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ORIGINAL ARTICLE

Acute mesenteric ischemia of arterial origin: Importance of early revascularization

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KEYWORDS
Mesenteric ischemia;
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Summary
Goal: The goal of our study was to show that survival was better when early revascularization was performed rather than gastrointestinal resection in the management of acute mesenteric ischemia of arterial origin.
Methods: The reports of patients managed in our center between January 2005 and May 2012 for acute mesenteric ischemia of arterial origin were analyzed retrospectively. Data on clinical, laboratory and radiologic findings, the interval before treatment, the operative findings and the surgical procedures were collected. Follow-up information included the postoperative course, and mortality at 48 h, 30 days and 1 year, the latter being compared between patients undergoing revascularization versus gastrointestinal resection.
Results: Of 43 patients treated during this period, 20 had gastrointestinal lesions deemed to be beyond all therapeutic resources, 13 were treated with gastrointestinal resection without revascularization, while 10 underwent early revascularization. There were no statistically significant differences found in the extent of involvement between the two groups ($P = 0.22$). Mortality at 48 h, 30 days and 1 year was 8% ($n = 1$), 30% ($n = 4$) and 68% ($n = 8$) in patients who underwent enterectomy vs. 0% ($n = 0$), 0% ($n = 0$) and 10% ($n = 1$) in patients who underwent revascularization procedures. The difference at 1 year was statistically significant ($P = 0.02$). At 1 year, two patients in the revascularized group had a short bowel syndrome vs. one in the non-revascularized group.
Conclusion: Acute mesenteric ischemia of arterial origin is associated with high morbidity and mortality. Optimal management should include early revascularization.

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Introduction

Acute mesenteric ischemia of arterial origin is rare, representing one in a thousand emergency admissions [1], but the prognosis remains particularly poor in spite of progress in both medical and surgical management [2].

Diagnosis is notoriously difficult as clinical signs are often lacking and not very specific. Likewise, laboratory findings are not very specific [3]. Radiology, and in particular, angio-CT scan can be diagnostic [4]. However, the absence of signs on imaging does not allow elimination of the diagnosis, especially when these investigations are performed early; diagnosis often requires exploratory laparotomy or laparoscopy. Currently, the optimal therapeutic strategy is poorly defined. Effectively, revascularization is not routinely attempted and the consequences of extensive intestinal resection must be factored into the long-term gastrointestinal functional prognosis.

The goal of our study was to evaluate the management of acute mesenteric ischemia of arterial origin in our University Hospital, and in particular, to study the value of early revascularization on survival.

Material and methods

The records of patients undergoing operation for acute mesenteric ischemia between January 2005 and May 2012 in our unit were analyzed retrospectively. The arterial origin was determined according to information including clinical, radiologic and intra-operative findings. Patients undergoing exploratory laparotomy alone were not excluded. Patients whose ischemia was secondary to mesenteric venous thrombosis or to non-occlusive disease as well as those with only colonic ischemia were not included. Patient records were reviewed to collect clinical and para-clinical data, as well as operative reports and postoperative follow-up information. Short gut was defined as less than 1.5 meters of remaining small intestines after operation. Attending physicians for all surviving patients were contacted in May 2013. Patients who underwent revascularization were compared with patients who underwent surgery but without revascularization. Univariate analysis was performed with the Wilcoxon and Fisher tests. Statistical significance was set at $P < 0.05$.

Results

In all, 43 patients (mean age 70-years-old, range 43 to 92, 16 women and 27 men) underwent surgery for acute mesenteric ischemia between January 2005 and May 2012. Seven (16%) had no prior cardiovascular history. Twenty patients (46%) had antecedent history of atrial fibrillation. Twenty-two patients (52%) had atheromatous disease, 12 (28%) had ischemic heart disease and 15 (35%) had peripheral arterial occlusive disease. Active tobacco abuse was found in 10 patients (23%).

All patients underwent abdominal CT scan before surgical intervention, but the arterial phase was not visualized in 28 instances because the radiologist was not well-informed of the differential diagnosis. Diagnosis was established by radiology in 24 cases (55%), either by direct visualization of superior mesenteric artery (SMA) occlusion in 18 cases, or by indirect signs of visceral ischemia. CT scan demonstrated small intestinal obstruction in six patients, without any further indications as to the etiology.

Therapeutic abstention was decided in 20 (46%) patients after exploratory laparotomy, because the extent of intestinal necrosis was beyond all therapeutic resources. Twenty-three patients (53%) underwent surgery with curative intent. Antecedent history did not differ statistically significantly between the two groups (Table 1). The presence of shock was more frequent in patients who underwent exploration alone (10/20 vs. 5/23; $P = 0.064$) while the other clinical signs were comparable between the two groups. Preoperative evaluation found that acute renal failure with increased BUN ($P = 0.003$), creatininemia ($P = 0.040$), and blood lactates ($P < 0.05$) were more prevalent in patients who underwent exploration alone. There were more patients with cytolysis and abnormal coagulation in this group. Laboratory findings, including blood cell counts, CRP and hepatic function tests (gamma GT, alkaline phosphatases, total bilirubin) were similar in the two populations. The proportion of patients with imaging diagnostic for acute mesenteric ischemia due to mesenteric arterial occlusion was similar in both groups. The proportion of patients with radiologic signs of severity (pneumatosis intestinalis, absence of CT enhancement, portal venous air) was not statistically significantly different between patients treated surgically or undergoing exploration alone ($P = 0.763$).

Among patients undergoing surgery with curative intent, 10 had a revascularization procedure, sometimes associated with intestinal resection, while 13 had intestinal resection alone. Age and gender as well as antecedent history of patients were similar between the two groups whereas revascularized patients had more embologenic rhythm disorders (7/10 vs. 3/13; $P = 0.040$).

Pain was the most frequent presenting sign in both groups. Clinical presentation differed between the two populations. The revascularized population presented more frequently with vomiting, diarrhea, and/or hematochezia (Table 2). Abdominal guarding was more frequent in patients who did not undergo revascularization. Shock was present only in patients who did not undergo revascularization. Laboratory findings (leukocyte count, creatiniemia, blood urea, lactates) were similar. Among the 10 patients undergoing revascularization, eight angio-CT scans were performed preoperatively and SMA occlusion was demonstrated in seven patients. In the group of 13 patients who did not undergo revascularization, six angio-CT scans were performed; only one demonstrated SMA occlusion, while the others showed diffuse ischemia without any signs of thrombosis. There were no signs of severity in either group. Angiography was performed in two cases: one, as a first-line diagnostic investigation, led to angioplasty and insertion of a stent. The second was performed as a second line investigation (after angio-CT scan) and showed an incompletely obstructive image at the level of the SMA, without any evidence of visceral ischemia. This led to confirmation of SMA thrombosis.

No statistically significant difference was found between the two populations as concerns the etiology by thrombosis or embolism ($P = 0.381$). However, more of the patients with embolism underwent revascularization (7/10 vs. 5/13).

No statistically significant difference was found concerning the operative findings (ischemia and necrosis) between the two groups. The extent of small bowel involvement in the group treated without revascularization was less (< 1 m 50 involved) but the difference in the number of patients with this limit of involvement was not found to be statistically significant (9/13 vs. 4/10; $P = 0.221$). Nor was any statistically significant difference found between