade (lower grade, higher risk) were statistically significant risk factors for the development of the syndrome. On the other hand, family time, time spent on hobbies, and exercise time were statistically significant protective factors, at the expense of the fact that the more time spent on these activities, the lower the proportion of individuals with diagnosis of burnout. *Table 1*

shows the rest of the variables associated with the development of burnout syndrome because of the bivariate and multivariate analysis.

DISCUSSION

The burnout syndrome results from the combination of emotional exhaustion, depersonalization, and poor personal fulfillment related to professional practice.[2] It is well recognized that surgeons or surgeons in training are constantly subjected to high levels of stress, resulting in mental health problems, substance abuse, poor functionality, and, in extreme cases, suicidal ideation or suicide. Likewise, the association of burnout syndrome with impaired decision-making capacity, as well as hostile or inadequate attitudes towards patients, medical errors, and poor working relationships, has been recognized. All of the above leads to problems in the quality of care of health systems and a negative impact on the management of patients without forgetting or minimizing the personal and/or family part of the physician himself/herself.[9]

In different series reported in the literature, the burnout rate in groups of surgeons has been up to 40%, close to that found in our study, with a total group rate of 49.3%.[9] This difference could be explained by the workload between specialties and subspecialties and the fact that our cohort included responses from specialists in training. The latter is a particular group with different levels of demand. It is also important to note that the COVID-19 pandemic occurred during this study, which could have affected our results.

In a survey of 601 surgeons in England, Houdtman, et al. found that emotional fatigue was present in up to 56.9% of the surgeons surveyed, depersonalization in 48.5%, and low levels of personal fulfillment in 14.3%.[10] This contrasts with the findings of our group, in whom the prevalence of fatigue and depersonalization was significantly lower than those reported in this study.

In contrast, the low levels of personal fulfillment are almost three times higher than those published by the same authors. Although not analyzed in detail in our population, the following factors could contribute to this phenomenon: the work environment, poor or no benefits and recognition, and low salaries.

In our study, women represented only 23.7% of the associates surveyed. Although it is not possible to know if this percentage represents an accurate sample of the number of female surgeons training or working in the different health systems in our country, it undoubtedly opens an area of opportunity to better understand the situation of female surgeons in Mexico, as well as to encourage their incorporation into the academic activities of the AMCG. Having said that, and consistent with other studies, female sex was associated with a higher risk of presenting burnout syndrome during the bivariate analysis. Multiple series have reported a burnout prevalence of 30% in women. This association has been little explored; in a study of 14 women working as basic practitioners, they reported that the lack of control in their work life and gender differences in the work environment were important factors associated with burnout.[11] Likewise, in a survey of three surgical societies in the United States, with a response rate of 63% of female surgeons, it was identified that satisfaction concerning the work-life balance was lower than in men. In addition, other variables considered important were the stress associated with making decisions related to motherhood, the feeling of little emotional support in the personal environment, and poor personal fulfillment.[12]

Speaking specifically of burnout, the factors found in our study were female gender, being in the first years of residency, less time invested in physical activity, and less free time devoted to family and/or hobbies. Interestingly, in a review by Shaikh CF and colleagues[13] the main factor associated with burnout was having a lower academic degree. Although the mission of this study was initially to measure the prevalence and understand or identify factors related to burnout in a population specific to the AMCG, these findings open opportunities to investigate and better understand the predisposing factors to the occurrence of this entity in the population of physicians in training.

In an evaluation of 7,409 surgical residents determining the prevalence *of* burnout, physical

Table 1: Comparative analysis between associates with and without a diagnosis of burnout and variables associated with the development of such diagnosis.

	Bivariate analysis			Multivariate analysis
	No burnout N = 706 (50.7%)	Burnout N = 687 (49.3%)	p	p
Academic degree*			*< 0.0001*	*< 0.0001*
Undergraduate	2 (0.3)	3 (0.4)		
Intern	1 (0.1)	1 (0.1)		
Social service	0 (0)	0 (0)		
First-year resident	2 (0.3)	29 (4.2)		
Second-year resident	5 (0.7)	34 (5)		
Third-year resident	3 (0.4)	31 (4.5)		
Fourth-year resident	3 (0.4)	42 (6.1)		
Attending Physician	555 (78.8)	467 (68.2)		
Retired	76 (10.8)	34 (5.0)		
Another	57 (8.1)	44 (6.4)		
Tabaquismo*			*0.004*	0.317
Yes	56 (7.9)	87 (12.7)		
No	649 (92.1)	597 (87.3)		
Working time, (mean ± SD)	56.57 ± 19.4	65.33 ± 22.2	*< 0.0001*	0.053
Exercise time (minutes per week)*			*0.001*	*0.048*
Less than 100	95 (17.7)	118 (27.6)		
Between 100 and 150	124 (23.1)	94 (22.0)		
Between 150 and 200	123 (22.9)	98 (23.0)		
More than 200	195 (36.3)	117 (27.4)		
Family time (hours per day)*			*< 0.0001*	*< 0.0001*
Less than 2	141 (20.0)	304 (44.4)		
2 to 4	278 (39.5)	223 (32.6)		
4 to 6	165 (23.4)	96 (14.0)		
6 to 8	62 (8.8)	34 (5.0)		
More than 8	58 (8.2)	28 (4.1)		
Time spent on hobbies (hours per day)*			*< 0.0001*	*< 0.0001*
Less than 2	153 (21.7)	270 (39.4)		
2 to 4	236 (33.5)	231 (33.7)		
4 to 6	134 (19.0)	98 (14.3)		
6 to 8	93 (13.2)	50 (7.3)		
More than 8	88 (12.5)	36 (5.3)		

* Data expressed by frequency and percentage [n (%)].

and mental mistreatment during residency was objectively documented as a predisposing factor.[14] This mistreatment was documented in 66.7% of the respondents.

All the predisposing factors already mentioned have an important relationship with the development of burnout syndrome and the consequences that this may entail,

since associated with it, high rates of depression have been reported among many other mental health problems, suicidal ideation of up to 4.5% of the residents, and about 0.02% as suicide rate in that population.[15]

Among the tools that can help mitigate the effects of this syndrome, we identified that time spent in exercise, family, and recreational activities or hobbies was associated with a lower prevalence of burnout in our cohort. These findings are consistent with what has been documented by other authors in other countries.[16-18] More practically, these "protective" factors are well-established strategies to prevent and mitigate the effects of burnout. Strategies to highlight the importance of these activities and involve surgeons should be a goal of residency training centers, healthcare organizations, and related academic associations.

Our study has some limitations. First, the study period coincides with the COVID-19 pandemic, which is outside the usual professional scenario of surgeons or any health professional and could overestimate the prevalence of this syndrome. Second, the work environments in which the physicians surveyed in our study work are heterogeneous, so the factors influencing burnout could be different in the subgroups of the cohort of associates of the AMCG. Due to this heterogeneity in the work environment, we considered the assessment of the Maslach Burnout Inventory based on absolute cut-off points for each of the dimensions of this disorder and not the use of percentile measures as implemented by some authors. Third, the recruitment method could bias the results because participation was voluntary, which does not allow us to know the conditions of those who preferred not to participate in the survey. Finally, this is a cross-sectional study, so the survey results show a single point in time, with the biases that this implies.

The authors of this paper hope that this study will serve the AMCG as a basis for implementing new strategies and designing protocols to identify, prevent, and mitigate the effects of this syndrome in our country's physicians and physicians and surgeons in training.

CONCLUSIONS

Our study showed a high prevalence of burnout syndrome in almost half of the participants (49.3%). The main predisposing factors were younger age, lower academic level, and female sex. Some protective factors recognized in the literature coincide with those reported in our study, such as physical activity and time spent with family and hobbies. Our study results open opportunities for implementing strategies to carry out early interventions to avoid or mitigate the effects of this syndrome on physicians.

Studies are needed to analyze other populations not associated with the AMCG to understand better the prevalence *of* burnout syndrome in surgeons in our country.

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Key points for safe transabdominal peritoneal laparoscopic inguinal hernioplasty (TAPP)

Puntos clave para realizar una hernioplastía inguinal laparoscópica transabdominal peritoneal (TAPP) segura

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Keywords:
transabdominal preperitoneal, safety, inguinal hernia, key points.

Palabras clave:
transabdominal preperitoneal, seguridad, hernia inguinal, puntos clave.

ABSTRACT

Progress in the surgical treatment of inguinal hernia is due to the introduction of new techniques and materials and better knowledge of the region's anatomy. This study aims to review the experience obtained in a private hospital center to determine the points of the surgical technique that increase safety. An observational, retrospective, cross-sectional, and analytical study was carried out, and a protocol of 11 points was established, followed in all procedures using the transabdominal and preperitoneal techniques. The records of patients with inguinal hernia treated from January 02, 2000, to December 31, 2021, were reviewed. There were 750 patients with an average age of 52 years and 623 patients with unilateral hernia. Polypropylene mesh was used in 98% of the patients. The most frequent complication was seroma; in 15 patients, recurrence, adhesions, infection, and death represent less than 1%. The causes of complications were analyzed. It is concluded that the eleven points established in the surgical protocol are essential for safe transabdominal preperitoneal surgery.

RESUMEN

Los progresos en el tratamiento quirúrgico de la hernia inguinal se deben a la introducción de nuevas técnicas y materiales, así como al conocimiento de la anatomía de la región. El objetivo de este estudio es revisar la experiencia obtenida en un centro hospitalario privado, para determinar los puntos de la técnica quirúrgica que aumentan la seguridad. Se realizó un estudio observacional, retrospectivo, transversal y analítico y se estableció un protocolo de 11 puntos, los cuales se siguieron en todos los procedimientos, usando la técnica transabdominal y preperitoneal. Fueron revisados los expedientes de pacientes con hernia inguinal atendidos del 02 enero de 2000 a 31 de diciembre de 2021. Se contabilizaron 750 pacientes, con promedio de 52 años; 623 pacientes con hernia unilateral. En 98% se usó malla de polipropileno. La complicación más frecuente fue el seroma, en 15 pacientes, la recidiva, adherencias, infección y muerte representan menos de 1%. Fueron analizadas las causas de las complicaciones. Se concluye que los once puntos establecidos en el protocolo quirúrgico son esenciales para la realización de una cirugía transabdominal preperitoneal segura.

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INTRODUCTION

Progress in the surgical treatment of inguinal hernia is due to the introduction of new techniques and materials, as well as to the better knowledge of the anatomy of the region. In 1982, Ger reported the repair using only clips for the closure of the deep inguinal orifice; in 1989, Bagjavalenski proposed the occlusion of the indirect sac using a mesh, and in 1992 Schoultz and Arregui described the longitudinal opening of the peritoneum, how to free the sac and place a large mesh covering the internal, direct and femoral orifices, thus establishing the transabdominal and transperitoneal technique later known as TAPP.[1,2] Today, laparoscopic inguinal hernia repair is performed in Latin America in only

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6% of inguinal plasty cases, while in Australia, it is performed in up to 80%.[2] In addition to the transabdominal peritoneal technique (TAPP), there are other approaches, such as extraperitoneal (TEP) and extraperitoneal extended vision (eTEP).[3] Knowledge of anatomy is important since now the structures are visualized posteriorly, different from what the surgeon was used to in previous approaches as in the techniques proposed by Bassini and McVay; in addition, precise knowledge and mastery of the technique favor patient safety regarding results.[4] The present study aimed to review the experience obtained in a hospital center to determine the points of the surgical technique that increase patient safety.

MATERIAL AND METHODS

An observational, retrospective, cross-sectional, and analytical study was carried out, reviewing the records of patients who underwent inguinal hernia repair by TAPP technique from January 2, 2000, to December 31, 2021. They were followed up for five years until 2018, and the corresponding time was for those who underwent surgery afterward. All were treated at the Hospital de las Américas in San Luis Potosí, S.L.P. Mexico.

Surgical technique: a surgical protocol based on 11 strategic key points was established: 1) Placement of three ports, one of 10 mm in the umbilical scar for the optic and two of 5 mm, one in each flank, 3 or 4 cm above the level of the horizontal transumbilical line.[5] 2) Localization of the symphysis pubis and the iliac crest. 3) Opening of the peritoneum, starting at the level of the imaginary line between the iliac crest and the midline. 4) Dissection of the retroinguinal and retropubic spaces with a lower limit of about 2 or 3 cm distal to the pectineal ligament and femoral vessels. 5) Identification of the ilioinguinal, iliohypogastric, and genitofemoral nerves.[6] 6) Dissection of the external limit until the psoas muscle is identified and dissection up to the pubic tubercle, which is the internal limit. 7) Identify and dissect the hernial sac, pre-herniation lipoma, and the cord or round ligament elements. 8) When dissecting the pectineal ligament and femoral vessels, look for femoral defects and avoid vessels known as *"corona mortis"*.[7,8] 9) Placement of a "custom-made" mesh, according to the size of the pelvis, having weighed the area with metric tape on the outside of the patient and guided by the size of the instruments on the inside. 10) Heavy polypropylene mesh was used, fixing it with metallic tackers or 0 polypropylene suture, 3 cm from the hernial defect above to the pectineal

Table 1: Recommended safety measures.

TAPP-type inguinal plasty safety points
Placement of ports
Location of the symphysis pubis and iliac crest
Opening of the parietal inguinal peritoneum
Dissection of the retroinguinal and retropubic space
Identification of the inguinal nerves
Identification and dissection of the external limit up to the psoas
Identification and dissection of the internal limit up to the midline and pubis
Dissection of the hernial sac and lipomas of the cord
Identification of the pectineus ligament and the femoral vessels
Placement of adequately sized netting
Hermetic closure of the peritoneum

TAPP = transabdominal peritoneal.

Table 2: Results. N = 750.	
Total population	
Female	258
Male	492
General anesthesia patients	746
Average length of hospitalization (hours)	20
Hernias	
Bilateral	127
Femoral	7

ligament and the pubic tubercle. 11) Closure of the peritoneum as tight as possible. Three-chip cameras and occasionally HD cameras were used. The optics used were 0 degrees most of the time. During 2021, self-adherent meshes were placed *(Table 1)*.[9]

Statistical analysis: statistical analysis was used to describe measures of centralization and dispersion; the results are given in proportions.[10,11]

Ethical considerations: The patient's informed consent was obtained for the surgeries, and their data was anonymously handled for research. The study was not risky for the patient and followed the Helsinki Declaration and the General Health Law for human studies.

RESULTS

During the study period, there were 750 patients, 492 (65.6%) male and 258 (34.4%) female. The average age was 52, ranging between 16 and 94 *(Table 2)*. Six hundred and twenty-three patients had unilateral hernia (83%) and 127 bilateral (17%). Heavy polypropylene mesh was used in 738 (98.4%) and self-adherent mesh in 12 (1.6%). The average operative time was 42 minutes, ranging from 27 to 82 minutes. General anesthesia was used in 746 patients (99%) and regional anesthesia in the rest (1%). The average number of hours of hospitalization was 20 hours, with a range of 12 to 48 hours. The number of complications is shown in *Table 3*. There were 15 seromas, corresponding to 2%. All others were 0%.

Given the work's objective, the complications' causes were analyzed, and the following was found: a) recurrence: a 65-year-old male patient (0.13%), operated on in 2003. After two months, he presented a conical pelvis with recurrence; a midline hernia was found in the reintervention, and a short mesh was appreciated. A wide dissection of the retro inguinal space was performed, and the mesh was placed above the previous one and fixed to the pubic tubercle with polypropylene sutures. Since then, the surgical protocol included this fixation. b) Infection: three patients (0.4%), all male, presented infectious conditions. Two were deep surgical site infections (abscesses in left iliac fossa) and one was superficial (subcutaneous). Cultures were *Escherichia coli* Blee+, sensitive to amikacin, so they were managed with this antibiotic at a dose of 1 g intramuscular for 14 days, as well as puncture (4 and 3) for the abscesses and drainage with Penrose tube for the superficial one. The cases occurred in 2005, and since then, it has been decided to be impregnated with a solution of amikacin 500 mg directly without dilution. It was not necessary to remove the mesh. c) Bladder perforation: in a 53-year-old male patient (0.13%), with previous surgery eight years earlier, bilateral anterior inguinal plasty with mesh, in another institution. During dissection of the retroinguinal space, when separating the bladder, firm adhesions were seen with the mesh placed years before, which led to perforation when trying to separate the bladder. It was resolved by closing the bladder in planes and placing a Foley catheter

Table 3: Complications.	
	n (%)
Relapse	1 (0.13)
Infection	3 (0.4)
Adherence	1 (0.13)
Bladder perforation	1 (0.13)
Seroma	15 (2.0)
Death	1 (0.13)

for 10 days. The hernia was repaired with mesh occupying both sides of the iliac crests, fixed to the pubis and pectineal ligaments. d) Seroma: in 15 patients (2%) treated by in-office punctures. In two patients operated on in 2002, a residual hernial sac had been left, requiring its removal because it formed a seroma "capsule". e) Mortality: in one patient (0.13%) due to corona mortis lesion not noticed in the first surgery and hypovolemic shock in reintervention the following day. There were no cases of inguinodynia in the medium- or long-term.

In 127 patients with bilateral inguinal hernias, both sides were dissected, according to protocol, from iliac crest to iliac crest. A mesh covering both inguinal regions, about 30 cm in longitudinal diameter, was placed.

In the total number of patients (750), seven (0.9%) femoral hernias were not diagnosed during the preoperative period, but they were detected when the femoral orifice was intentionally checked; they occurred in six female and one male patient. Self-adherent mesh was used in 12 patients only when the mesh size was adequate for the patient's size *(Table 3)*.

DISCUSSION

Surgical treatment of inguinal hernia using the laparoscopic TAPP technique was established as the treatment of choice in a private hospital. Since the beginning of the interventions 20 years ago, a protocol has remained practically unchanged and consists of the following 11 key points during surgery. This protocol has maintained the advantages of minimally invasive surgery, such as less pain, short hospital stay, and cosmetic aspects. The data analysis reported a recurrence rate of 0.13%; according to the experience of other Latin American authors, the recurrence rate is up to 2.6% at 5 years of follow-up.[9]

It is important to highlight that there were no cases of inguinodynia, and we consider the nerve identification step fundamental. We consider that the placement of tackers or sutures in the pubic tubercle in the pectineal ligament was not a cause of inguinodynia in this cohort of patients, so we should look for the causes of nerve injury and not the placement of metallic or plastic material or sutures in the ligaments. The use of amikacin solution and prophylactic intravenous amikacin was added to the protocol, which has resulted in no infections. Remnants of the hernia sac are no longer left behind, as recommended in the medical literature in the early years,[10] since this led to the appearance of seromas that required excisional surgical management.

Wide dissection in bilateral inguinal hernias is important. A large mesh should be placed longitudinally, covering both orifices and well fixed. The procedure is not risk-free, and care must be taken in the dissection of the retropubic space due to the risk of injury to the vasculature known as *"corona mortis"*.

CONCLUSIONS

Based on the analysis of this cohort of patients who underwent laparoscopic TAPP-type inguinal plasty, it is recommended to follow the 11 key points to perform this surgery safely.

Dissection and care of the inguinal nerves considerably reduce the risk of inguinodynia as a postoperative complication. The placement of tackers or sutures in the pectineal ligament or pubic tubercle does not seem to cause inguinodynia. Careful dissection of the hernia sac, leaving no remnant in the canal, eliminates the possibility of a seroma refractory to simple drainage. Strict adherence to the key points for safe TAPP inguinal hernioplasty allows diagnosis of inadvertent femoral hernia in up to 1 in 100 procedures.

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The importance of comprehensive preoperative geriatric assessment as a predictor of postoperative complications in the older adult

La importancia de valoración geriátrica integral preoperatoria como predictor de complicaciones posquirúrgicas en el adulto mayor

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Keywords:
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Palabras clave:
valoración geriátrica integral, complicaciones posquirúrgicas, adulto mayor.

ABSTRACT

The preoperative assessment is a tool that helps to recognize risk factors, establish percentages of complications in those patients who undergo surgery, and classify those who are more susceptible to developing complications, even to determine those who are not suitable to perform a specific surgical procedure. Currently, the population of older adults is increasing, and as a consequence, the percentage of patients who require surgical interventions is increasing. The comprehensive geriatric assessment is a tool for individualized evaluation of the elderly that allows integrating important data from different domains (cognitive, clinical, functional, and social), collected through different scales and helps to detect patients with frailty syndrome, which is a risk factor for the development of postoperative complications and is used as a predictor of morbidity and mortality in the perioperative period, currently considered a well-established risk factor for adverse effects. For this reason, in order to perform a surgical procedure more safely and reduce complications in this group of patients, an assessment beyond laboratory data, imaging, and electrocardiographic recording is required since this is a population with a decreased response of several systems, so we propose to implement the comprehensive geriatric assessment as a tool to identify the frailty syndrome in the elderly and reduce postoperative complications that occur in patients requiring some surgical procedure in general surgery.

RESUMEN

La valoración preoperatoria es una herramienta que ayuda a reconocer factores de riesgo, establecer porcentajes de presentación de complicaciones en aquellos pacientes que se someten a una cirugía y clasificar a aquellos que son más susceptibles de desarrollar complicaciones, incluso para determinar quienes no sean aptos para realizar un procedimiento quirúrgico específico, en la actualidad, la población de adultos mayores se incrementa y como consecuencia el porcentaje de pacientes que requieren intervenciones quirúrgicas. La valoración geriátrica integral es una herramienta de evaluación individualizada del adulto mayor que permite integrar datos importantes de los diferentes dominios (cognitivo, clínico, funcional y social), recopilados a través de diferentes escalas y ayuda a detectar pacientes con síndrome de fragilidad, que es un factor de riesgo para el desarrollo de complicaciones posoperatorias y se utiliza como predictor de morbimortalidad en el perioperatorio, actualmente se considera un factor de riesgo bien establecido para efectos adversos. Por tal motivo para poder realizar un procedimiento quirúrgico de manera más segura y disminuir complicaciones en este grupo de pacientes, se requiere un valoración más allá de datos de laboratorio, de imagen y registro electrocardiográfico, ya que se trata de población con una disminución de la respuesta de varios sistemas, por lo que proponemos implementar la valoración geriátrica integral como herramienta para identificar el síndrome de fragilidad en el adulto mayor y disminuir las complicaciones posquirúrgicas que se presentan en pacientes que requieren algún tipo de procedimiento quirúrgico en cirugía general.

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INTRODUCTION

Preoperative assessments are tools that recognize risk factors and predict those subjects who may develop complications or are not suitable for the surgical procedure; nowadays, the population of older adults (OA) is increasing and requires surgical interventions. The population of the OS is the one that presents more complications during and after the surgical event due to the decrease in the functionality and immune system response, all of which is a sum of unhealthy aging. Therefore, a comprehensive preoperative geriatric assessment is required to have an overall picture of the functional, cognitive, social, and clinical situation, thus facilitating the identification of subjects with frailty syndrome to intervene promptly.

COMPREHENSIVE GERIATRIC ASSESSMENT

It is an individualized assessment of the older adult that allows the integration of important data from different domains (cognitive, clinical, functional, and social) collected through different scales.

1. The information obtained in the clinical area makes it possible to know all the personal pathological history and nutritional status.
2. The cognitive sphere is evaluated through tests such as the Mini-Mental State Examination of Folstein (MMSE), which allows the identification of some type of dementia secondary to an underlying disease such as type 2 diabetes mellitus, hypertension, cerebrovascular events, etc., or related to genetics, which condition some dependence.
3. Functionality is assessed through scales such as the Short Physical Performance Battery (SSPB), the Basic Activities of Daily Living (BADL), and the Integrated Activities of Daily Living (IADL).[1]
4. The social domain allows to evaluate the environment in which the OA develops, the support of those with whom he/she lives, his/her income, and whether he/she has a primary caregiver, which allows to identify situations that may influence his/her health status.[1]

The values obtained through this multi-integral assessment allow to identify patients who are more vulnerable and/or at higher risk of hospital admission, hospital stay, postoperative complications, and morbidity and mortality.[1-3]

Frailty results from an accelerated loss of function associated with age, a multidimensional and complex syndrome that leads to different frailty phenotypes *(Figure 1)*. Advanced age is an important predictor of adverse postoperative outcomes; given the significant stress involved in surgery, frailty is a key factor to consider. However, patients with frailty should also benefit from optimizing the healthcare system. It has been noted in several studies that not only comprehensive geriatric assessment instruments should be used, but also factors associated with hospital stays, such as hospital time and conditions, should be considered.

Frailty syndrome is a risk factor for the development of postoperative complications. It is characterized by the loss of homeostasis of several systems, causing a decrease in response to minimal stressors. It is used to predict morbidity and mortality in the perioperative process. It is currently considered a well-established risk factor for adverse effects such as prolonged hospital stay, readmission, use of resources, and mortality. The frailty

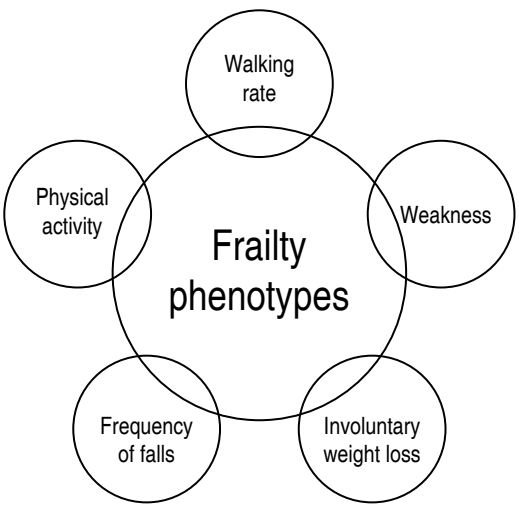

Figure 1: Frailty phenotypes.

index is a scale that allows to integrate all the cumulative deficits of different domains, such as functional, nutritional, cognitive, emotional, social, and geriatric syndromes and diseases; it is calculated by dividing the number of deficits by the total number of possible deficits.[4,5] According to several prospective longitudinal results, nowadays, frailty syndrome is considered a risk factor for postoperative complications. However, it is not an absolute contraindication for a surgical procedure,[6] so the patient can be intervened and stabilized before surgery.

DISCUSSION

A systematic review and meta-analysis conducted by the Brookdale Department of Geriatrics and Palliative Medicine and colleagues analyzed nine prospective observational studies published between 2010 and 2017 in 2,281 patients aged 61 to 77 who were candidates for different types of surgery. It was concluded that frailty in these patients, who underwent some surgery, was associated with poor postoperative outcomes, more complications and mortality, and extended hospital stay.

There is evidence of the relationship between subjects who were identified as frail and presented with postoperative complications. The prospective longitudinal study of 108 adults over 65 years of age by Dogrul RT and colleagues demonstrated a useful and necessary tool of comprehensive geriatric assessment and frailty to predict postoperative complications, delirium, and preoperative management of risk factors to improve postoperative outcome compared to the *American Society of Anesthesiologists* (ASA) scales that do not predict postoperative outcome.[3]

Comprehensive geriatric assessment and frailty evaluation in the elderly are useful preoperative tools. The complete evaluation through the comprehensive geriatric assessment and frailty index has allowed to know that very frail patients are associated with greater long-term complications, such as hospitalization at 12 months and death. This gives us an overview to focus on the intervention of risk factors and improve a postoperative outcome.

An accurate assessment considers the components of frailty: biophysical, mental, nutritional, and social. Currently, no tool assesses these components simultaneously, nor is there a consensus on how frailty should be assessed, as there are more than 20 validated tools to assess and measure frailty, but none has been defined as a standard. All the tools are assessed and classified in different ways. However, they all converge on a single question: Can the patient undergo the planned operation?

The life expectancy of the elderly has increased. With it, the need for surgical interventions, which requires an assessment beyond laboratory data, imaging, and electrocardiographic recording, since this is a population with a decrease in the response of various systems; therefore, it is necessary to perform more than standardized preoperative evaluations, i.e., a complete assessment, including a comprehensive geriatric assessment to determine the functional, psychological, cognitive, social and general health status of these patients, since they are at greater risk of functional and systemic deterioration.

CONCLUSION

Comprehensive geriatric assessment allows to identify frailty syndrome in the elderly, and is nowadays a useful tool for predicting post-surgical complications. It allows to identify and intervene in a timely manner in the triggering factors and thus reduce risks such as hospital stay, post-surgical complications, and mortality. Prehabilitation and rehabilitation should be considered when performing a preoperative evaluation of the elderly for a better postoperative outcome.

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Stump appendicitis

Apendicitis del muñón

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Keywords:
appendicitis, stump appendicitis, recurrent appendicitis, appendiceal abscess, appendectomy.

Palabras clave:
apendicitis, apendicitis del muñón, apendicitis recurrente, absceso apendicular, apendicectomía.

ABSTRACT

We present the case of a nine-year-old male patient with a history of appendectomy 30 months before his admission; he presented abdominal pain of 10 days of evolution, suggestive of an appendicular condition. An ultrasound and an abdominal resonance suggested a collection in the right iliac fossa, so exploratory laparotomy was performed, finding appendicitis of the stump. A bibliographic review of the subject is made. Stump appendicitis should be considered as a diagnostic possibility in cases of lower abdominal pain, mainly when there is a history of previous appendectomy. An early diagnostic suspicion can avoid important complications.

RESUMEN

Se presenta el caso de un paciente masculino de nueve años con antecedente de apendicectomía 30 meses antes de su ingreso; presenta dolor abdominal de 10 días de evolución, sugestivo a un cuadro apendicular. Un ultrasonido y una resonancia abdominal sugirieron una colección en la fosa iliaca derecha, por lo que se realizó laparotomía exploradora, encontrando apendicitis del muñón. Se hace una revisión bibliográfica sobre el tema. La apendicitis del muñón debe ser considerada como una posibilidad diagnóstica en cuadros de dolor abdominal bajo, en particular cuando hay el antecedente de apendicectomía previa. Una sospecha diagnóstica temprana puede evitar importantes complicaciones.

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INTRODUCTION

Acute appendicitis is the most frequent abdominal emergency, and appendectomy is the most common non-elective surgery performed by general surgeons, with more than 250 thousand cases per year in the United States alone. The inflammatory process begins with an obstruction of the appendiceal orifice, followed by an increase in intraluminal pressure and a decrease in lymphatic drainage (catarrhal phase), followed by venous obstruction (phlegmonous phase), which may progress and involve arterial compromise with ischemia (necrotic phase), culminating in perforation of the appendix and causing localized or generalized peritonitis.[1] The mortality rate of acute appendicitis is low; however, although there are common postoperative complications, we should not overlook those less frequent, such as stump appendicitis.

Stump appendicitis (SA) is an inflammation of the appendiceal remnant after an incomplete appendectomy, which may result in local inflammation, abscess formation, peritonitis, or intestinal obstruction.[2]

PRESENTATION OF THE CASE

We report the case of a nine-year-old male with a history of having undergone surgery for acute appendicitis two and a half years before his current condition, which began 10 days before his admission and was characterized by generalized abdominal pain and vomiting on two occasions with gastro alimentary characteristics, managed by a physician with unspecified analgesics and without improvement. He continued with abdominal

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pain, predominantly in the right lower quadrant, accompanied by nausea and vomiting. For this reason, he went to the Emergency Department of the hospital, where the patient was found with pain in the right lower quadrant, in the trigger position, and with data of peritoneal irritation. Laboratory tests were requested, reporting a hemoglobin level of 13.0 mg/dl, hematocrit of 38.2%, 15.15 × 10^9 white blood cells, and 76.4% neutrophils. The plain abdominal X-ray showed a fixed loop image in the right iliac fossa *(Figure 1)*. An abdominal ultrasound was requested, which reported a collection of 5 × 4 cm *(Figure 2)*, so the General Surgery Service was consulted since there was no pediatric surgeon on shift; 24 hours after admission, the patient was evaluated by surgery, finding the patient with discrete voluntary resistance in the right lower quadrant and peritoneal irritation. An abdominal MRI was requested to determine the probable etiology of the collection, which reported an amorphous collection in the right iliac fossa, with irregular and well-defined borders, measuring 5.1 × 4.3 × 4.9 cm in its longitudinal and transverse anteroposterior diameters, respectively, compatible with an abscess in the right iliac fossa.

Figure 1: Simple abdominal plain film showing an antalgic rectification of the spine. The arrow indicates a fixed loop in the right iliac fossa.

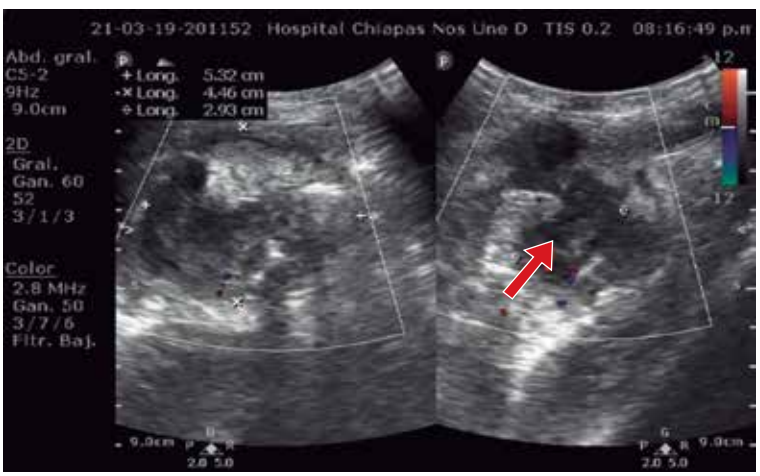

Figure 2: Ultrasonographic imaging shows a liquid collection at the lower right quadrant. The arrow points to the collection.

He underwent an exploratory laparotomy, and an infraumbilical incision was made, finding a localized abscess of about 50 cm^3 in the right iliac fossa; also, an elongated appendicular stump of approximately 8 cm, perforated at the tip, with a friable base and a free fecalith in the cavity-resection of the appendicular remnant, drying of the cavity, and placement of drainage were performed. In the postoperative period, antibiotic therapy (ceftriaxone and metronidazole) was administered, leaving the patient fasting for 48 hours postoperatively and then progressively evolving to a regular diet; care of the surgical wound and monitoring the Penrose expenditure, which was withdrawn on the seventh day, were also included. The patient was discharged 10 days after the operation and seen at the outpatient clinic.

DISCUSSION

Stump appendicitis is a rare complication that occurs after appendectomy and is caused by an obstructive and inflammatory process of the remaining portion of the appendix. Many factors can influence the presentation of stump appendicitis: failure to identify the base of the appendix, a sub serosal appendix or a retrocecal appendix, either partially or totally, and very severe inflammatory processes that hinder good dissection.[3]

Although the true incidence of stump appendicitis is unknown and difficult to

establish,[4] some authors estimate it to be one per 50,000 cases.[5] Different publications have proposed varied data regarding incidence: Dikicier,[6] based on different publications, established a frequency ranging from 0.06 to 0.15%. In contrast, Burbano and associates[7] considered the incidence not as rare as estimated since three different publications found the incidence was 1.37, 0.62, and 1.27 per 1,000 appendectomies performed. SA was first described by Rose in 1945. It can occur in any age group, with an average age of 35.8 ± 17 years and a range of between 2 and 75 years.[8] It often occurs above the age of 50 years, with an interval after the original appendectomy ranging from four days to several decades.

Even though the signs and symptoms of stump appendicitis do not differ from those of acute appendicitis, its diagnosis *a priori* is not simple, taking into account the history of previous appendectomy and not infrequently it is performed at the time of surgery, which is why a delay in the diagnosis and an increase in the probability of complications is frequent.[6,8,9] The frequency of perforation varies according to the literature, ranging between 16 and 30%; however, it is closely related to the delay in diagnosis in the extremes of life or atypical presentations of the painful picture.

On the other hand, the main factor for the incomplete removal of the appendix is the lack of good visualization of its base and its origin in the cecum, either by following the path of taenia coli to its base or by locating the branch of the appendicular artery that indicates the base of the appendix. This difficulty may also be due to a severe inflammatory process or the appendix's retrocecal or subserosal position.[4,10]

Imaging studies, such as ultrasound and computed tomography, are often helpful in guiding the diagnosis. Ultrasound has a sensitivity and specificity of 44 and 93%, respectively, and computed tomography has a sensitivity and specificity of 97 and 94%, respectively.[5,11]

An ultrasound scan can detect an increase in the size of the stump, evidence of free fluid in the right iliac fossa, and edema in the cecum;[12,13] while computed tomography can show inflammatory changes in the perirectal region, thickening of the cecal wall (arrowhead sign), fluid in the pericecal and paracolic area, and even demonstrate the presence of a tubular structure related to the cecum or even the appendicolith.[14]

The incidence and prevalence of stump appendicitis have been increasing in recent years, and it occurs in both open and laparoscopic procedures.[9] Most of the cases reported in the literature associate stump appendicitis in open procedures in 55 to 66% of the reported cases.[5,10] It has been found that stump appendicitis is more frequent in patients with a history of previous open appendectomy, which could be explained by different reasons: either because open appendectomy is more frequent than laparoscopic appendectomy, because not all cases of stump appendicitis are diagnosed or reported, or because more experienced surgeons perform most endoscopic procedures and they are usually more careful, among other factors.[5]

Regardless of whether an open or laparoscopic appendectomy is performed, optimal visualization of the appendicular region is recommended, placing the appendix at 10 o'clock, the free taenia at 3 o'clock, and the terminal ileum at 6 o'clock, in addition to complete exposure of the mesoappendix and ligation of the accessory branch of the appendicular artery (artery of Seshachalam).[15]

The delay in diagnosis goes hand in hand with the delay in treatment. Dikicier and collaborators[6] report an average of two days from patient arrival to surgical treatment. Complications can range from an abscessed appendix[9] to necrosis of the cecum, secondary to the infectious process.[6] The condition most related to stump appendicitis is the length of the appendiceal remnant. This complication is particularly present when the residual appendix exceeds 5 mm.[15]

Einem and associates,[10] based on a review of 35 cases, reported that the average length of the appendicular remnant in patients initially operated on laparoscopically was 3.9 cm. In contrast, the average length in patients operated on by open surgery was 2.6 cm, a statistically significant data ($p = 0.048$).

The treatment of choice for SA is to complete the resection of the appendix, conventionally or laparoscopically; however,

up to 18% may require ileocecal resection. Reports in the literature have shown that an open approach has done more than 50% of the cases, and almost a third have required intestinal resection;[15] likewise, some authors report that up to 68% of the cases of stump appendicitis that were operated on presented a perforation.[6,15]

CONCLUSIONS

Although a rare complication, appendicitis of the stump should be considered a diagnostic possibility in patients with a history of appendectomy who have symptoms and signs compatible with acute appendicitis, mainly if there is no other apparent cause. Imaging studies, primarily computed tomography, are advisable to rule out other possible causes of pain and support the diagnostic suspicion.

The treatment is surgical intervention, either by conventional or laparoscopic means, to complete the resection of the appendicular remnant without leaving a length greater than 5 millimeters.

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Adenocarcinoma of the gallbladder and Mirizzi's syndrome

Adenocarcinoma de vesícula biliar y síndrome de Mirizzi

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Keywords:
cholecystolithiasis, gallbladder cancer, Mirizzi syndrome, cholangioresonance, abdominal ultrasound, choledocholithiasis.

Palabras clave:
colecistolitiasis, cáncer de vesícula biliar, síndrome de Mirizzi, colangiorresonancia, ultrasonido abdominal, coledocolitiasis.

ABSTRACT

Mirizzi syndrome and gallbladder cancer are two rare entities associated with gallbladder lithiasis. There is little evidence about the increased risk of this association; in any older patient with atypical data, malignancy should be suspected. Diagnosis is usually postoperative; in about 1% of the cases, it is made during the surgery by the general surgeon, who must know the attitude to take given the findings; various procedures such as radical treatment, biliodigestive bypass, or even leakage procedures are options to be considered because of the incidental finding; timely referral is the best option in most cases. The prognosis is poor, with survival of less than 18 months due to advanced disease. We present the case of a 64-year-old male patient; the atypical data made us suspect malignancy; in the transoperative, the patient was diagnosed with Mirizzi syndrome type 2, and the pathology service reported moderately differentiated adenocarcinoma. The patient refused all kinds of treatment and was lost for follow-up. We reviewed the case and management according to the updated bibliography.

RESUMEN

El síndrome de Mirizzi y el cáncer de vesícula biliar son dos entidades poco frecuentes asociadas con la litiasis vesicular, existe poca evidencia acerca del aumento de riesgo de esta asociación, en todo paciente mayor con datos atípicos se debe sospechar de malignidad. El diagnóstico suele ser posoperatorio, en alrededor de 1% de los casos se realiza en el transoperatorio por el cirujano general, el cual debe conocer la actitud a tomar ante los hallazgos; diversos procedimientos como el tratamiento radical, la derivación biliodigestiva o incluso los procedimientos de fuga son opciones a considerar ante el hallazgo incidental; la referencia oportuna es la mejor opción en la mayoría de los casos. El pronóstico es malo, con supervivencia menor a 18 meses por enfermedad avanzada. Presentamos el caso de un paciente masculino de 64 años, los datos atípicos hacen sospechar malignidad, en el transoperatorio se diagnostica con síndrome de Mirizzi tipo 2, anatomía patológica reporta adenocarcinoma moderadamente diferenciado, el paciente rechaza todo tipo de tratamiento y se pierde el seguimiento. Revisamos el caso y manejo de acuerdo con la bibliografía actualizada.

Abbreviations:

ALT = alanine aminotransferase.
AST = aspartate aminotransferase.
BDB = bile duct bypass.
CA 19-9 = carbonic anhydrase 19-9.
CBD = common bile duct.
CC = cystic duct.
CH = hepatic duct.
CRP = C-reactive protein.
ERCP = endoscopic retrograde cholangiopancreatography.
FA = alkaline phosphatase.
GB = gallbladder.
GBCA = gallbladder cancer.
GBL = vesicular lithiasis.
HB = Hartmann's bag.
MS = Mirizzi syndrome.

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INTRODUCTION

Mirizzi syndrome (MS) and gallbladder cancer (GBCA) are rare complications of gallbladder lithiasis (GL), and their association is poorly understood. MS is recognized as a significant risk factor for developing GBCA.[1] Preoperative diagnosis is usually suspected in jaundiced, older patients with atypical symptoms. Magnetic resonance cholangiography is the study of choice in these cases, as it assesses the origin of jaundice; the association with obstruction-fistulation not only

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delimits the characteristics of the biliary tract but also the extent of the disease in the case of GBCA.[2]

Intraoperative diagnosis is rare, occurring in less than 0.5% of cases. It is essential to know the staging of the malignant disease, either pre or postoperatively, as it helps to understand the surgical treatment and the need for systemic therapy.[2,3]

The prognosis is poor, with survival of less than 18 months; most diagnoses are made with the postoperative histopathological examination, and most patients are candidates for reoperation to complete an extended cholecystectomy with lymph node dissection or even a hepatectomy of the IV/V lobes IV/V.[4,5]

PRESENTATION OF THE CASE

A 64-year-old male began his illness with jaundice and denied other symptoms. It is noteworthy that he had it for at least three days before he arrived at the emergency room; his physical examination was without alterations, and his lab tests showed total bilirubin of 25 mg/dl, direct bilirubin of 22 mg/dl, alkaline phosphatase 235 IU/l, gamma-glutamyl transferase 157 IU/l, creatinine 2.5 mg/dl, and the rest of the test were within normal limits. An abdominal ultrasound was performed, which reported an ill-defined gallbladder and dilatation of the biliary tract of 19 mm *(Figure 1)*; a 12 mm bile duct stone was observed in the common bile duct. The diagnosis of choledocholithiasis was done. Tumor markers were requested, with a report of CA 19-9 > 8,000 IU; cholangioresonance was performed, which showed bile duct dilatation (bile duct) of 20 mm and a 16 mm stone at the level of the ampulla. No morphology of the gallbladder (GBV) was reported. The patient was a candidate for endoscopic retrograde cholangiopancreatography (ERCP), according to the Gastroenterology service. ERCP was performed without being able to extract the lithium, and the patient was scheduled

Figure 1: Ultrasound image revealing a dilated common bile duct with a stone in its interior.

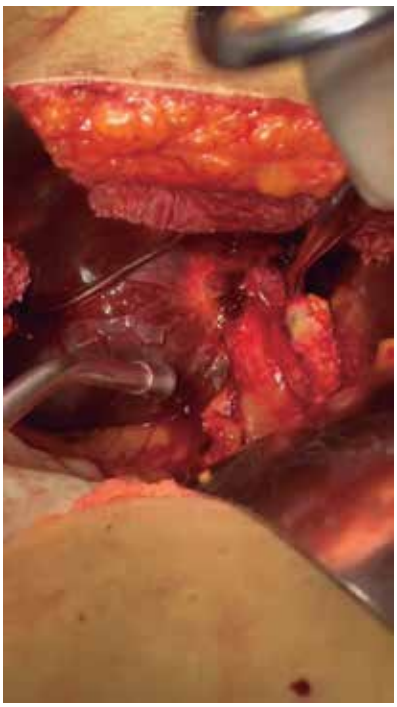

Figure 2: The clamped neck and the fistulous orifice in the common hepatic duct can be observed. In addition, the absence of the gallbladder can be observed. This remnant was sent to pathology.

for cholecystectomy with an exploration of the biliary tract; the transoperative examination revealed biliperitoneum, lysis of the GB, a cholecystocoledochobiliary fistula *(Figure 2)* and a single 15 mm stone; a T probe was placed. Since there was no hepatopancreaticobiliary surgeon a definitive repair was not performed. A transoperative cholangiography revealed passage of contrast material to the duodenum without apparent leakage through the fistulous orifice *(Figure 3)*. The patient had a favorable postoperative evolution; the drainage through a T catheter was an average of 500 ml per day with progressive decrease, with the improvement of hyperazoemia and a urinary flow greater than 0.5 ml/kg/h. A postoperative cholangiography showed no leaks with the passage of the contrast medium to the duodenum. The pathology report revealed a moderately differentiated adenocarcinoma of the gallbladder with muscular infiltration *(Figure 4)*. The patient refused medical treatment and decided to voluntary discharge; he understood and accepted the risks and was lost for follow-up.

Figure 3: Transoperative cholangiography revealing passage of material from both hepatic ducts into the duodenum (semicircular folds). Leakage was observed and managed with soft aspiration drainage.

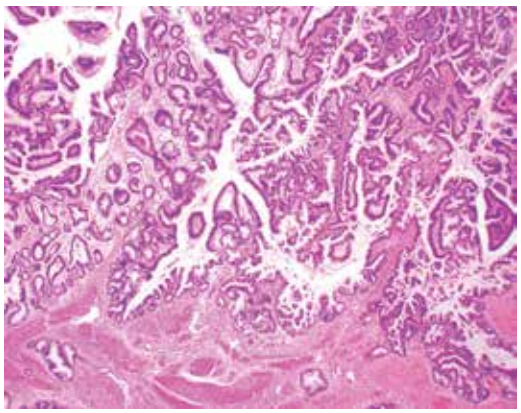

Figure 4: Histological section showing moderately differentiated adenocarcinoma.

DISCUSSION

Kehr first mentioned it in 1905, then Ruge in 1908, and finally Pablo Mirizzi in 1948. However, Mirizzi described an external compression of the hepatic duct (HD) or common bile duct in the context of an impacted stone in the neck of the GB or cystic duct (CD).[5]

Mirizzi syndrome (MS) and gallbladder cancer (GBCA) occur in 4 and 1% of cases of uncomplicated gallbladder lithiasis. Up to 5% of MS cases are associated with GBCA.[5]

Known risk factors for GBCA are GB lithiasis, age older than 50 years, MS, and xanthogranulomatous cholecystitis.[1]

MS is defined as a compression of the common bile duct (CBD) or hepatic duct (HD), with or without some degree of cholecystobiliary fistula and, in some cases, a cholecystoenteric fistula, which results from stone impaction in the Hartmann's pouch (HP) or the CBD.[6]

In our service, we have reported cases of Mirizzi syndrome with cholecystoenteric fistula. However, pathology has not demonstrated malignancy in any other reported case of MS.

Gallbladder lithiasis is a key condition, as it leads to chronic inflammation with subsequent alterations of the gallbladder wall and surrounding structures such as the Calot's triangle, hepatoduodenal ligament, and even the intestinal wall; edema, adhesions, fibrosis, and perforation-fistulation are the key events in the development of MS, choledocholithiasis,

cholecystoenteric fistula biliary ileus, and GBCA.

The clinical picture is a product of the torpid evolution (compression-fistulation, acute inflammation, incomplete remission, chronic inflammation, dysplasia) along with the clinical manifestations *(Table 1)*, the laboratory, imaging, and transoperative findings, and the degree of complexity in the treatment (such as the subsequent risk of bile duct bypass [BDBP]) such as subtotal cholecystectomy, liver resection and/or temporary bile duct bypass.

In this case, the sudden onset of jaundice, which initially made us think of cholangiocarcinoma or pancreatic cancer, was noteworthy, as well as the absence of previous symptoms.

There are multiple classifications regarding MS, such as Cortelle's of 1975 and McSherry's of 1982. The classification of Csendes (1989) is a modification of McSherry's and divides it into four stages: type 1 obstruction of the CBV, type 2, 3, and 4 with some degree of cholecystocoledochal fistula. Beltrán (2008) adds a fifth category for bilioenteric fistulas and subdivides this situation into Va and Vb (the latter complicated with biliary ileus).[7]

On the other hand, GBCA is the most frequent cancer of the biliary tract, 80% concerning cholangiocarcinoma; it is more commonly found in the fundus (60%), body (30%), and neck (10%) or the GB; the most frequent histological type is adenocarcinoma. It is considered invasive when it surpasses the muscularis propria, that is, stages T1a *(Figure 4)*. Frequently, some cases are found with perforation of the visceral peritoneum and invasion of adjacent organs; however, intraoperative diagnosis and radical treatment are only performed in less than 1% of the cases.[8-10]

Table 1: Data associated with Mirizzi syndrome and gallbladder cancer.

	Percentage
Pain	67-100
Jaundice	45-87
Nausea-vomiting	31-62
Fever	21-42
Anorexia	11-29
Asymptomatic	17

Laboratory tests such as blood cell count, C-reactive protein (CRP), alanine aminotransferase (ALT), aspartate aminotransferase (AST), direct bilirubin, alkaline phosphatase (ALP), and gamma-glutamyl transpeptidase, are not specific or sensitive enough to predict the degree of complication or discriminate between them.

Although not diagnostic, CA 19-9 (carbonic anhydrase 19-9), with a specificity of 90% and sensitivity of 50%, is usually elevated in cases of MS; however, it is elevated in most cases of MS associated with GBCA (above 1,000 IU/ml).[11,12]

We decided to perform the CA 19-9 study since choledocholithiasis led us to think of asymptomatic gallbladder lithiasis. The evaluation of oncologic surgery and gastroenterology suggested continuing the diagnostic protocol. On rare occasions, the CA 19-9 may be elevated in benign pathology such as adenomyosis.[13,14]

In general, preoperative diagnosis is difficult; it is usually suspected in older patients with right hypochondrium pain and atypical symptoms. Ultrasound is not very sensitive in detecting findings, as it has accuracy as low as 11% in some reported series. Some authors mention suggestive data for MS: atrophic GB, dilatation of the HD with normal caliber of the GBCD (92%). Other indirect data are dilatation of the GBCD greater than 7 millimeters, with or without a stone greater than 10 mm in CBV, pneumobilia, and Hartmann's stone.[7]

In the case of GBCA, calcifications, luminal invasion, loss of the liver-vesicle interface, direct hepatic infiltration, irregular wall, and vesicular polyps larger than 10 mm are the known findings.[3] Ultrasound is not helpful to assess the stage, i.e., the extent of the disease.

The presence of stones alone, regardless of the episode, makes it more likely to find symptomatic choledocholithiasis as a complication as the cause of jaundice. With a diagnostic accuracy of up to 90% preoperatively (superior to ERCP), it delineates typical features of the syndrome, such as stone in the HC or Gallbladder duct with dilatation of the HC

and presence or absence of dilatation of the CBV (depending on its location). In the case of CAVB, there tends to be low signal uptake in T2. The hepatic extension, vascular involvement (hepatic artery and portal vein), and lymphatic extension are assessed.[2]

In our service, we decided to perform cholangioresonance imaging since it is considered within the imaging studies in suspected choledocholithiasis. According to the American Association of Gastroenterology and Endoscopy, it is noteworthy that the patient did not present free fluid or collections in the gallbladder.

Both situations can be treated with minimally invasive surgery; however, the complexity of these cases favors conversion to conventional surgery.

The gold standard remains tumor resection surgery, which is considered curative in the early stages of the disease.

MS type I and non-invasive GBCA (Tis, T1) share the same treatment: cholecystectomy. For the former, the risk of GBD increases with the kind of adhesions between the GB and the bile duct cancer (GBCA).

In advanced cases, the same treatment consists of liver resection with or without bilioenteric diversion, even in the most advanced stages.[15] In both cases, management is multidisciplinary; it is important to determine the conduct to follow according to the diagnosis, whether pre-, trans, and postoperative, the extent of the disease, and the need for surgery and pre or postoperative systemic treatment.[4,5]

The Oncologic Surgery Service suggested reintervention to complete radical treatment, as well as to determine the extent of the disease since the intraoperative findings showed non-advanced disease; however, the patient refused to continue treatment.

The prognosis in both cases is poor, with deterioration of quality of life; survival in GBCA invasive stages is less than 18 months.

CONCLUSIONS

Mirizzi's syndrome and gallbladder cancer are rare entities, both associated with gallbladder lithiasis; their coexistence is an even less common event; although the preoperative diagnosis of both is difficult, the general surgeon should always be attentive to findings suggestive of both, which force to perform more radical leakage procedures that allow the patient to be evaluated in a high specialty center.

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Pylephlebitis and portal pneumatosis secondary to complicated diverticular disease

Pileflebitis y neumatosis portal secundario a enfermedad diverticular complicada

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Keywords:
pylephlebitis, pneumatosis, portal, diverticular disease, sepsis.

Palabras clave:
pileflebitis, neumatosis, portal, enfermedad diverticular, sepsis.

ABSTRACT

Introduction: pylephlebitis is septic thrombosis of the portal vein and its tributary branches, secondary to intra-abdominal or pelvic infection, which migrates throughout the splanchnic circulation system and causes systemic deterioration. Portal pneumatosis is a rare condition and is traditionally an incidental finding with high mortality. Complicated diverticular disease, on infrequent occasions, can cause pneumatosis. **Case presentation:** we present the case of a 77-year-old male patient with acute abdomen, pylephlebitis, and portal pneumatosis secondary to complicated diverticular disease. **Conclusion:** pylephlebitis and portal pneumatosis require urgent control of the septic focus by resolutive surgery to avoid the fatal complications of abdominal sepsis that this condition causes.

RESUMEN

Introducción: *la pileflebitis es la trombosis séptica de la vena porta y sus ramas tributarias, secundaria a infección intraabdominal o pélvica, la cual migra por todo el sistema de circulación esplácnica y causa deterioro sistémico. La neumatosis portal es una condición rara y tradicionalmente es un hallazgo incidental con alta mortalidad, la enfermedad diverticular complicada, en muy raras ocasiones, puede causar la neumatosis.* ***Presentación del caso:*** *se presenta el caso de un paciente masculino de 77 años con abdomen agudo, pileflebitis y neumatosis portal secundario a enfermedad diverticular complicada.* ***Conclusión:*** *la pileflebitis y la neumatosis portal requieren de control del foco séptico urgente mediante cirugía resolutiva para evitar las complicaciones mortales de la sepsis abdominal que este cuadro origina.*

INTRODUCTION

Pylephlebitis is septic thrombosis of the portal vein and its tributary branches secondary to intra-abdominal or pelvic infection, which migrates throughout the splanchnic circulation system and causes systemic deterioration.[1] Only 0.6% of abdominal sepsis is complicated by this entity.[2]

Portal pneumatosis is a rare condition and is traditionally an incidental finding with high mortality. Complicated diverticular disease can cause pneumatosis on very rare occasions.[3] The anatomy of the portal circulation explains why diverticulitis (26.5%) and appendicitis (22%) are the primary etiologies of this disorder; other etiologies can be cholecystitis, pancreatitis, and hepatic abscesses.[4] Pylephlebitis is a septic process with high mortality, where timely management of the primary septic focus is imperative.

We present the case of a 77-year-old male patient with acute abdomen, pylephlebitis, and portal pneumatosis secondary to complicated diverticular disease.

PRESENTATION OF THE CASE

We present the case of a 77-year-old male with a history of diabetes mellitus 2 and long-standing systemic arterial hypertension, surgical history of laparoscopic cholecystectomy six years

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ago, and cardiac catheterization for chronic ischemic heart disease. His current condition began 10 days before his admission with diffuse abdominal pain in the lower quadrants, as well as an attack on his general condition accompanied by asthenia and hyporexia. An external physician with antibiotic therapy managed him. On arrival at the Emergency Department, he presented tachycardia and a tendency to hypotension accompanied by altered alertness. Physical examination revealed an inflammatory plastron in the left lower quadrant that aroused pain during manipulation; however, there was no evidence of peritoneal irritation. Laboratory tests showed leukocytes 13,400 mm^3, neutrophilia 92.9%, and lactate 3.9 mmol/l. A contrast abdominopelvic CT scan was requested, showing portal vein thrombosis *(Figure 1)*, portal pneumatosis *(Figure 2)*, and diverticular disease *(Figure 3)*. Due to the above findings, initial management with intravenous solutions and empirical broad-spectrum antibiotic therapy with piperacillin-tazobactam 4.5 g IV every 8 hours was started; after stabilizing management, exploratory laparotomy was performed, where sigmoidectomy and terminal colostomy were performed due to the findings of diverticular perforation *(Figures 4 and 5)* and purulent inflammatory plastron in the mesosigmoid with special distribution in the path of the inferior mesenteric vein. Samples for cultures were taken. Postoperative management was performed in the intensive care unit, and antibiotic therapy was directed to *E. coli*. Total parenteral nutrition and anticoagulant therapy were started with 60 mg of enoxaparin subcutaneously (SC) every 12 hours. The patient had a favorable clinical evolution thanks to the multidisciplinary management provided.

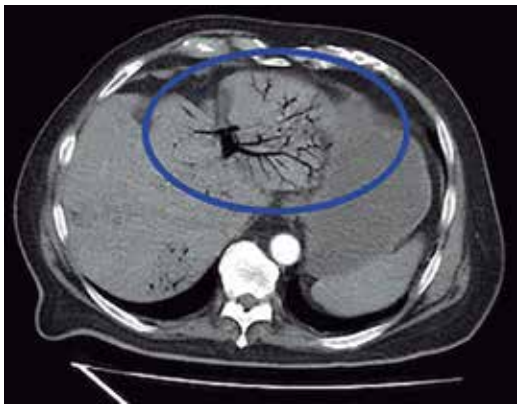

Figure 2: Portal pneumatosis.

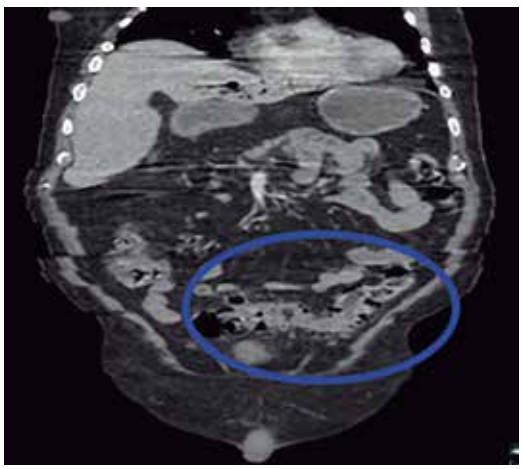

Figure 3: Diverticular disease.

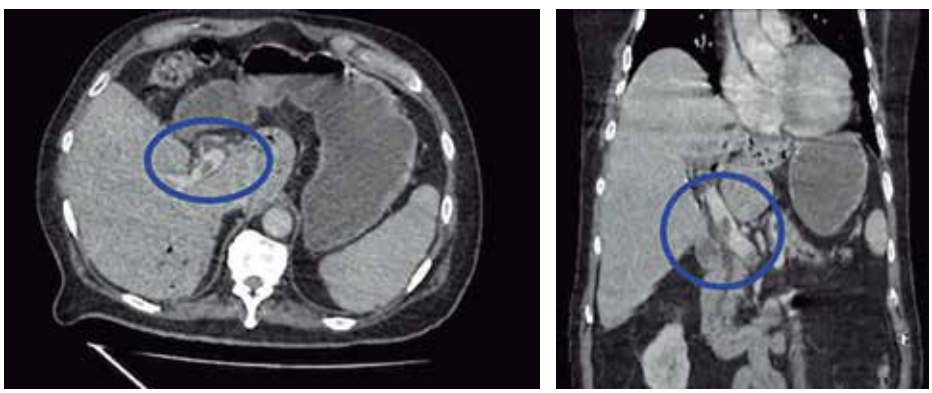

Figure 1: Portal thrombosis.

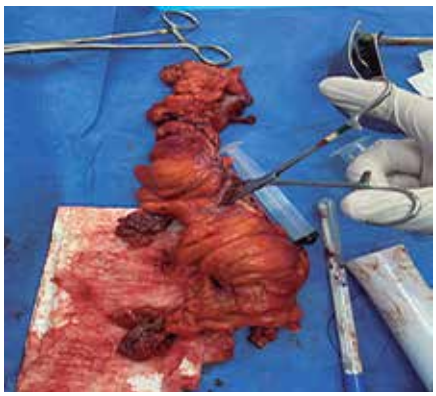

Figure 4: Sigmoid colon.

He was discharged one week after the surgical procedure without any complications. He was referred to the outpatient clinic one week after his discharge. He was tolerating the oral route with a functional stoma and with the wound intact. The histopathology report revealed a complicated diverticular disease.

DISCUSSION

The leading cause of pylephlebitis reported in the literature is complicated diverticular disease. However, it is a rare finding and of low incidence although potentially fatal; in this case, the previous situation is presented together with portal pneumatosis, an even rarer complication; most cases reported in the literature are case series. It occurs secondary to the dissemination of gas-producing organisms through the inferior mesenteric vein or by direct communication between the perforated diverticulum and the mesenteric circulation.[5] It is a serious entity that requires immediate management with mortality rates of up to 50 to 80%, which, due to the formation of septic emboli, can result in different complications such as intestinal ischemia, hepatic abscesses, hepatic and splenic infarcts, and death secondary to septic shock.[6] Coagulation disorders should be ruled out as a risk factor. In our case, there were no complications or hematologic pathology.

The most frequent symptoms may be fever, abdominal pain, and even jaundice, the most common agents being *Bacteroides fragilis* and *Escherichia coli*.[7] The definitive diagnosis is made with percutaneous drainage and culture of the portal tree; however, in clinical practice, it is detected when there is a septic process and gas or thrombi in the portal system in imaging studies.[8]

In the case presented here, the problem was treated early with the resolution of the condition through initial control of hemodynamic parameters with intravenous hydration and empirical antimicrobial management, followed by surgical treatment with sigmoidectomy and terminal colostomy, antimicrobial therapy to control the septic focus, in addition to anticoagulation, which has been shown to reduce mortality in these patients; however, there is still no scientific evidence to support it.[9] The use of antibiotics and anticoagulation is indicated for six weeks. Likewise, postoperative parenteral nutrition was given, complying with all aspects of multidisciplinary management of sepsis.[10,11]

CONCLUSIONS

Although portal pneumatosis and pylephlebitis are rare complications, they should be suspected in a patient with diverticular disease and hepatic manifestations or manifestations of a severe septic state; therefore, it is suggested to approach these patients with an intentional search for these entities through imaging and

Figure 5: Closed abdomen with colostomy.

laboratory studies, to offer timely management that improves the probability of survival and decreases mortality in these patients.

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Encapsulating sclerosing peritonitis, a very rare entity of intestinal occlusion

Peritonitis esclerosante encapsulante, una entidad muy infrecuente de oclusión intestinal

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Keywords: encapsulating sclerosing peritonitis, intestinal occlusion, peritoneal capsule.

Palabras clave: *peritonitis esclerosante encapsulante, oclusión intestinal, cápsula peritoneal.*

ABSTRACT

Encapsulating sclerosing peritonitis is a rare entity that forms a fibro collagenous membrane due to chronic peritoneal irritation and inflammation, presenting as a picture of intestinal occlusion. The diagnosis is suspected with a CT scan (computerized tomography) (cocoon sign); however, the definitive diagnosis is made during surgery. This clinical case is of a male patient in his sixth decade of life with multiple comorbidities who presents with intestinal occlusion, where conservative management is initiated without response, so surgical management is decided.

RESUMEN

La peritonitis esclerosante encapsulante es una entidad infrecuente caracterizada por la formación de una membrana fibrocolagenosa como resultado de irritación e inflamación crónica peritoneal, presentándose como cuadro de oclusión intestinal. El diagnóstico se sospecha tomográficamente (signo del capullo); sin embargo, el diagnóstico definitivo es durante la cirugía. Este caso clínico va de un paciente masculino de la sexta década de la vida con múltiples comorbilidades que acude por cuadro de oclusión intestinal donde se inicia manejo conservador sin respuesta, por lo que se decide manejo quirúrgico.

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INTRODUCTION

Encapsulating sclerosing peritonitis is a rare entity characterized by forming a diffuse fibro collagenous membrane that affects the peritoneum and involves the bowel. It usually shows intermittent intestinal occlusion, so early diagnosis is rare.[1] The pathogenesis of this entity is not clear. However, it can be primary (idiopathic) or secondary, resulting from chronic irritation and inflammation.[2] This entity can be suspected with history, clinical, and laboratory studies; however, the definitive diagnosis is made during surgery.[3] Management can be conservative or surgical, depending on the severity of symptomatology. We present a case of a patient who presented with intestinal occlusion, with a history of systemic inflammatory pathology and liver transplantation, who underwent surgery due to the persistence of the symptoms and the presence of a grayish fibrotic membrane covering the intestine.

PRESENTATION OF THE CASE

We present the case of a 51-year-old male patient with a history of idiopathic chronic ulcerative colitis since 2015 on treatment with mesalazine, previously with infliximab; primary sclerosing cholangitis since 2017 initially managed with ursodeoxycholic acid, propranolol, furosemide and spironolactone, complicated with malignant degeneration managed with liver transplantation in 2019, currently on immunosuppressive management

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based on everolimus, azathioprine, and prednisone.

The patient came to the emergency department with abdominal pain of 12 hours evolution, sudden, located in the epigastrium, cramping, disabling, without irradiation, accompanied by nausea and gastro alimentary vomiting on multiple occasions, as well as the inability to pass gases, with the following vital signs: blood pressure (BP) 110/60 mmHg, heart rate (HR) 75 beats per minute, respiratory rate (RR) 18 breaths per minute, temperature 36.6 ºC. Physical examination revealed a patient with painful facies, regular hydration status, muco-tegumentary coloration, and abdominal distension with pain on palpation in the epigastrium, audible, but decreased peristalsis. Paraclinical tests were requested reporting hemoglobin 9 g/dl, leukocytes 3.1 mm^3, platelets 416 mm^3, glucose 179 mg/dl, creatinine 0.9 mg/dl, sodium 137 mEq/l, potassium 4.1 mEq/l, chlorine 100 mEq/l, alanine aminotransferase (ALT) 41 IU/l, aspartate aminotransferase (AST) 9 IU/l, lactate dehydrogenase (LDH) 181 IU/l, total bilirubin (BT) 0.40 mg/dl, adenosine triphosphate (ATP) 14 sec, international normalized ratio (INR) 1.01, activated partial thromboplastin time (aPTT) 28 sec, as well as an abdominal simple X-ray showing hydro-aerial levels, dilated loops and absence of distal intestinal gas.

He was admitted to the hospital, and due to suspicion of occlusion secondary to surgical adhesions, conservative management was decided based on intestinal rest, a nasogastric tube placement, and crystalloid fluid therapy; however, due to persistent symptoms and increased abdominal pain, a simple abdominopelvic CT scan was requested showing distension of the small bowel loops, with maximum dilatation in the terminal ileum, as well as wall edema and concentric striations due to probable intussusception *(Figure 1)*.

Due to the tomographic findings and persistence of symptoms, surgical management was decided, consisting of an exploratory laparotomy with supra- and infraumbilical midline incision. The findings were a fibrotic peritoneal capsule of approximately 20 × 30 cm with thin loops inside, multiple interloop adhesions, and Mazuji II-III loop-wall with peritoneal reaction fluid *(Figure 2)*.

Complete resection of the peritoneal capsule, adhesiolysis, and umbilical plasty were performed without drainage placement and trans-surgical complications. The gastroenterology service managed the patient during the postoperative period. He was kept fasting for 48 hours, and immunosuppressive drugs were restarted without any eventuality. Oral administration was started; however, with poor tolerance, intestinal rest was

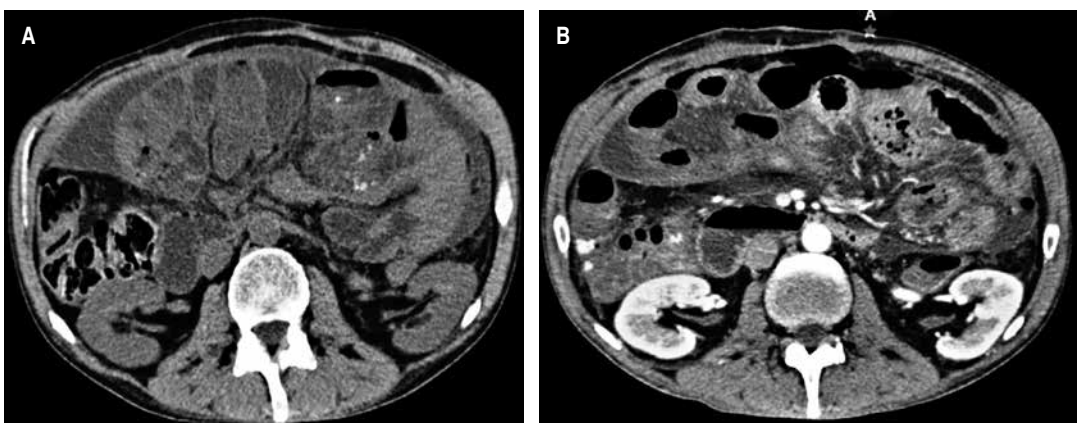

Figure 1: Computed tomography pictures. **A)** A simple computed tomography scan showing ascites in compartments and interloop-free fluid. **B)** A computed tomography scan with intravenous contrast showing overdistension of small bowel loops, predominantly with liquid content, and reaching maximum dilatation towards the terminal ileum, where wall thickening and concentric striations are observed.

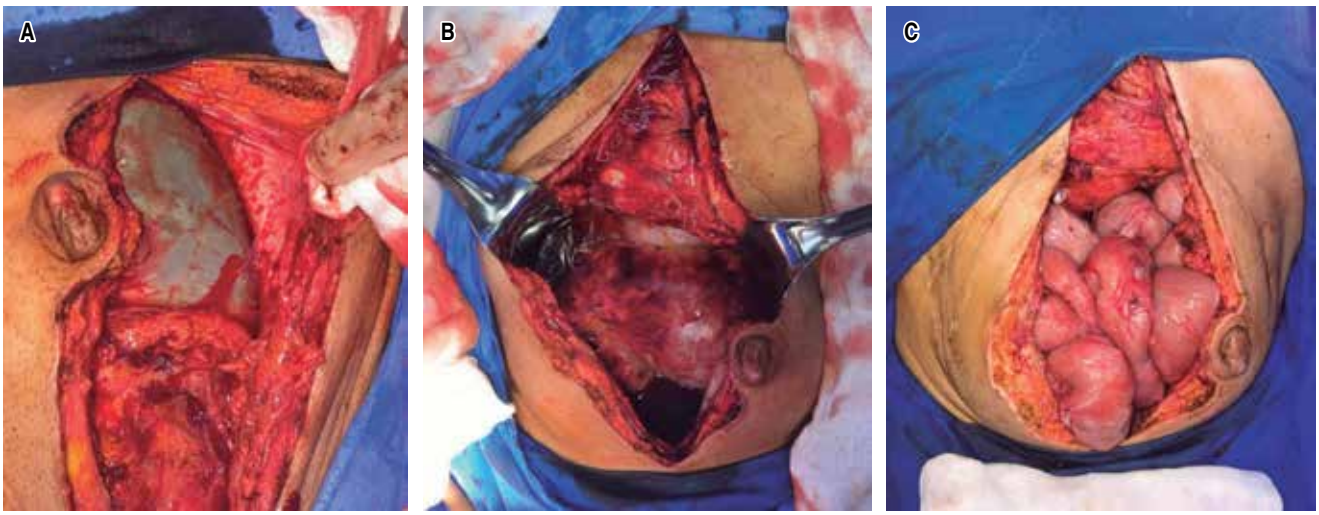

Figure 2: Surgical photos of exploratory laparotomy. **A)** The initial aspect is where the capsule or cocoon can be appreciated. **B)** The capsule has been incised and removed. **C)** The capsule has been removed from the peritoneum, freeing the intestines.

indicated again, and a Levin tube was placed. A control CT scan was requested, reporting distension of loops and discrete interloop edema. So, it was decided to continue with conservative management based on fluid therapy, ambulation, and a Levin tube.

After 24 hours, intestinal transit X-ray imaging showed adequate passage of the contrast medium. The Levin tube was removed, and the oral route was restarted with adequate tolerance. Due to adequate evolution, it was decided to discharge him home on the tenth day of his hospital stay with an oral antibiotic and analgesic. Follow-up appointments were made for 15 and 30 days with adequate evolution without evidence of complications or recurrence.

The specimen was sent to pathology; the histopathological diagnosis reported fibro adipose wall with chronic and acute inflammatory infiltrate, abscessed, with data of congestion, edema, and ascites characterized by isolated mesothelial cells on the proteinaceous background-no evidence of malignancy was found.

DISCUSSION

Sclerosing encapsulating peritonitis or abdominal cocoon is a rare entity characterized by forming a diffuse fibro-collagenous peritoneum membrane. It affects the small intestine partially (type I) or totally (type II) and may involve adjacent structures (type III).[4]

It is classified as primary or secondary, the former being idiopathic and the latter associated with proinflammatory events mainly related to peritoneal dialysis and, to a lesser extent, with the use of drugs such as beta-blockers or chemotherapeutic agents, previous abdominal surgery, autoimmune diseases, and other conditions. The most recognized entity and with the most extensive bibliography is secondary to peritoneal dialysis, whose histopathology is characterized by peritoneal des-mesothelial tissues, interstitial thickening composed of fibroblasts and collagen deposits in the peritoneal membrane, as well as infiltration of mononuclear and polymorphonuclear cells.[2,5]

Clinically, it is characterized by episodes of partial and intermittent intestinal occlusion due to twisting and compression of the intestine within the fibrous membrane that covers it. In chronic states, it may present as anorexia and weight loss.[1,5] The diagnosis is suspected based on clinical history and laboratory studies and is confirmed during surgery. The imaging study of choice is with a contrast CT scan, the typical radiological finding being the presence

of a conglomerate of thin loops covered by an enveloping and thickened peritoneum (cocoon sign). Other suggestive tomographic findings are peritoneal thickening, peritoneal reinforcement, calcifications, and loculated liquid collection.[3,6]

Treatment depends on the severity of the symptoms. From conservative management with fasting, gastrointestinal decompression with nasogastric tube, and nutritional support. After the resolution of the condition or poor response to conservative management, it has been recommended to use drugs such as steroids, tamoxifen, or colchicine to inhibit the synthesis and maturation of collagen and reduce the inflammatory response. The ideal surgical management is total excision of the fibrous membrane plus adhesiolysis, since this reduces the rate of recurrences. The main complications related to the surgical procedure are intestinal occlusion, intra-abdominal infection, enteral fistulas, and the creation of an enterostomy.[4,6,7]

As mentioned in the clinical case, the first suspicion regarding a semiology of this type is intestinal occlusion, which is why conservative management was decided; however, due to persistent symptoms and increased abdominal pain, a simple abdominopelvic CT scan was requested as indicated by the literature, which guided us to the diagnosis due to the finding of the characteristic radiological image, the cocoon sign, giving rise to surgical treatment in which complete resection of the peritoneal capsule was performed; after this, the histopathological diagnosis confirmed what has already been described by several authors concerning the histology and composition of the capsule.

CONCLUSIONS

Sclerosing encapsulating peritonitis or abdominal cocoon is a rare cause of intestinal occlusion characterized by the formation of a diffuse fibro-collagenous peritoneum membrane. The imaging study of choice is a contrasted CT scan. The typical radiological finding is the presence of a conglomerate of small loops covered by an enveloping and thickened peritoneum, the cocoon sign.

The presentation of this case is important since the available literature on this entity is mainly related to peritoneal dialysis. At the same time, the availability of information for other secondary etiologies is very limited, and the knowledge of this cause as a differential diagnosis of intestinal occlusion is of utmost importance for its adequate management and treatment. In this patient, surgical management was decided due to the absence of improvement with conservative management and tomographic findings. The diagnosis was corroborated by the evidence of a grayish-thickened membrane covering the entire small bowel. It was complemented by the histopathological report showing fibrous wall with acute and chronic inflammatory infiltrate.

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Vitalism: from philosophy of life to medicine

Vitalismo: de la filosofía de la vida a la medicina

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Keywords: vitalism, animism, Montpellier, vital force, medical philosophy.

Palabras clave: *vitalismo, animismo, Montpellier, fuerza vital, filosofía médica.*

ABSTRACT

During the "Age of Reason" and part of the "Enlightenment", vitalism was the most logical explanation for the physical phenomena occurring in nature and life; from today's perspective, vitalism can be defined as a theory of life in the life sciences. Much of the preservation and diffusion of vitalism was thanks to the Greek physician Galen of Pergamon (129-216 BC, approximately), who, in addition to his work in health, was an eminent philosopher who took features of the ideology of Plato (427-347 B.C.), Aristotle (384-322 B.C.) and the Hippocratic tradition, to generate his doctrinal system based on the union of medicine and philosophy. Georg Ernst Stahl (1659-1734) took up the ancient concept of anima (from the Latin alma) to make sense of regulating health and disease. Contemporaneously, François Boissier de Sauvages de Lacroix (1706-1767) introduced animism (the word âme) to the medical school of Montpellier in France (1730), where the theory of vital flux emerged. Due to Napoleonic campaigns throughout Europe and the monarch's support for science, vitalism was internationally distributed throughout the 18th century. It was not until Bichat approached the study of tissue that brought down the fibrillarist theory giving rise to the application of an anatomo-clinical mentality.

RESUMEN

Durante la "Edad de la razón" y parte de la "Ilustración" el vitalismo fue retomado como la explicación más lógica a los fenómenos físicos que ocurrían en la naturaleza y la vida; desde la perspectiva actual, el vitalismo se puede definir como una teoría de la vida, en las ciencias de la vida. Gran parte de la conservación y difusión del vitalismo fue gracias al médico griego Galeno de Pérgamo (129-216 a.C., aproximadamente) quien, además de sus labores en la salud, fue un eminente filósofo que tomó rasgos de la ideología de Platón (427-347 a.C.), Aristóteles (384-322 AC) y la tradición hipocrática, para generar su propio sistema doctrinal basado en la unión de la medicina y la filosofía. Georg Ernst Stahl (1659-1734) retomó el antiguo concepto de ánima (del latín alma) con el propósito de dar sentido a la regulación de la salud y la enfermedad. De forma contemporánea, François Boissier de Sauvages de Lacroix (1706-1767) introdujo al animismo (la palabra âme) a la escuela de medicina de Montpellier en Francia (1730), en donde surgió la teoría del flujo vital. Debido a las campañas napoleónicas a través de Europa, así como al apoyo del monarca hacia la ciencia, el vitalismo tuvo una distribución de carácter internacional a lo largo del siglo XVIII. Fue hasta que Bichat abordó el estudio del tejido que hizo caer la teoría fibrilarista y dio pie a la aplicación de una mentalidad anatomoclínica.

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INTRODUCTION

During the "Age of Reason" and part of the "Enlightenment", vitalism was considered the most logical explanation for the physical phenomena occurring in nature and life; from today's perspective, vitalism can be defined as a theory of life in life sciences (natural philosophy, natural sciences, and medicine).

Although the origin of vitalism as a doctrine is not known, the term is strongly associated with the medical tradition of the Montpellier school during the 18th century, as well as with the ideas of the physician Paul-Joseph Barthez (1734-1806); however, it should be mentioned that its history goes back to Aristotle and his work.[1-3] Likewise, within the conceptualization of vitalism between the 17th and 19th

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centuries, it is possible to recognize three phases: animism (end of the 17th century), the conception of vital force or energy (1770-1840), and finally the assumption of "organizing power" (beginning of the 19th century).

Vitalism and its evolution in the sciences

Much of the preservation and diffusion of vitalism was thanks to the Greek physician Galen of Pergamon (129-216 BC, who, in addition to his work in health, was an eminent philosopher who took features of the ideology of Plato (427-347 BC), Aristotle (384-322 BC) and the Hippocratic tradition, to generate his own doctrinal system based on the union of medicine and philosophy.[2,3] Galen built his biological doctrinal principles on Aristotelian vitalism based on the works *"Historia Animalium"* (around 343 BC), *"De partibus animalium" (*around 350 BC), and *"De generatione animalium"* (4th century BC).[4-6]

Galen's doctrinal legacy was accepted as an actual science within the medical field so that no other conceptions were developed during the centuries that it was in force. However, in the 17th century Johannes Kepler (1571-1630), Galileo Galilei (1564-1642), Isaac Newton (1642-1727), and René Descartes (1596-1650) gave impetus to the Scientific Revolution, initiated by Francis Bacon (1561-1626) in the second half of the 16th century and, after the publication of the "Discourse on Method" *(Discours de la méthode pour bien conduire sa raison, et chercher la vérité dans les sciences, 1637)* written by Descartes, for most of the 17th century the Cartesian mechanicism dominated the explanation of life through physics.[7-9] However, towards the end of the century, the German physician Georg Ernst Stahl (1659-1734), due to his training as a pietist in the Lutheran movement and his inability to accept the medical-philosophical beliefs based on the framework of Cartesian mechanistic work, took up the ancient concept of anima (from the Latin alma) in order to make sense of the regulation of health and disease, such as the duration and course of human life through a somewhat religious vision; however, he dispensed with the ancient element that took the spirits (animals) as intermediaries between the material and the immaterial.[5,8]

For Stahl, this soul gives life to matter, although it does not live. Moreover, life cannot be explained by the physical and chemical components that form the body; he did not consider the human body as a mechanism but as "an organism" with a clear distinction between the mind *(res cogitans)* and the body *(res extensa)* that manifested the existence of a vital flow *(tonicus motor)*. Thus, animism emerged as an option to the inability of mechanisms to explain certain properties of the human body without including a spiritual element that united reason with the physical aspects of the body.[5,10-12]

Stahl's ideas were so influential throughout the next century that countless contemporary scholars gave their opinion, such as Gottfried Wilhelm von Leibniz (1646-1716), John Locke (1632-1704), Immanuel Kant (1724-1804), Denis Diderot (1713-1784), Claude-Adrien Helvétius (1715-1771), among others.

The eighteenth century was characterized by the continuous dispute between both philosophical currents, where each one was reinforced according to concepts implemented by each of the new emerging thinkers. Thus, the mechanistic ideology was strongly hit after being criticized by the French scholar Pierre Daniel Huet (1630-1721), who affirmed that the Cartesian doctrine was a plagiarism of the philosophy exposed in the work "Antoniana Margarita: *opus nempe physicis, medicis ac theologis non minus vtile quam necessarium"*[13] by the Spanish physician Antonio Gomez Pereira (1500- 1558) published during the 16th century which represented the first modern approach to brain function to the exclusion of the Galenic concepts of soul and spirit, and established a topographical brain model for the functioning of the prefrontal cortex.[8,9,14] The dispute was further fueled sometime later by Herman Boerhaave (1668-1738) when he spoke of "iatro-mechanics," expressing the existence of a clear division between soul and body with a connection that could not be explained.[15,16] All this would form the basis of the philosophy of mind and the conceptualization of mind-body dualism, denoting the non-physical view of mental phenomena.

Contemporaneously, François Boissier de Sauvages de Lacroix (1706-1767) introduced animism (the word *âme*) to the medical school of Montpellier in France (1730), where the theory of the vital flux (formerly defined by Stahl as *tonicus motor*) regulating health, disease, duration, and course of human life emerged.[3,17] However, with time, Boissier's ideas moved away from the original Stahlian animism by affirming that the main role of the soul is in the emotions, having nothing to do with other physiological phenomena (such as movements or secretions). We can say that vitalism emerged as a conservative and more measured response to mechanistic and atomistic physicochemical reductionism.[3]

Montpellier's vitalist ideas continued to change due to the thinking of Paul Joseph Barthez (1734-1806), a pupil of Boissier, who preferred to call it *"le Principe Vitale"* or "vital principle", as well as Jean Guillaume Grimaud (1750-1789) who subdivided the *Principe Vitale* into external and internal motor forces *(forces motrices)* and an internal "inferior" vital sense *(sens vital intérieur)*.[3,16-18]

In the mid-18th century, many physicians and naturalists described vital activity as originating in the body parts. Among the most important proponents of this theory were the ophthalmologist Albrecht von Haller (1708-1777) and Théophile de Bordeu (1722-1776); von Haller established, based on microscopic observations and experimental investigations, the basic concept of "fiber", as well as its inherent properties: irritability (contractility), sensitivity and immanent force *(vis insita)*.[16-19] He also clarified that these properties are exclusive to animate objects and nonexistent in inert matter. In addition, von Haller distinguished between the irritability of the muscular fiber, which he called contractility, and the excitability of the nervous fiber, which he called sensibility. He called sensitive fiber in man that, by being touched, transmitted to the soul the impression of this contact.[16] He took the skin's sensitivity as a reference to compare with the rest of the organism. These ideas formed the pillar of the vitalism of the Montpelier school, whose major exponents were Louis de La Caze (1705-1765) and Gabriel F. Venel (1723-1775) together with Bordeu. However, we must emphasize that both Bordeu and Haller described the inherent properties of living beings; Bordeu's vitalistic theory was based on the irritability of the fibers, while Haller emphasized sensibility and immanent force; this is why Marie-François-Xavier Bichat (1771-1802) creator of the experimental method and modern histology, explicitly compared Barthez's vital principle with Stahl's anima, and therefore considered these vital properties similar to gravity and other physical forces.[3,16-19]

Having said this, due to the Napoleonic campaigns throughout Europe, as well as the support of the monarch towards science, vitalism had an international distribution during the 18th century, giving rise to different variants throughout the continent. Thus, in Germany, the "vital force" *(Lebenskraft)* developed as a rather abstract concept (Medicus, 1774), as a universal "formative impulse" *(Bildungstrieb)* (Blumenbach, 1787) or as an "organizing principle" operating according to a "rational plan" (Müller, 1833-1834). Meanwhile, in Italy, Luigi Galvani defended the idea of the existence of two types of electrical energy: animal energy and "common" energy. Galvani read his lecture *"De Animali Electricitate"* for the first time at the Academy of Sciences of Bologna on October 30, 1786. In addition to presenting his results in the 1971 paper *"De viribus electricitatis in motu musculari. Commentarius"*, which changed the medicine of the time after giving rise to a scientific debacle with the Italian physicist Alessandro Giuseppe Antonio Anastasio Volta (1745-1827).[20,21]

On the other hand, "mesmerism" was born in Vienna and introduced by the physician Franz Anton Mesmer (1734-1815), who affirmed the existence of "animal magnetism", a universal fluid. However, it did not have the support of the scientific community. Mesmerism moved away from the scientific method and medicine. During the following years, it was adopted as an unconventional therapy and was associated with mystical traditions giving rise to the genesis of associated sciences and diverse therapies such as spiritualism, phrenology, clairvoyance, and telepathy; however, vitalism remained in force as an indoctrinated theory for the medical sciences.[22]

Vitalism and the scientific method

Despite its wide distribution, vitalism's main difficulty was to distance itself from the scientific method and the various philosophical currents that derived from it; there was opposition and reluctance towards the practice of experimentation, including experimentation on life and a 'vitalist' reaction to this perspective; it was not until Bichat approached the study of tissue that the fibrillarist theory in force since the sixteenth century was demerited and gave rise to the application of an anatomoclinical mentality.[23] Histopathological studies and the conceptualization of the term "tissue" centered on French physiology eventually consecrated a new mechanistic antithesis with the need to resort to the vitalist hypothesis. Bichat defined and enshrined the properties of living systems down to their components through their 21 tissues *(Table 1)*; this made the vital properties assigned to these components opposed to their physical properties, again overthrowing mechanicism. For the above, the French physician François Magendie (1783-1855) provided useful insight through his experiments. Magendie founded the first physiology laboratory in France in 1830, and many of his experiments were aimed at abolishing the vital properties known as sensibility and contractility and "considering them as functions"; however, he recognized that many physiological phenomena remained beyond experimental reach, so it was not possible to explain them in physical terms for the time. While Magendie was not entirely a vitalist, his experiments gave rise to a "rational" view of vitalism and physiological empiricism.[23,24]

On the other hand, the German Theodor Schwann (1810-1882) proposed two views on organized bodies: the teleological view, which stated that "every organism originates with an inherent power which molds it in conformity with an overriding idea, arranging the molecules in the necessary relation to achieve certain purposes established by this idea". And second, the physical view: "... the fundamental powers of organized bodies agree essentially with those of inorganic nature, which work together blindly by the laws of necessity and independently of any purpose". Schwann's theory was perhaps the precedent or preamble to the coming changes for the vital force theory.[25,26]

Sooner rather than later, Claude Bernard (1813-1878), a pupil of Magendie, had to re-establish the methodological hypothesis as a fundamental part of the experimental method; this gave rise to the axiom of determinism. Claude Bernard believed it was necessary to abandon the idea of antagonism between the general external forces and the vital internal forces of organisms, which meant repealing the dogma imposed by the vitalist and mechanistic doctrine.[27-30]

The 19th century gave way to a new way of thinking; the empiricism of Magendie and Claude Bernard evolved towards doctrines in which reason is the fundamental pillar of science: rationalism and positivism.[28-30]

Nowadays, philosophy and medicine are still working hand in hand, although they no longer explain life and the organism's functioning. Currently, the question lies in the origin of our thinking and the ability to

Table 1: Bichat's tissues.[23]

1. Cellular
2. Nervous system of animal life
3. Nervous system of organic life
4. Arterial
5. Venous
6. Exhaling
7. Absorbent or lymphatic
8. Bone
9. Medullar
10. Tendinous
11. Fibrous tissue
12. Fibrous-tendinous tissue
13. Muscular of animal life
14. Muscular of organic life
15. Mucous
16. Serous
17. Synovial
18. Glandular
19. Dermal
20. Epidermal
21. Pilous

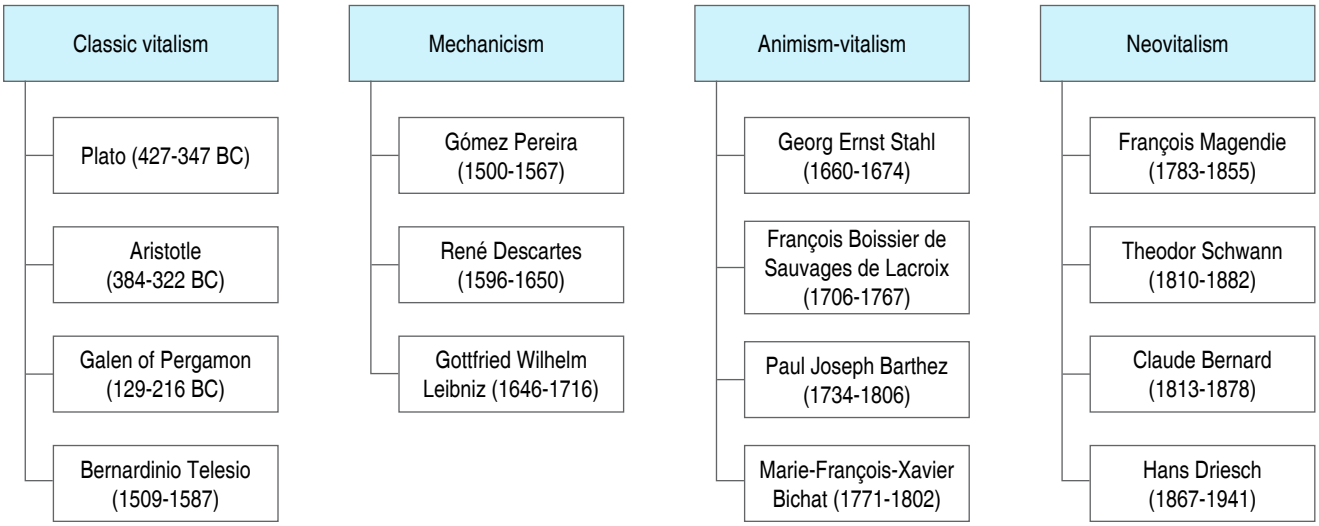

Figure 1: Schematization that exemplifies the philosophical currents related to vitalism and its exponents by epoch.

see ourselves as thinking beings; the medical-philosophical conceptualization allows us to explain some characteristics of human beings of a social nature such as free will, empathy, and emotional states, among others.[31] In addition, it allows us to rationalize our own consciousness, which, in recent years, has led to the genesis of cognitive neuroscience that allows the explanation and interpretation of emotions around a situational link and the conditions associated with different neurological diseases. *Figure 1* briefly summarizes the philosophical currents related to vitalism and their important exponents.

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