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CLINICAL CASE

Septic pylephlebitis secondary to appendicitis

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KEYWORDS
Pylephlebitis;
Thrombolysis;
Thrombectomy;
Portal vein;
Nutritional therapy

Abstract

Background: Pylephlebitis is secondary to intraabdominal infectious processes, especially appendicitis and diverticulitis. Although its incidence has decreased from the advances in surgical techniques and the rational use of antibiotics, mortality remains high, especially due to complications, which include venous intestinal ischemia, sepsis and malnutrition.

Objective: We report a case of septic pylephlebitis managed with a combination of thrombectomy, thrombolysis, anticoagulation and nutritional support.

Clinical case: Five days after undergoing laparoscopic appendectomy, a 36-year-old man was admitted to the hospital because of fever, diffuse abdominal pain, abdominal distension, ileum, and shock. Exploratory laparotomy was conducted, finding diffuse intestinal ischemia. Angiography showed thrombosis of the portal and superior mesenteric veins. The patient underwent thrombectomy, thrombolysis, anticoagulation and mixed nutritional support. Complete recanalization as well as reversion of the intestinal ischemia was achieved.

Conclusions: Early diagnosis of septic pylephlebitis and its management including thrombectomy, thrombolysis, anticoagulation and mixed nutritional support are critical to reverse secondary intestinal ischemia and to promote intestinal viability.

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PALABRAS CLAVE
Pileflebitis;
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Vena porta;
Terapia nutricional

Pileflebitis séptica secundaria a apendicitis

Resumen
Antecedentes: La pileflebitis es secundaria a cuadros infecciosos intraabdominales, en especial apendicitis y diverticulitis. A pesar de que su incidencia ha disminuido a partir de los avances en las técnicas quirúrgicas y del uso racional de antibióticos, su mortalidad sigue siendo elevada, en especial por sus complicaciones, de las que destacan la isquemia venosa intestinal, la sepsis y la desnutrición.
Objetivo: Presentar un caso de pileflebitis séptica manejada con trombectomía, trombolisis, anticoagulación y terapia nutricional.
Caso clínico: Enfermo de 35 años, que presentó al quinto día del postoperatorio de apendicectomía laparoscópica cuadro caracterizado por: dolor abdominal epigástrico, distensión abdominal, fiebre, náusea y vómito, y choque, por lo que se realiza laparotomía exploradora con datos de isquemia intestinal difusa. La angiografía mostró trombosis de la porta y mesentérica superior, por lo cual se realizó trombectomía y trombolisis a través de un catéter portal con recanalización completa. El manejo nutricional fue a base de terapia nutricional parenteral y nutrición enteral.
Conclusiones: El diagnóstico temprano de pileflebitis séptica y el tratamiento oportuno a base de trombectomía, trombolisis, anticoagulación y terapia nutricional mejora de manera significativa la perfusión intestinal y la sobrevida.

Background

According to Baril et al.[1] septic thrombosis of the portal vein or pylephlebitis was first described in 1846 by Waller as a complication of acute appendicitis. In 1886, Fitz described 11 cases from 247 acute appendicitis. Pylephlebitis is secondary to intraabdominal infectious processes, especially appendicitis and diverticulitis. Even though its incidence rate has decreased to 0.05% due to advances in surgical techniques and the rational use of antibiotics, mortality remains high, especially because of its complications, which include venous intestinal ischemia and sepsis[2,3].

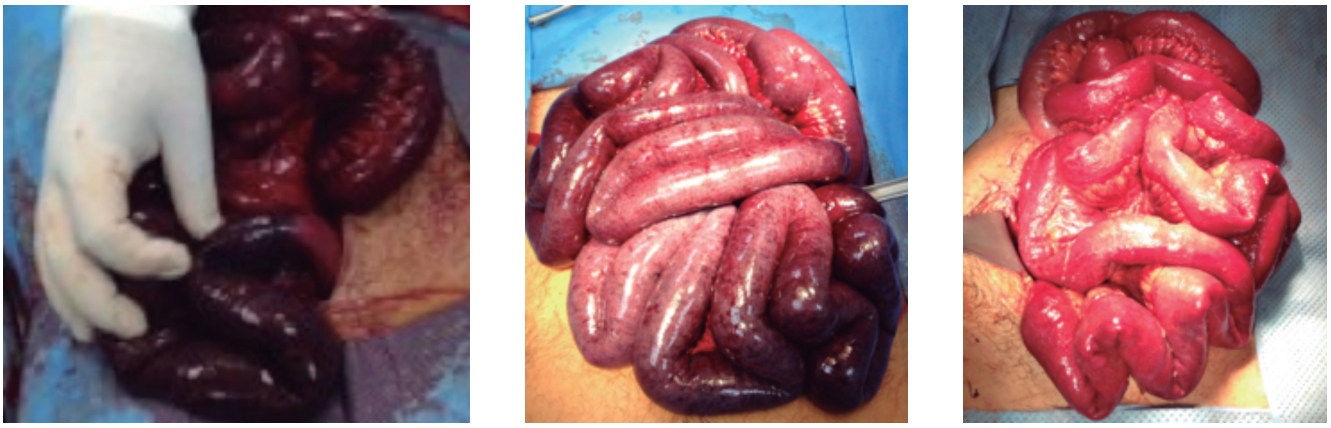
The aim of this paper is to expose a case of septic pylephlebitis secondary to appendicitis, highlighting the importance of treatment based on thrombectomy, thrombolysis, anticoagulation and the importance of nutritional therapy as an essential part of treatment.

Clinical case

Five days after undergoing laparoscopic appendectomy, a 35-year-old man was admitted to the hospital because of diffuse abdominal pain, abdominal distension, fever, nausea and vomiting. Of interest from his laboratory tests was leukocytosis of 16,400 due to neutrophils and bands (0.2 x 10^3/µl), platelets 135,000 and lactate 4 mmol/l. In the plain computed tomography (CT) for the abdominal area, 9 x 5 x 11 cm plastron was observed located in the right iliac fossa and ipsilateral paracolic gutter. During his stay in the emergency department, the patient presented haematochezia accompanied by tachycardia, hypotension and tachypnea, such that he was moved to the intensive care unit with a diagnosis of severe sepsis. Resuscitative measures were initiated based on recommendations from the Surviving Sepsis Campaign. Cultures were taken and antimicrobial therapy was started. An exploratory laparotomy was performed where intestinal distension and a diffuse and extensive ischemia with involucre of virtually the entire small bowel was found. It was therefore decided to terminate the surgical procedure and in the immediate postoperative period an angiographic study was conducted where thrombosis of portal and superior mesenteric veins was observed. Given these findings a thrombectomy was carried out, obtaining abundant clots; subsequent to that thrombolysis and anticoagulants were administered through catheter in the superior mesenteric and portal veins for 24 h.

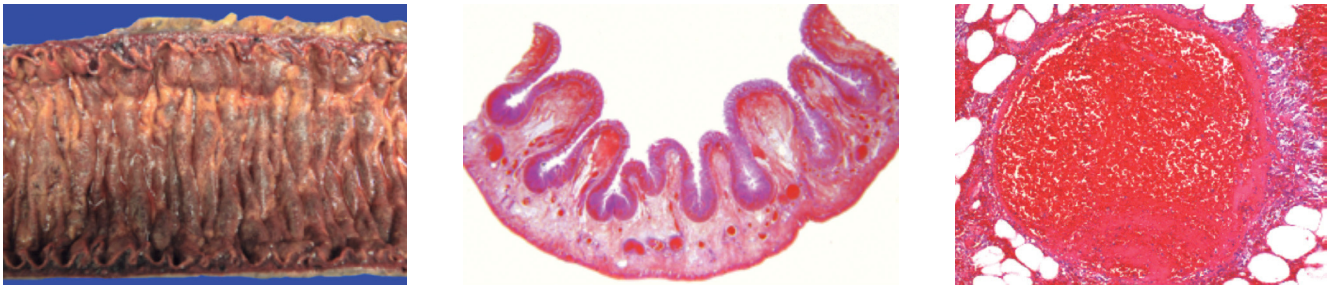
At 24 h of infusion a second laparotomy was conducted where a significant improvement in the intestinal perfusion was observed, so the decision was made to continue with the infusion of thrombolytics and anticoagulants in order to limit as much as possible the ischemic/necrotic segment. In this second intervention an open abdomen technique with Bogota bag was chosen. In a new angiographic study carried out after 24 h, partial recanalization of the superior mesenteric and portal veins with the presence of flow was observed, which is why the decision to perform another surgical exploration was taken where a significant improvement in perfusion and intestinal viability was observed. Necrosis was limited to a jejunal segment of 40 cm, which was resected by enteroanastomosis (Fig. 1).

The vascular catheter was removed and the infusion of thrombolytic and anticoagulant was suspended to continue treatment with low molecular weight heparin at doses of 60 mg subcutaneously every 12 h. The histopathological examination of the surgical specimen reported small bowel wall with panmural ischemic necrosis and recent thrombosis in the mesenteric vessels (Fig. 2). A control TC was performed where the changes observed were compatible with cavernous transformation of the portal vein (Fig. 3).



A B C

Figure 1 Findings from the exploratory laparotomy where the following was observed: A) Extensive intestinal ischemia. B) Improvement in intestinal perfusion after thrombectomy and infusion of thrombolytic and heparin, with jejunal necrotic area. C) Intestine with normal perfusion after 48h of infusion of thrombolytic and heparin, where the jejunal segment resection was performed.



A B C

Figure 2 Histopathology of resected specimen where the following was observed: A) Macroscopic image of the oedematous small bowel and necro-haemorrhagic appearance. B) Small bowel wall where villi haemorrhage, oedema and multiple thrombodesi can be seen. C) Blood vessels with thrombus.

B

Figure 3 Angiotomography where the recanalized portal vein with perfusion defects in its interior compatible with cavernous degeneration can be seen (arrow).

The results of the immunological profile and determination of protein C, S and antithrombin III were normal or negative.

Once the patient was stable, parenteral nutrition therapy was initiated, calculating a dose of 35 kcal/kg/day with a 110:1 ratio. The amino acids administered were a combination of branched chain amino acids and crystalline, in a 1:2 proportion. The administration began with a third of the calculated requirements and was increased to a full dose according to tolerance at a ratio of 130:1. The mixture was enriched with omega-3 fatty acids, glutamine, albumin, selenium and trace elements. Nutritional therapy was closely monitored to prevent the occurrence of refeeding and hyperglycaemia syndrome. Once ileus was resolved and the permeability of the intestinal anastomosis was verified, enteral feeding was initiated based on an elemental diet enriched with glutamine dipeptide. Tolerance was adequate, so parenteral and enteral nutrition were progressively decreased to initiate oral feeding.

Discussion

Septic pylephlebitis is a rare complication that occurs following an intra-abdominal infectious process, especially acute appendicitis, which has also been associated with diverticulitis, acute cholecystitis, cholangitis and intra-abdominal abscesses. Its clinical presentation and evolu-

tion depend on the degree of thrombosis of the portal vein and its branches, with a clinical spectrum ranging from asymptomatic patients to portal hypertension and septic shock[4,5].

Pylephlebitis is a complex process in which the intra-abdominal infectious source allows passage of endotoxins and bacteria into the portal circulation which, upon contact with the endothelium and due to activation of tissue factor, induces a prothrombotic state that conditions thrombosis in the portal vein and its branches. The most frequently isolated microorganisms are *Bacteroides fragilis,* followed by aerobic gram-negative bacilli such as *Escherichia coli* and aerobic streptococci[2,3,5]. The high incidence of bacteremia by *Bacteroides* in patients with pylephlebitis suggests that the thrombogenic nature of the micro-organism plays an important role in the pathogenesis of septic thrombophlebitis. The heparinases produced in the cell wall of *Bacteroides* are responsible for the development of the localised thrombosis[5].

Risk factors for the development of this entity are divided into local and systemic. Within the localisations, malignant tumours and liver cirrhosis should be ruled out. Systemic factors are hereditary prothrombotic disorders such as mutation of factor V Leiden, mutation of the prothrombin gene and deficiencies in protein C, protein S and antithrombin III[6].

The diagnosis of pylephlebitis is based on clinical suspicion and imaging studies. Doppler ultrasound was performed at the patient's bedside and allowed assessment of the portal vein system flow, thus facilitating the diagnosis and evaluation of the degree and extent of the thrombosis[6]. The most common ultrasonographic image is the presence of hyperechogenic material within the lumen of the portal and superior mesenteric vein. It also facilitates monitoring and assessment of the recanalization of the portal vein and/or its evolution in the portal cavernomatosis[7]. Another useful study is a CT with contrast dye, which in addition to diagnosing and evaluating the extent of pylephlebitis helps to identify the presence of abdominal infectious sources and liver abscesses[6,7]. Treatment of pylephlebitis is based on management of sepsis through antibiotics and draining collections. In cases of extensive venous ischemia such as the one presented by the patient, surgical resection is a therapeutic option, but different studies have shown it to be associated with high morbidity and mortality, which is why new therapeutic options have been developed and implemented. Thrombolysis, thrombectomy and anticoagulation are of interest, especially if implemented at an early stage with the aim of promoting recanalization and flow of the portal vein system, which improves splanchnic and hepatic perfusion avoiding venous congestion, with the consequent decrease in the risk of mesenteric venous thrombosis[8-10].

Moreover, enteral nutrition is the recommended nutritional treatment for the severely ill patient, provided their gastrointestinal tract is functioning. Enteral nutrition is associated with a lower rate of complications than parenteral nutrition and is less expensive. However, enteral nutrition does not often meet the caloric requirements of critically ill patients. It is known that suboptimal nutrition and acute malnutrition are associated with a higher prevalence of infection, longer duration on mechanical ventilation and death in severe patients[11].

At various stages of the patient's clinical evolution the simultaneous use of enteral and parenteral nutrition is frequent. This type of nutrition is associated with better compliance of caloric objectives when they are difficult to meet due to digestive intolerance or metabolic problems[12].

Mixed nutrition can be administered in the following ways: *a)* orally + peripheral parenteral nutrition; *b)* enteral nutrition by catheter + peripheral parenteral nutrition; *c)* enteral nutrition by catheter + central parenteral nutrition, and *d)* orally + central parenteral nutrition.

According to the guidelines of the European Society of Parenteral and Enteral Nutrition (ESPEN), any patient who does not supplement their requirements within 2 days of receiving enteral nutrition exclusively should receive supplemental parenteral nutrition, with grade C evidence[13]. In contrast, American and Canadian guidelines recommend starting enteral nutrition early in patients without malnutrition and waiting for at least a week to supplement parenteral nutrition if needed[14].

Peripheral parenteral nutrition can be used to minimise the risk of placing a central catheter and complications associated with central parenteral nutrition; the disadvantages of this are that it is limited to the administration of nutrients with an osmolality <900 mOsm/l and the total amount of calories and proteins are also limited. It should almost always be administered in combination with enteral nutrition or orally to achieve the total requirements. Some experts recommend associating supplemental parenteral nutrition if, 72 h after admission, a caloric and protein level of at least 60% of the patient's needs are not met[13].

Peripheral parenteral nutrition does not have the risks central parenteral nutrition has because of the catheter, and although the caloric intake that can be administered is lower, it has been shown in many clinical cases that caloric needs oscillate at ~1500 kcal/day and protein needs between 67 and 70 g/day. In critically ill patients it is recommended that the daily caloric intake does not exceed 20-25 kcal/day[13].

The critical patient frequently shows symptoms of gastrointestinal intolerance, which are mainly high gastric residuals, abdominal bloating or pain. The appearance of these symptoms limits enteral nutrition. The benefit of maintaining intestinal tropism is essential for the recovery of critically ill patients, so that even a low caloric intake enterally should be maintained whenever possible. In these cases, supplemental parenteral nutrition is the recommended nutritional therapeutic option[14].

In addition to gastrointestinal intolerance, critically ill patients often begin enteral nutrition until the third day and on the fourth day their caloric intake is <70% of desired levels. If the caloric requirement is not met, the nutritional status of the patient and their clinical situation is compromised. A link between low caloric intake and increased infectious complications in critically ill patients has been established. A contribution of <25% of the calories needed is associated with an increased risk of blood nosocomial infection. An increase in cases of acute respiratory distress, sepsis, renal failure, bedsores and need for surgery is also reported[15]. However, some studies have suggested that the critical patient benefits from a calorie in-

take of between 33 and 66% of the target, with a grade 2B evidence[13].

The EPaNIC (Early Parenteral Nutrition Completing Enteral Nutrition in Adult Critically Ill Patients) study compared early initiation of parenteral nutrition (within 48 h of admission) with late initiation of parenteral nutrition to complete enteral nutrition (8 days). The late start group had more hypoglycaemia and higher C-reactive protein levels. There were no differences in mortality or functional capacity upon discharge[14].

Supplementary parenteral nutrition that was started on day 8 was associated with fewer infections, but with a greater degree of inflammation. Cases that started parenteral nutrition later had a shorter duration of mechanical ventilation and renal therapy replacement, a shorter stay in intensive care and reduced hospital and care costs. This study concludes that starting mixed therapy early is not recommended and that starting later is a good therapeutic option to prevent malnutrition and meet the energy requirement of critically ill patients[14].

Several studies have shown that wound dehiscence and venous catheter infections are frequently observed in patients treated with total parenteral nutrition who receive <90% of their total requirements. Critically ill patients who are treated with total parenteral nutrition but who can receive enteral nutrition of at least 10% of the total show a more favourable clinical evolution than those receiving <10% of their requirement enterally[13].

Other studies have shown that the combination of parenteral nutrition with enteral nutritional improves glycaemic control compared to only using parenteral nutrition. This result suggests that improved glycaemic control is enhanced by the combination of proper insulin secretion and decreased resistance to it. It is likely that the glucose-dependent insulinotropic polypeptide (GIP) and other incretins are responsible. The addition of enteral nutrition improves the integrity of the intestinal mucosa with increased permeability and an increased secretion of GIP, which promotes an increase in the release of insulin-dependent glucose[13].

Heidegger et al.[15] conducted a study on 305 patients in intensive care and divided them into two groups: one with exclusive enteral nutrition and one with supplemental parenteral nutrition. The results showed a benefit with supplemental parenteral nutrition between days 4 and 8 after admission to intensive care. The higher caloric intake of the supplemented group decreased the risk of nosocomial infections, the number of days of antimicrobials and duration of mechanical ventilation in patients without nosocomial infections until day 28.

The TICACOS (Tight Calorie Control Study) study showed that enteral nutrition combined with parenteral nutrition reduced mortality, provided that an adjustment was made to the caloric requirement using indirect calorimetry compared with patients who had no specific caloric targets[17].

Enteral nutrition should always be the first choice for patients' nutritional treatment. In cases where enteral nutrition may not be exclusive, low-volume enteral nutrition (trophic) associated with parenteral nutrition or supplemental parenteral nutrition to reach the caloric target can be useful to feed critical patients[13].

Supplemental parenteral nutrition is included in ESPEN guidelines with grade C recommendation. However, in the American guidelines there are not enough data to support it and it is recommended only when all other enteral nutrition maximising techniques have failed, such as using prokinetic and jejunal access. American guidelines recommend late supplemental parenteral nutrition for patients who do not meet their caloric requirement exclusively with enteral nutrition[13].

The point where the American and European guidelines agree is that energy homeostasis should be the most important priority for the critically ill patient. Both an excessive and insufficiency of energy can be negative for the patient. The National Institute for Health and Care Excellence (NICE) stated that the administration method is not as important as the quality and balance of nutritional therapy that is prescribed[13,15].

Conflict of interest

The authors declare no conflict of interest.

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