Why do i perform sigmoid resection and primary anastomosis in diverticular purulent peritonitis?

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BACKGROUND

Acute diverticulitis is the presentation form of at least 20% of all patients with diverticular disease. In recent years, a significant increase has been detected in the number of emergency hospitalizations due to it.[1-2] The management of this disease requires the use of multiple resources of the health system and a consequent high economic cost.[3] Thirty percent of patients with acute diverticulitis require emergency surgical treatment, and in many cases the approach and type of treatment to be performed is not standardized and continues to be a matter of discussion.[4]

Historically, the most widely used treatment in acute diverticulitis complicated by peritonitis was open resection of the diseased colonic segment, closure of the rectal stump, and a terminal colostomy (Hartmann's procedure). Postoperative results showed up to 50% morbidity and around 15-25% mortality.[5-6]

Over the years and with the development of better diagnostic techniques, postoperative care and minimally invasive therapies, the therapeutic paradigm of this disease has changed.

The classification of the complicated acute diverticulitis devised by Hinchey helps to stratify the severity of the disease.[7] However, no less important is the evaluation of the patient's clinical status, co-morbidities and hemodynamic status, as well as the treating team experience in making the decision about the treatment to be performed. There is consensus that clinically stable patients presenting with Hinchey I or II diverticulitis can be effectively treated conservatively.[8] Those with localized abscesses can be drained percutaneously, avoiding emergency surgery in most cases.[9-10] On the other hand, patients presenting with generalized fecal peritonitis (Hinchey IV) require emergency resection. However, in the case of patients with generalized purulent peritonitis (Hinchey III) the treatment of choice is controversial and the following therapeutic options are discussed: Hartmann's procedure (HP), resection with primary anastomosis (RPA) with or without a protective stoma, and laparoscopic peritoneal lavage (LPL). The first two procedures, in turn, through conventional or laparoscopic approach.

In the Hospital Alemán of Buenos Aires we performed RPA in the vast majority of patients presenting with Hinchey III diverticular peritonitis. This decision is based on the extensive bibliographic evidence that supports RPA when it is correctly indicated, the poor results obtained with HP (over-indicated in many cases), the limited and contradictory evidence of the LPL and the endorsement of our own results. In this editorial we will develop the concepts on which we base our choice.

RESECTION AND PRIMARY ANASTOMOSIS OR HARTMANN'S PROCEDURE?

The decision to perform a primary anastomosis or a terminal colostomy after sigmoid resection in Hinchey III diverticulitis was and will be a matter of discussion. The possible advantages of performing HP would be a shorter operative time and the absence of anastomotic dehiscence risk in the postoperative period. In return, intestinal transit reconstruction is a complex surgery that ends up being performed in only 50-60% of patients.[11-12]

The RPA has the advantage of solving the problem in a single time, avoiding the morbidity and costs of the reconstruction of the intestinal transit. Furthermore, if the RPA is protected with an ileostomy, transit reconstruction is performed in approximately 90% of cases and its morbidity is significantly lower.[13-14]

In the last decade, multiple randomized studies and meta-analyzes have attempted to answer this question and all of them favor the performance of RPA in selected cases[15-21]. For example, the multicenter, randomized LADIES study (DIVA branch) compared 133 patients undergoing HP and RPA[20]. Although there were no significant differences in morbidity and mortality after the emergency operation, the rate of stoma-free patients one year after surgery was significantly lower in the RPA group (RPA: 94.6% vs. HP: 71.7%). Furthermore, morbidity after transit reconstruction (RPA: 8% vs. HP: 30%), morbidity considering both procedures (RPA: 40% vs. HP: 56%) and hospital stay (RPA: 12.5 vs. 14 days) was higher for HP. The study published by Oberkofler et al.[15] and the DIVERTI study[18], both multicenter

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and randomized, presented similar results. A recent meta-analysis published by Gachabayov et al.,[17] which included 4 randomized studies concluded that RPA was associated with better short and long-term results at the cost of longer operating time. The incidence of permanent stoma was 16% with RPA and 35.5% with HP. Furthermore, the incidence of surgical site infection and morbidity after transit reconstruction was significantly higher with HP. Likewise, the meta-analysis by Ryan et al.,[21] found a lower incidence of abdominal sepsis, mayor morbidity and overall mortality after RPA.

Despite numerous publications attempting to demonstrate the superiority of a technique, many studies have selection bias. In non-randomized studies, the most compromised patients (independently of Hinchey's stage) are likely to undergo HP; therefore, the worst results could be due to the clinical situation of the patients and not to the chosen technique. On the other hand, some randomized prospective studies also include Hinchey IV patients. RPA, even in these cases, shows a similar morbidity and mortality to HP[15,16, 20]. In an ideal design in which only Hinchey III patients are included, the benefit of RPA is probably even greater, since HP in these patients is possibly over-indicated. As Binda mentions, conducting the ideal study in this pathology is impractical since many patients are necessary and it is difficult that the surgeons respect the randomization in an emergency situation with high morbidity[22-23].

In summary, the evidence shows a clear benefit in favor of RPA in Hinchey III hemodynamically stable patients. For this reason, the main clinical practice guidelines recommend performing RPA over HP in these patients[8, 24-25].

RESECTION AND PRIMARY ANASTOMOSIS OR LAPAROSCOPIC PERITONEAL LAVAGE?

LPL has gained popularity in the past two decades as a therapeutic alternative in patients with diverticular peritonitis. The advantages of LPL are the benefits of the minimally invasive approach and avoiding the morbidity of intestinal resection, the eventual need for a stoma and its subsequent reconstruction. Various series have demonstrated its feasibility, safety and effectiveness in selected patients, achieving sepsis control and low rates of mortality, ostomies and short-term reoperations.[26-29] However, the indication for LPL is currently controversial and raises some questions:

- Is there a standardized LPL technique? As many LPL techniques have been described as there are publications in the bibliography. It is not clear whether or not to look for colonic perforation and how to identify it (endoscopy, pneumatic test, methylene blue). If a perforation is found, it is not standardized what to do with it (perform a resection, suture, suture and epiploplasty, etc.). Furthermore, it is also not defined how much volume of saline solution should be used during the lavage or what is the number of abdominal drains that should be placed.

What is the ideal patient to indicate a LPL? Some of the initial LPL series that showed good results included between 25 and 57% of Hinchey II patients, in which there is consensus that they can be treated conservatively.[26, 29]

On the other hand, in those patients in whom perforation is identified, LPL failure is significantly greater as shown by one of the largest recently published multicenter studies.[28] It would seem, then, that the ideal patient to perform a LPL is one who presents with Hinchey III peritonitis and is hemodynamically stable, although some inclusion criteria such as the presence or absence of perforation and the standardization of the technique are not yet clarified.

Is it logical to compare LPL with conventional HP? The DILALA study randomized 43 patients to LPL and 40 patients to conventional HP and concluded that LPL is a better option due to a lower risk of reoperation at one and two years, a lower frequency of permanent stoma and similar mortality.[30-31] It is controversial that the main objective of this study was to assess the reoperation rate at one year after LPL or PH, since the latter option always implies a new operation to reconstruct the intestinal transit. Furthermore, comparing LPL, a recommended mini-invasive procedure for selected Hinchey III patients, with a conventional operation performed on subjects with fecal peritonitis or seriously ill patients would not appear to be correct.

Is there sufficient evidence to recommend LPL over RPA? Unlike the DILALA study, two prospective randomized studies and various meta-analyzes comparing LPL with emergency sigmoidectomy have shown a greater incidence of reoperation and intra-abdominal abscesses with the use of LPL.[32-39] For example, the LOLA branch of the LADIES study that randomized patients to LPL and sigmoid resection had to be terminated prematurely due to a higher incidence of adverse events (80% vs. 23% $p = 0.0005$), mainly reoperations (40% vs. 5% $p = 0.0011$) in the LPL branch.[33] Furthermore, the combination of higher morbidity and 30-day mortality was significantly higher for LPL (39% vs. 19% $p = 0.04$). However, at 12 months it was similar between both groups (67% LPL vs. 60% sigmoidectomy, $p = 0.58$).

On the other hand, the SCANDIV study randomized 199 patients (in the preoperative period) to LPL or sigmoidectomy.[34] The sigmoidectomy could be an HP or a RPA with or without a protective stoma according to the

surgeon's decision, but those patients with fecal peritonitis or evident perforation were always submitted to HP (regardless of the preoperative randomization). The primary objective was to evaluate severe complications at 90 days. The authors found no difference in the frequency of severe complications (30.7% LPL vs. 26% Sigmoidectomy, p = 0.5). However, when the results were analyzed excluding the Hinchey IV patients, the LPL group had a higher frequency of deep infections (32% vs. 13%, p = 0.006) and reoperations (20% vs. 6%, difference 14.6 %, 95% CI: 3.5% -25.6%, p = 0.01). The main causes of 90-day reoperation in the LPL group were secondary peritonitis (6 cases) and sigmoid colon carcinoma (4 cases) undiagnosed at the time of lavage. The oncological evolution of a perforated carcinoma not resected at the time of the LPL leaves one more question about this procedure. Similarly, a recent meta-analysis that included 569 patients with Hinchey III diverticulitis found a significantly higher frequency of reoperations and secondary peritonitis with LPL compared to sigmoidectomy.[38]

Finally, the prospective multicenter study by Tartaglia et al.,[37] compared 66 patients with perforated diverticulitis undergoing LPL or laparoscopic sigmoidectomy (63% RPA and 27% HP). Although 40% of Hinchey II patients (not eligible for conservative treatment) were included in both groups, the patients who went to LPL needed more reoperations (18% vs. 0%) and had higher postoperative morbidity (33, 3% vs. 18.4%).

As it can be seen that the great majority of the studies attempting to compare RPA and LPL include patients with HP, a procedure which would not be necessary in hemodynamically stable Hinchey III patients. Even including HP, the results favor sigmoid resection over LPL. At the moment, LPL continues to be questioned and discouraged by some of the current clinical practice guidelines.[8,25]

LAPAROSCOPIC PRIMARY RESECTION AND ANASTOMOSIS: INSTITUTIONAL EXPERIENCE

In our center, we consider that the best alternative for hemodynamically stable patients with Hinchey III diverticulitis is laparoscopic RPA. This procedure combines the advantages of the mini-invasive approach and avoids the morbidity of stoma reconstruction. In the event that an ileostomy was necessary (less than 20% of our series), [40] its reconstruction is technically simpler, has less morbidity, and is performed in almost all patients.

In 2019, we published our series of patients with hemodynamically stable Hinchey III perforated diverticulitis in whom laparoscopic RPA was performed without a protective ileostomy.[41] To demonstrate its safety and feasibility, we compared 73 patients undergoing emergency surgery with 278 patients undergoing elective surgery for recurrent diverticulitis. We found a similar postoperative morbidity (28.7% vs. 22.3%, p = 0.27), mortality (1.3% vs. 0%, p = 0.21) and frequency of anastomotic dehiscence (5.4 % vs. 5.7%, p = 0.92) between both groups. The operative time (183 vs. 157 minutes, p <0.001), the conversion rate (18% vs. 4%, p <0.001) and the hospital stay (5 vs. 3 days, p <0.001) were significantly higher in the group of patients operated on for perforation. These differences can be explained as it is an emergency surgery, technically more complex performed in patients with peritonitis. On the other hand, we also describe that emergency laparoscopic RPA in patients with Hinchey III diverticulitis can be performed by residents (supervised) with similar rates of postoperative morbidity and mortality than that performed by a group of general and colorectal surgeons.[40] This is of great importance because it is an emergency pathology, in many centers treated by general surgeons and not by specialists. However, it is necessary to highlight that these results were obtained in a selected population of patients and in a center with experience in laparoscopic colorectal surgery. Likewise, all the surgeons participating in these studies have been trained in the Hospital Alemán and the working characteristics of our service allow for strict postoperative follow-up.

CONCLUSIONS

The management of acute perforated diverticulitis with purulent peritonitis (Hinchey III) continues to be a matter of discussion. The choice of surgical procedure and its results depend on the patient, the surgeon and the center where it is treated. When the patients are properly selected, the laparoscopic approach and the RPA have demonstrated their superiority over the conventional HP and the LPL. Despite the available evidence, a significant proportion of patients continue to undergo HP. This is probably due to the experience of the treating team, the availability of resources and the possibility of clinical and surgical control in the postoperative period.

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