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Colon Fistula: A Conditioning Treatment

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ABSTRACT

Introduction: colon or rectal fistula is a medical/surgical challenge that, with precedents and resilience, is presented as a complication of another real cause and fistula is defined as the path in abnormal communication between one epithelium and another. Objective: to present the experience of seven years in diagnosis and treatment in four hospitals in Mexico City. Method: this is a study with a multicenter, retrospective, longitudinal, observational and descriptive design. In the Colon and Rectal Surgery services, as well as General Surgery of the second and third level of health care. Results: from 118 records, a total of 46 patients with colon fistula were chosen, of which 17 were male (36.95 %) and 29 were female (63.04 %). With an age range of 21 to 82 years, with an average of 61 years and a bimodal value of 33 and 64 years. Its etiology was diverse, but its presentation was documented as entero-cutaneous, entero-bladder, entero-vaginal, entero-uterine, entero-enteric fistulas. Discussion: the diagnosis of colon fistula is made with a complete medical history, which is mostly clinically evident with the classic triad. The gold standard for confirming a diagnosis of acute diverticulitis and evaluating complications is CT scan with contrast of the abdomen; the treatment alternatives for colon fistulas to another organ varies according to the case, the clinical conditions and/or their prognosis of cure according to the Chapman and Sheldon stages; successful conservative management or treatment in hemodynamically stable patients, offering less invasive alternatives in selected clinical scenarios, or even fecal transplants in patients with complicated diverticulitis; however, surgical intervention remains the definitive treatment for symptomatic or complicated fistulas. Conclusions: regarding the treatment of colon fistulas, this will be conditioned according to each patient, by the hemodynamic conditions, the etiology, the characteristics of nutrition/infection and of course the surgeon's expertise, as well as the infrastructure of the installed capacity that is available.

Keywords: Fistula, Colon fistula, Diverticulitis, Fecal transplant, CT scan.

INTRODUCCIÓN

Colon or rectal fistula is a medical/surgical challenge that, with precedents and resilience, presents itself as a complication of another real cause. Fistula is defined as the path in abnormal communication between one epithelium and another. As previously mentioned, "the concept of fistula as a disease is not sustainable, since in a real context it is a complication of other defined diseases or by various well-identified factors" [1] It is not correct to attempt to mask or cover an intestinal perforation with a bad term such as intestinal fistula, which is erroneously referred to in the "current" nomenclature as *"enteroatmospheric fistula".* [2] The first actual

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historical site or documentation of a fistula in historical records is when the physician Praxágoras of Cos in 350 BC, created fistulas with a hot iron directly in the abdomen, thus forming intestinal and/or fecal fistulas. [3]

The colon or large intestine has an approximate length of 1.50 meters, forming a frame around the small intestine. It differs from this by its larger caliber, at the level of the cecum it has a width of 5 to 10 cm and as it becomes more distal, it decreases. It is divided into the following portions: cecum, cecal appendix, ascending colon, transverse colon, descending colon, sigmoid colon and rectum. [4] Its main functions are digestion and the reabsorption of ions and water to form feces. The main diseases that require colic surgery are cancer (50% of cases) and non-malignant pathologies (complications of colic diverticulosis, chronic inflammatory bowel disease, polyps and polyposis of the colony, volvulus, ischemic colitis, among others). [5]

Regarding the etiology of colonic fistula formation, it has been documented that approximately 85% of people with acute diverticulitis have uncomplicated diverticulitis (absence of abscesses, colon stenosis, colon perforation, or fistula formation). [6] Pancreatic-colonic fistulas have been reported following biliary pancreatitis and Clostridioides difficile infection with the clinical consequence of chronic diarrhea. [7] Crohn's disease, on the other hand, is a chronic inflammatory condition of the digestive tract characterized by segmental and transmural inflammation, with the presence of fistulas associated with stricture being independent of the inflammation/fibrosis dichotomy, which could influence the success or failure of medical treatment. In addition, some studies have revealed a strong association between stenotic dilation and the need for surgery for internal colon fistula. [8] It has also been reported that tumor activity may be a cause of colon fistulas, such as gastric T-cell lymphoma with colonic invasion, by contiguity evidenced by gastroscopy, which revealed the formation of a gastrocolic fistula and transverse colonic stenosis. [9] Other etiologies include postoperative fistulas, such as those reported in secondary colonic fistulas, which occurred approximately one month after laparoscopic total gastrectomy for advanced gastric cancer and/or may occur after any upper abdominal surgery. [10] Frequent ingestion of foreign objects, and occasional ingestion of magnets can cause serious problems because they are composed of unique materials that attract each other in the intestinal wall, necrosis of the intestinal wall, intestinal perforation, and fistula formation. Based on the history of magnet ingestion, clinical signs such as nausea and vomiting, and X-rays, it is easy to diagnose magnet-induced complications. [11] Although diverticular disease is the most common or well-known cause of colon fistulas, this report describes a unique case of colon-bladder fistula resulting from the ingestion of a foreign body; as the ingestion of foreign bodies, such as a chicken bone, can erode the intestinal wall and cause a urethral fistula to the colon. Spontaneous expulsion of these objects through the urethra is even rarer. These cases underscore the importance of a thorough history and imaging studies to identify unusual causes, such as foreign bodies. [12]

The first time a diverticulum is described in the medical literature was in the year 1700 by the French surgeon Alexis Littre, however, it was not until 1917 when Telling and Gruner published the classic and detailed description of complicated diverticular disease. [13] Diverticula have been classified as true and false; true diverticula contain all the histological layers of the gastrointestinal tract that make it up and which are very different in each portion of the intestine; to mention a few, in the esophagus Zenker's diverticulum, in the small intestine the duodenal diverticula or Meckel's diverticulum, or the anecdotal massive intestinal

diverticulosis, and finally in the stomach or colon, where the two types of diverticula (false/true) can occur alone or together. [14, 15] Their physio pathogenesis is unknown to date, it is believed that they are formed in an acquired way by an increase in pressure within the large intestine due to the lack of hydrophilic fiber in the intake of food, [16] this pressure is given by the effort to defecatory act (due to constipation or some syndrome of obstruction to the exit) which pushes through the weakest areas of the mucosa (inner layer). right where the blood vessels pass through it; [17] on the other hand, they have been described as congenital of the digestive tract elsewhere in the literature. [18]

OBJECTIVE

To present the experience of seven years in diagnosis and treatment, in a study of four hospitals in Mexico City. In addition, an analysis of the research of the national and international medical literature on colon fistulas is carried out.

METHOD

It is a study with a multicenter, retrospective, longitudinal, observational and descriptive design. In the Colon and Rectal Surgery services, as well as General Surgery of the second and third level of health care, in Mexico City:

- "Dr. Belisario Domínguez" Specialty Hospital of Mexico City of the Ministry of Health. Mexico City. Country: Mexico. 3rd level
- "Dr. Rubén Leñero" General Hospital of the Ministry of Health. Mexico City. Country: Mexico. 2nd Level.
- Metropolitan Hospital of Mexico City. Grupo Ángeles. Mexico City. Country: Mexico. 3rd Level.
- "Xoco" General Hospital of the Ministry of Health. Mexico City. Country: Mexico. 2nd Level.

In a study period that spanned from July 2018 to July 2025. The following were evaluated: age, sex, clinical picture, associated chronic-degenerative diseases, etiology of fistulas, time of medical attention for surgical treatment, location and anatomical extension of the colon, types of treatments with or without surgical intervention, surgical time, morbidity and mortality. In addition, an analysis of the research of the national and international medical literature on what is described in relation to colon fistulas is carried out.

RESULTS

A total of 118 records were reviewed where a total of 46 patients with colon fistula were chosen, of which 17 were male (36.95 %) and 29 cases were female (63.04 %). With an age range of 21 to 82 years, with an average of 61 years and a bimodal value of 33 and 64 years. Its etiology was diverse, but its presentation was documented as entero-cutaneous, entero-bladder, entero-vaginal, entero-uterine, entero-enteric fistulas.

Regarding the comorbidities, factors and associated previous diagnoses are detailed in table 1; the most frequent comorbidity was diabetes mellitus with 9 patients (19.56%), in second place obesity with a BMI equal to or greater than 30 present in 6 subjects (13.04%), systemic arterial hypertension was the third comorbidity in 5 people (10.86%). In terms of risk factors, alcoholism and smoking were the two most frequent. Likewise, other drug dependencies to cannabis and the "stone" were detected. It is necessary to clarify that the same patient may have

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had one or more comorbidities. All the morbidities together added together give a total of 23 that represent 50% of the group under study, but adjusted their incidence is only reduced to a percentage of less than 20%. This results in having control of the patient of chronic-degenerative diseases, since it is a complex surgery, mostly urgent/priority and with factors against it such as severe acute malnutrition, anemia, hydro electrolyte imbalance, infectious process and others, which undermine or alter uncontrolled and affect the recovery, healing, rehabilitation or cure of the patient.

Table 1: Comorbidities in Patients with Colon Fistula. Multicenter Study from 2018 to 2025, Expressed in Number and Percentage.

Comorbidity	Number	Percentage
Diabetes Mellitus	9	19.56 %
Arterial Hypertension	5	10.86 %
Chronic Obstructive Pulmonary Disease	1	02.17 %
Bronchial Asthma	1	02.17 %
Obesity	6	13.04 %
Inflammatory Bowel Disease	1	02.17 %
Total	23	100 %

Regarding its anatomical location of the colon fistula, it will be determined by its base/etiological disease that causes it, or the previous surgical procedure. Most colon fistulas are complications of another surgery due to surgical pathology. In principle, its incidence is low due to the caliber or diameter of the large intestine, this is where the resilience of the presence of a foreign body wreaks havoc or the same inflammatory and infectious process that manages to perpetuate it. [19] Table 2 tabulates the etiologies of colon fistulas. It should be clarified that perforation is not a fistula, the latter must meet the minimum defining requirements in time more than 9 days, in having a path already formed and in having epithelium at both ends. [1, 20]

Table 2: Etiology of Patients with Colon Fistula in the Multicenter Study from 2018 to 2025 Expressed in Number and Percentage

Etiology	Number/%
Complicated Acute Appendicitis	08/17.34
Complicated Diverticular Disease	11/23.91
Colon Injury From A Firearm Projectile	09/19.56
Stab Colon Injury	07/15.21
Colon/Rectal Cancer	05/10.86
Inflammatory Bowel Disease	02/04.34
Other	04/08.69
Total	46/100

The highest incidence of colon fistula is because the patient has undiagnosed diverticular disease, which spontaneously and suddenly presents a clinical and infectious symptomatology of another nature or not correlated in the first instance with the colon or rectum; however, it is immediately classified as complicated diverticular disease, reaching up to 24%. The second most frequent cause is the patient attacked by third parties with a projectile from a penetrating firearm in the abdomen, which meets the criteria of an exploratory laparotomy and is

complicated by a colon fistula with a frequency of 19.56%, in third place acute appendicitis complicated with perforation and intense infectious and inflammatory process of the cecum; the numerical differences of these three etiologies are due to the minimum value of 1 patient between the two patients. The impact value will be adjusted for the total statistics in the time stipulated in the study. With an approximate value of colon fistula in complicated diverticular disease: from 3 to 12%. [21, 22] Colon fistula from gunshot projectile injury to the colon: 5% to 11%.[23] Colon fistula due to complicated acute appendicitis of 0.03% to 0.2% or not reported. [24]

On the other hand, colon fistulas will be classified according to the organ involved, this will determine the behavior that is conservative or failing that, a passive/aggressive surgical intervention, which at the same time the etiology tends to be a reliable component in this decision. In this work, the type of colon fistula to the organ that communicates is specified. Described in **table 3**.

Table 3: Classification of Colon Fistula by Organ and By Pathology in a Multicenter Study from 2018 to 2025. In Number and Percentage

Type Of Fistula / Etiology	Number/%
Colon-Vegija/Diverticular Disease-Stab Wound	6 /13.04
Colon-Pile/Diverticular Disease-Gunshot Projectile Wound-Stab Wound-Acute Appendicitis	31 /67.39
Colon-Stomach/Gunshot Wound	2 /04.34
Colon-Small Intestine/Gunshot Wound	2 /04.34
Colon-Vagina/Previous Gynecological Surgery For Cervical Cancer-Divericular Diseas Obstetric Trauma	3 /06.52
Other	2/04.34
Total	46/100

Colo-cutaneous fistula is the one with the highest incidence since it reaches values of up to 67.39%, its etiology is diverse, although its appearance is mostly unnoticed and this is very characteristic, since it can be asymptomatic and spontaneous or through surgical drainage in the postoperative period or in the surgical wound itself; some patients have also been described with little or minimal pain in the abdomen. The characteristic of Colo-cutaneous fistulas is the low output, the characteristic stench and the appearance that resembles fecal matter. Its perpetuity will depend on specific/exclusive physical conditions. Within this group, the most frequent is Colo-cutaneous fistula secondary to a surgical procedure, in the first place the picture of complicated acute appendicitis, in the second place the one after an exploratory laparotomy and the last and extremely rare is due to the complicated diverticular disease that due to its chronicity is of a very benign clinical behavior, to call it that. See figure 1.

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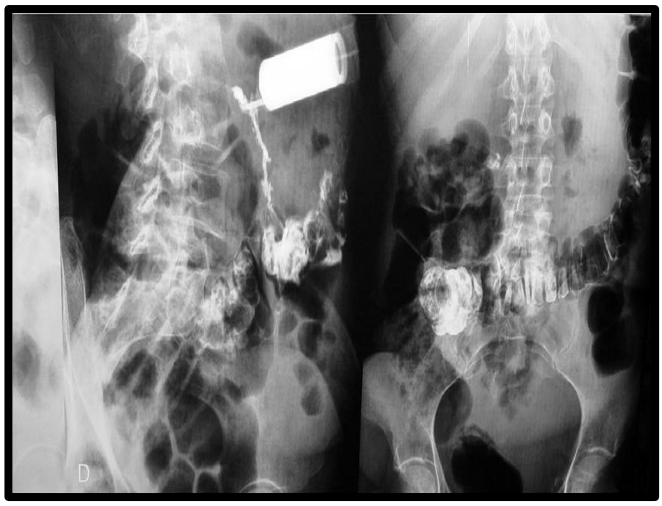

Figure 1: Evidence of a colocutaneous fistula secondary to abdominal surgery. Figure/Image taken from: Coelho, Júlio Cezar Uili & Gomes, Guilherme & Macedo, Júlio. (2010). Colonoscopic treatment of colocutaneous fistula with collagen plug. ABCD. Arquivos Brasileiros de Cirurgia Digestiva (São Paulo). 23. 135-137. [25]

The second most frequent fistula is Colo-vesical with a value of 13% and in most of them it is due to complicated diverticular disease, in this scenario the urinary infectious symptoms are a triggering pathognomonic with fecal urinary, pneumaturia, which together with the typical signs and signs of a urinary infectious picture. This presentation of fistula requires priority, preventive and curative treatment, extremely well planned and consequently staggered in the processes of comprehensive medical and especially surgical management. See figure 2.

Figure 2: Cross-sectional computed tomography shows an inflammatory process of the dome and an air bubble inside. Figure/image taken from:Castillo C Octavio, Rodríguez-Carlin Arquímides, Campaña V Gonzalo, Pérez C Alberto. Fístula colovesical secundaria a enfermedad diverticular: cirugía laparoscópica selectiva. Rev Chil Cir. Junio de 2012; 64(3): 278-281. [26]

This type of fistula involving the bladder becomes an exponential accelerator for irremediable kidney injury (such as renal abscess, emphysematous pyelonephritis, etc.) or for sepsis that can evolve into shock with a high risk of death.

Thirdly, colon fistulas involving the uterus or vagina, where by anatomy it is difficult to include the colon, but if by conformation the rectum is common, however, it is not exclusive; this is extremely rare but it has been documented both in complicated diverticular disease, as well as in obstetric trauma or in cervical cancer that due to its extension by contiguity this pathological anomaly is possible. See figure 3

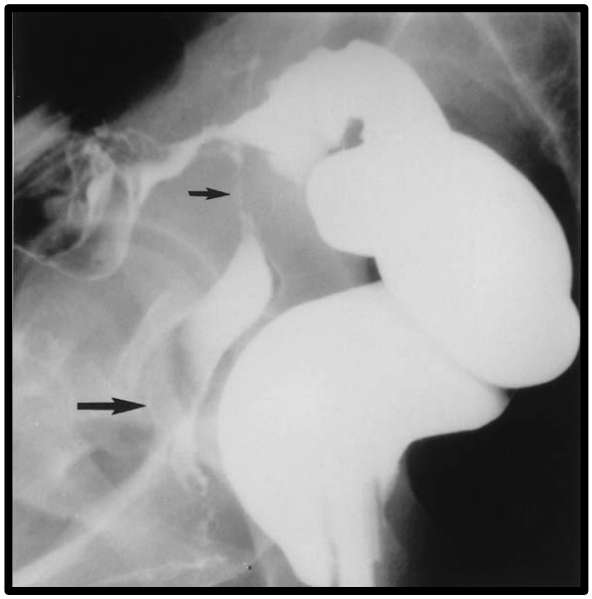

Figure 3: Colovaginal fistula using a self-expanding metal stent

Extracted Figure/Image de: Arjun R. Jeyarajah , MA, MRCOG·John H. Shepherd , FRCS, FRCOG·Peter D. Fairclough , doctor en medicina, MRCP·Stephen E. Patchett , MD, MRCPIEffective palliation of a colovaginal fistula using a self-expanding metal stent Jeyarajah, Arjun R. and others. Gastrointestinal Endoscopy, Volume 46, Issue 4, 367-369. [27]

It is unlikely that there are colon-enteric or colon-gastric fistulas, however, one should not stop being skeptical and never stop having the suspicion; that is why to comply with the protocol of the phases of Chapman and Sheldon as a protocol guide in the management of these patients. [20] Medical care in hospitalized patients was immediate, and in outpatients a protocol and scheduled surgical management were initiated with high priority. 76% of the patients, who are 35 cases, were given surgical treatment, most of whom underwent intestinal resection after colon preparation with an intraluminal antibiotic scheme (erythromycin or neomycin) and a mechanical one, with a Nichols-Condom scheme [26] and prophylactic antibiotic therapy, fistulectomy and omen tum patch in the bladder, intestine, stomach and uterus. For logical reasons, all types of infection caused by the presence of the colon fistula are mitigated and the nutritional status of the patient and hemoglobin for the scheduled surgical event are reacted. The average surgical time was 195 minutes, and the reported bleeding was varied, but the mean was documented at 150 milliliters. The remaining 11 cases were offered conservative management. The results were successful where closure and complete cure of the pathology

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were achieved in 100% of patients. No mortality was reported, and morbidity reached 18% where adjusted mortality only occurred in 2 patients: urinary tract infection in one of them and surgical wound infection in the other. All patients with no recurrence and/or any complications were followed up for up to six months, with definitive discharge without sequelae.

DISCUSSION

The diagnosis of colon fistula is made with a complete medical history, which is mostly clinically evident, where the classic triad (pain in the left lower quadrant, altered bowel habits, and fever) is present only in a minority of patients with acute diverticulitis, or was a previous transient condition (history of diverticulitis), but, on their own, they are not specific. [27] The gold standard for confirming a diagnosis of acute diverticulitis and evaluating complications is contrast-enhanced computed tomography of the abdomen, with excellent diagnostic yield, 99%–100% specificity and 98%–99% sensitivity. [28, 29] Rectal contrast tomography (with three or four contrasts) is generally not used in the acute setting because of its invasive nature and limited value that does not increase. However, it may be useful in selected cases to evaluate colonic fistulas after episodes of diverticulitis. [30] Ultrasound and magnetic resonance imaging offer radiation-free alternatives. Ultrasound is a cost-effective option, but its diagnostic accuracy is highly dependent on the operator and may be limited in overweight or obese patients. Magnetic resonance imaging is less sensitive to extraluminal gas, but it can help distinguish diverticular stenosis from cancer. [31, 32]

Fistula formation in diverticular disease is usually due to an unresolved abscess, which functions as a natural mechanism for the body to drain infection. Colossal fistulas are the most common type, accounting for approximately 65% of all diverticular fistulas, followed by Colo-vaginal fistulas, accounting for about 25%, especially in women with a history of hysterectomy. In fact, diverticular fistulas are responsible for 75% to 86% of Colo-vesical fistulas. [33, 34, 35] Colo-vesical fistulas are evidence of a slightly minor possible complication of diverticular disease of the colon, as they represent a complex condition due to the possible and unexpected evolution to septic shock with a high risk of mortality, which is why surgical management is imminent. [36] Contrast-enhanced computed tomography is the preferred diagnostic modality, demonstrating high diagnostic accuracy ranging from 61% to 100%. [37] Water-soluble contrast can sometimes delineate the fistula path, but sensitivity is limited, with successful visualization in up to 64% of cases. [38] Gallbladder fistulas are left by connecting primarily to the duodenum (in 83.3% of cases) and the colon (in 24.5%). Clinical and pathological features are reported, with a single case of a cholecystoduodenocolic and gastrocolic fistula combined with a common hole in the colon. [39] In most patients, diverticulitis is uncomplicated. Only 12% have complications, such as perforation, abscess formation, stenosis or Colo-vesical fistula, where this study investigates the diagnostic yield of cystography after sigmoid resection of a diverticular Colo-vesical fistula and its influence on the postoperative evolution. In addition, a comparative analysis of diverticulitis with and without Colo- vesical fistula is performed. [40] There are cases in which cystography reveals a Colo-vesical fistula and colonoscopy reveals multiple diverticula in the ascending colon and sigmoid colon, where a fistulous opening is barely visible about 20 cm from the anus in the sigmoid colon. [41] Fistula requires anatomical definition of the fistula and distal extension of the rectum with respect to the coccyx prior to subsequent sagittal anorectoplasty. Previously, contrast Colo-sonography has been validated as a safe, reliable and accurate technique for preoperative characterization,

allowing an early prognosis, correct surgical planning and comprehensive advice to be obtained. [42]

Not only is complicated diverticular disease not only the cause of colon fistulas, it has also been documented that the ingestion of foreign bodies in children is not uncommon among accidental childhood injuries. 80%–90% of ingested foreign bodies can pass through the gastrointestinal tract on their own, and less than 1% can cause very serious complications requiring surgical intervention or fistula formation/perpetuity. [43, 44] On the other hand, there are erroneous beliefs by some physicians that ileal reservoir fistulas, performed by proctocolectomies both for chronic non-specific ulcerative colitis that cannot be coerced/without response to medical treatment, or in patients with familial adenomatous polyposis: are due to Crohn's disease and not due to poor post-surgical technique or adverse conditions of the patient both in the vagina and skin in an intersphincteric tract. [45] Also, there are pathologies such as Takayasu's arteritis that associated with Crohn's disease occur with entero-enteric fistulas, which are extremely rare, a colon to jejunal fistula with gastrointestinal and vascular symptoms is documented. [46] Likewise, the presence of gastro-colic fistula has been reported, which is defined as an abnormal pathological connection between the epithelialized mucosal layers of the stomach and the large intestine, most commonly between the greater curvature of the stomach and the transverse colon, causing chronic diarrhea, severe malnutrition and therefore significant morbidity. [47]

It should be noted that there are fistulas from the colon to the blood vessels. As in the most frequently described aorto-enteric fistula, between the abdominal aorta and the third portion of the duodenum. Historically, it has been described as a rare post-surgical complication of an aortic aneurysm, but it has also been observed in endovascular repairs; such as endovascular aortic repair and spiral repair of the left hypogastric artery due to aneurysm, causing a fistula between the sigmoid colon, by sigmoidectomy due to diverticulitis and the left hypogastric artery; or what has been described in the formation of a collateral fistula has been described after an esophagectomy and an enteric reconstruction with colon interposition. It must be stressed that this type of fistulas from the colon to a blood vessel are post-surgical and not native or spontaneously acquired. [48, 49]

Another type of fistula originating from another cause is the so-called spontaneous fistulization of pancreatic collections to the colon, due to a rare complication of acute pancreatitis, reporting an incidence of less than 3% and high morbidity and mortality. [50] Or because it is so anecdotal, the Colo-pleural fistula has been published remotely in isolated cases, which is mainly due to abdominal processes, confirming the radiological diagnosis of its existence. [51] Fistulas affecting the female reproductive tract, especially between the colon and fallopian tubes, are extremely rare. Tub-enteric or Colo-salpingeal fistulas have been described in fewer than 50 cases, and bilateral contrast salpingeal transit has only been published twice globally. [52]

What are the treatment alternatives for colon fistulas to another organ, varies according to the case, the clinical conditions and/or their prognosis of cure according to the Chapman and Sheldon stages; of a successful conservative management or treatment in hemodynamically stable patients, [1, 50, 53] offering a less invasive alternative in selected clinical scenarios, or even fecal transplants in patients with complicated diverticulitis. [54] Surgical intervention

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remains the definitive treatment for symptomatic or complicated fistulas. [55] Therefore, surgery is recommended. The laparoscopic approach has proven to be viable and safe for fistulizing diverticulitis, although it has revealed a conversion rate of 36% to traditional surgery due to the resilient incoercible inflammatory process.[56] Other nonsurgical therapeutic alternatives after sterility of the fistulous canal and regression of the empyema or intra-abdominal collection, the fistulous canal is closed with fibrin glue. [51] It has also been possible to treat with colonic stent placement plus vascular plug for gastrocolic fistula, so gastroscopy showed complete expansion of the vascular plug into the fistula canal with fistula closure, which is completely successful even at follow-up. [57] Or, on the contrary, endoscopic use of stents can be combined with surgery for partial healing at first and later definitive with surgery, which improves the conditions of the patient with an enteric fistula. [58] Minimally invasive or laparoscopic repair of colon to bladder, colon to skin, colon to vagina fistulas, among others, was associated with shorter hospital stays than open surgery, with no significant differences and fewer major complications. [59] The surgical resource of choice for patients with colon fistulas is currently the only one that is resolute, safe, effective, and has long-term or permanent results. Regardless of the conventional, laparoscopic or even robotic approach. [60]

CONCLUSIONS

The fistula of the colon to other organs such as skin, bladder, small intestine, stomach, blood vessels among many others is very different from the perforation of the organ (colon) or in the erroneously called enteroatmospheric.

The study and protocol of any colon fistula must comply with the Chapman and Sheldon phases, as this will allow an adequate diagnosis and correct treatment.

The treatment of colon fistulas will be conditioned according to each patient, by the hemodynamic status, the etiology of the fistula, the characteristics of nutrition/infection and of course the surgeon's expertise, as well as the infrastructure of the installed capacity.

Conflict of Interest

The authors stated that they had no potential conflicts of interest regarding the research, authorship, and/or publication of this article.

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