Mesenteric venous thrombosis: Still a lethal disease in the 1990s

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Purpose: This study was designed to evaluate progress in diagnosis, management, and clinical outcome of mesenteric venous thrombosis (MVT).
Methods: We retrospectively reviewed the clinical course of 72 patients treated for mesenteric venous thrombosis between 1972 and 1993.
Results: Fifty-three patients had acute and 19 had chronic mesenteric venous thrombosis. Fifty-seven patients had secondary mesenteric venous thrombosis; previous abdominal surgical procedure and hypercoagulable states were the most prevalent associated conditions. Computed tomography was abnormal in all patients who underwent this test for acute mesenteric venous thrombosis and in 93% of those who had chronic disease. Angiography diagnosed acute mesenteric venous thrombosis in five (72%) of seven patients. Acute mesenteric venous thrombosis presented most frequently as abdominal pain (83%), anorexia (53%), and diarrhea (43%). Thirty-three (75%) had symptoms longer than 48 hours. Thirty-four (64%) patients with acute mesenteric venous thrombosis underwent a surgical procedure. Bowel resection was necessary in 31 patients. One patient had unsuccessful mesenteric venous thrombectomy. Seven patients with acute mesenteric venous thrombosis underwent anticoagulation without a surgical procedure, and 12 were observed. All patients with chronic mesenteric venous thrombosis were observed; nine of the 19 underwent anticoagulation. The median delay in diagnosis for patients with acute mesenteric venous thrombosis was 48 hours and did not decrease during the last decade. Mesenteric venous thrombosis recurred in 19 (36%) patients. The 30-day mortality was 27%. Long-term survival of patients with acute mesenteric venous thrombosis was significantly worse than that of those with chronic disease (36% vs 83% survival at 3 years). The patients with acute mesenteric venous thrombosis who underwent anticoagulation with and without surgical procedure had improved survival when compared with the observed group.
Conclusion: Acute mesenteric venous thrombosis remains a lethal disease. Mortality has not improved in the last 22 years. Computed tomography is the most sensitive diagnostic test. Anticoagulation and surgical procedure enhanced survival in the acute subgroup. The underlying disease determined survival in chronic disease. (J VASC SURG 1994;20:688-97.)

Mesenteric venous thrombosis (MVT) is an uncommon but often lethal form of intestinal ischemia. First described by Elliot[1] in 1895 and characterized as a clinical entity by Warren and Eberhard[2] in 1935, MVT makes up 5% to 15% of all acute mesenteric ischemia.[3-5] Despite modern diagnostic tools and methods, delay in diagnosis is frequent and contributes to the 15% to 40% mortality rate reported in the literature.[6-9] The primary reasons for delay in diagnosis are the nonspecific abdominal signs and symptoms of MVT despite progressive or advanced disease.

The increasing use of computed tomography (CT) and ultrasonography in the evaluation of abdominal disease has facilitated diagnosis of MVT

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Presented at the Sixth Annual Meeting of the American Venous Forum, Wailea, Maui, Hawaii, Feb. 23-25, 1994.
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0741-5214/94/$3.00 + 0 24/6/58382

and sparked interest in an earlier and more aggressive surgical treatment of this disease.[10-12] These imaging studies have also revealed MVT as incidental findings in patients without acute symptoms of bowel ischemia. Hence the spectrum of presentation for MVT is broad. Options for treatment may range from observation to urgent exploration with resection of infarcted bowel and possibly even venous thrombectomy. Anticoagulation is suggested by most authors.[13-15] High recurrence rates and increased mortality rate remain significant problems.[16-17] Experience at any one institution with the management of MVT is limited; only case reports[18-22] or small series[6-10,17] exist in the literature dealing with this lethal form of bowel ischemia. Our study was designed to evaluate progress in diagnosis, management, and clinical outcome in a larger group of patients treated for MVT in the past 22 years at a tertiary referral center.

PATIENTS AND METHODS

We retrospectively reviewed the clinical course of 72 patients, 45 men and 27 women (mean age: 57.1 years, range: 23 to 81 years), who were treated for MVT between January 1, 1972, and August 31, 1993. This group represented 6.2% of 1167 patients treated for mesenteric ischemia during the same period at the Mayo Clinic. Patients who had MVT secondary to mechanical small bowel obstruction or volvulus were excluded. We also decided to exclude those patients who had MVT diagnosed at autopsy, because our pathologists had difficulty differentiating the diffuse postmortem mesenteric venous and arterial thrombosis from true MVT, which existed before death. Patients with symptoms of less than 4 weeks duration were classified as having acute MVT. Those with symptoms greater than 4 weeks duration but without bowel infarction or those with MVT diagnosed as incidental and clinically insignificant findings on abdominal imaging were classified as having chronic MVT. Primary MVT was defined as spontaneous, idiopathic thrombosis of mesenteric veins not associated with any other disease or etiologic factor. Patients with any condition known to predispose to MVT such as trauma, infection, or hypercoagulability were noted to have secondary MVT.

The following radiographic criteria for the diagnosis of MVT were established. Ultrasonography was positive for MVT, if thrombus or lack of flow was demonstrated in the superior mesenteric-portal venous system. Computed tomography was positive, if it demonstrated thrombus in the superior mesenteric vein, venous collateralization surrounding the occluded vein, or abnormal thickening of the wall of the ischemic bowel. Mesenteric arteriography with venous phase was diagnostic for MVT, if thrombus was demonstrated in the superior mesenteric vein. Additional findings included failure of arterial arcades to empty, a prolonged blush in the involved segment, and failure to visualize the superior mesenteric vein in an otherwise adequate study.

Statistical analysis was performed with Fisher's exact test or Pearson's χ-square test to evaluate differences in categoric variables. Wilcoxon rank-sum test was used to test for differences in continuous variables. Kaplan-Meier estimate was used to assess survival and time to recurrence. Log-rank test was used to test for differences in survival between groups. Methods of treatment and outcome were analyzed and compared between patients with acute MVT from the earlier period of the study (1972 to 1983) and those treated during the last decade (1984 to 1993). All values were expressed as mean ± SEM. Statistical significance was accepted when $p < 0.05$.

RESULTS

Seventy-two patients were identified with a diagnosis of MVT. Twenty patients were treated in the first period of the study (1972 to 1983) and 52 in the last decade (1984 to 1993). Fifty-three (74%) patients presented with acute MVT and 19 (26%) with the chronic form.

Cause. Fifty-seven (79%) patients had secondary MVT. Previous abdominal surgical procedure, hypercoagulable states, previous MVT, smoking, and history of deep venous thrombosis were the most prevalent associated conditions (Table I). In the 30 patients with a hypercoagulable state, polycythemia vera was the most common disorder (11). Other diseases included myeloproliferative disorders (six), antithrombin III deficiency (five), hyperfibrinogenemia (four), protein C deficiency (three), and protein S deficiency (two). Fifteen (21%) patients had primary, idiopathic MVT.

Acute mesenteric venous thrombosis.

Presentation. Fifty-three (30 men and 23 women) patients presented with acute MVT. Their mean age was 56.6 ± 2.2 years (range: 23 to 81 years). The most common presenting symptoms were abdominal pain (83%), anorexia, (53%) and diarrhea (43%) (Table II). Only four (9.1%) patients presented with symptoms less than 24 hours in duration, 16% had symptoms for 24 to 48 hours, and 75% had symptoms of greater than 48 hours. Thirty (57%) patients with abdominal pain had diffuse, nonspecific pain. If the pain was localized, it tended to occur in the lower

Table I. Conditions associated with MVT

Condition	*Acute MVT, n = 53(%)*	*Chronic MVT, n = 19(%)*	*Total, n = 72(%)*
Previous abdominal surgical procedure	28 (52.8)	9 (47.4)	37 (51.4)
Hypercoagulable state	20 (37.7)	10 (52.6)	30 (41.7)
Previous MVT	17 (32.1)	8 (42.1)	25 (34.7)
Smoking	15 (28.3)	8 (42.1)	23 (31.9)
Previous DVT	15 (28.3)	5 (26.3)	20 (27.8)
Alcohol abuse	8 (15.1)	7 (36.8)	15 (20.8)
Malignant tumor	10 (18.9)	3 (15.8)	13 (18.1)
Cirrhosis	10 (18.9)	3 (15.8)	13 (18.1)
Oral contraceptives	4 (7.6)	0	4 (5.6)

DVT, Deep venous thrombosis.

Table II. Symptoms of MVT

Symptom	*Acute MVT, n = 53(%)*	*Chronic MVT, n = 19(%)*	*Total, n = 72(%)*
Abdominal pain	44 (83.0)	15 (78.9)	59 (82)
Anorexia	28 (52.8)	7 (36.8)	35 (49)
Diarrhea	23 (43.4)	7 (36.8)	30 (42)
Nausea & vomiting	22 (41.5)	4 (21.1)	26 (36)
Upper GI bleeding	15 (28.3)	7 (36.8)	22 (31)
Lower GI bleeding	12 (22.6)	3 (15.8)	15 (21)
Constipation	7 (13.2)	0	7 (10)

GI, Gastrointestinal.

quadrants (71%). Abdominal distension and blood found during rectal examination were the most common findings on admission (Table III). Peritoneal signs were present in 36% of the patients and fever in 25%. The white blood cell count was elevated in half the patients, and lactate was abnormal in one third (Table III). Platelet counts, fibrinogen levels, and coagulation studies at admission were generally within normal limits.

Diagnosis and radiographic imaging. Plain abdominal radiographs were nonspecific and nondiagnostic. An ileus pattern was seen in 25 (71.4%) of 35 patients. Computed tomography was performed in 20 (38%) patients with acute MVT and demonstrated thrombus in the superior mesenteric vein (SMV) in 11 (55%) patients (Fig. 1). Thrombus was also noted in the portal vein in 35% and in the splenic vein in 35%. Abnormal bowel characteristics on CT (i.e., bowel wall thickening, pneumatosis, "streaky" mesentery) were found in 70% of the patients (Fig. 2). The overall sensitivity of the CT scan to detect *any* abnormalities associated with acute MVT was 100%. Mesenteric arteriography with venous phase was performed in only seven (13%) patients. The presence of thrombus or nonfilling of the SMV was diagnostic of MVT in five of seven patients (sensitivity, 71%). One patient had sluggish filling of the SMV, and another had prolonged blushing in the region of the SMV. Ultrasonography with or without color duplex evaluations of the mesenteric veins were obtained in 10 patients. Thrombus or the absence of flow in the mesenteric veins were demonstrated in eight patients (sensitivity, 80%). Thirty-seven patients were diagnosed with MVT with radiographic techniques; 16 were diagnosed at the time of the operation. The median delay in diagnosis was 48 hours (mean, 83.1 ± 17 hours). This delay in diagnosis did not change significantly over the last 22 years.

Treatment. Nineteen patients were treated without operation, with seven (37%) of these patients receiving anticoagulation. Thirty-four (64%) patients with acute MVT underwent abdominal exploration. Twenty-six were operated on at the Mayo Clinic, whereas eight had operations elsewhere and were transferred to us for further treatment. Among patients initially evaluated by us, 12 (46%) were operated on more than 48 hours after admission, and only six (23%) were operated on within 6 hours of admission. The diagnosis of mesenteric venous thrombosis was confirmed in all, although thrombus extended into the proximal superior mesenteric vein in only four (12%) patients (Fig. 3). The arterial supply was intact with pulsatile flow palpable in the superior mesenteric artery in all but one patient. The jejunum and the ileum were affected most commonly (Fig. 4). Transmural bowel necrosis was present in 29 (85%) patients, with bowel perforation in seven

Fig. 1. Abdominal computed tomography of patient with acute mesenteric venous thrombosis. *Arrow* shows thrombus in superior mesenteric vein.

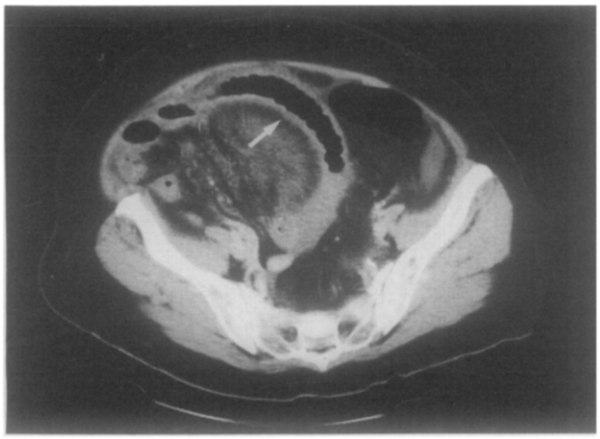

Fig. 2. Abdominal computed tomography of patient with acute mesenteric venous thrombosis. Small bowel is distended, its walls thickened, and mesentery shows "streaking" and edema. *Arrow* shows thickened bowel wall.

Table III. Signs of MVT

Symptom	*Acute MVT, n = 53(%)*	*Chronic MVT, n = 19(%)*	*Total, n = 72(%)*
Abdominal distension	27 (50.9)	4 (21.1)	31 (43.1)
Blood on rectal exam	17 (32.1)	4 (21.1)	21 (29.2)
Peritonitis	19 (35.9)	1 (5.3)	20 (27.8)
Ascites	5 (9.4)	1 (5.3)	6 (8.3)
Hypotension (<90 mmHg)	3 (5.7)	1 (5.3)	4 (5.6)
Tachycardia (>110/min)	11 (20.8)	0	11 (15.3)
Fever (>38° C)	13 (24.5)	1 (5.3)	14 (19.4)
Leukocytosis (10.0 × 10^9L)	27 (50.9)	8 (44.4)	35 (49.3)
Lactate (>1.65 mmol/L)	15 (28.3)	1 (5.3)	16 (22.2)
Amylase (>115 U/L)	10 (18.9)	3 (15.8)	13 (18.1)
Creatinine kinase (>350 U/L)	4 (7.5)	0	4 (5.6)

(21%). In four patients extensive necrosis of the entire jejunoileum precluded resection. Bowel resection was done in 30 patients during the primary exploration (88%). In a 75-year-old man thrombectomy of the SMV was also performed; nevertheless thrombosis reoccurred in the vein during the same hospital stay, requiring resection of an additional segment of small bowel. A second-look operation was performed in 14 (41%) patients, and all 14 required additional bowel resection. Whereas bowel resection with primary anastomosis was performed in 22 patients, a diverting ileostomy or colostomy was deemed necessary in eight. The length of bowel resected was 108.6 ± 11.2 cm during the initial operation and 44.6 ± 15.4 cm at the second operation (121 ± 14.9 cm total). Thrombus in the proximal aspect of the larger veins in the resected specimens was noted in 40% of cases and in smaller, distal veins in 60%. Twenty-six patients who had a surgical procedure underwent anticoagulation immediately after diagnosis (six patients), before the operation (three patients), during the operation (seven patients), or after the operation (10 patients). Most underwent anticoagulation within 8 to 24 hours. Seven other patients were treated with anticoagulation alone. Because a unified treatment protocol for MVT did not exist during the study period, the decision of initiating anticoagulation as primary or adjunctive therapy was usually made by the surgeon. The risk of gastrointestinal bleeding was one reason why some surgeons elected not to treat with anticoagulation.

Outcome. The mean follow-up was 19.3 months (range: 1 day to 14 years). The duration of hospitalization for patients with acute MVT was long (mean 21.9 ± 3.2 days, range: 1 to 98 days). In-hospital complications of treatment occurred in 55% of the patients (Table IV). Short bowel syndrome as a result of extensive bowel resection developed in 40%. Five patients had pulmonary embolism after treatment. Only one of these five patients were given anticoagulants at the time of the

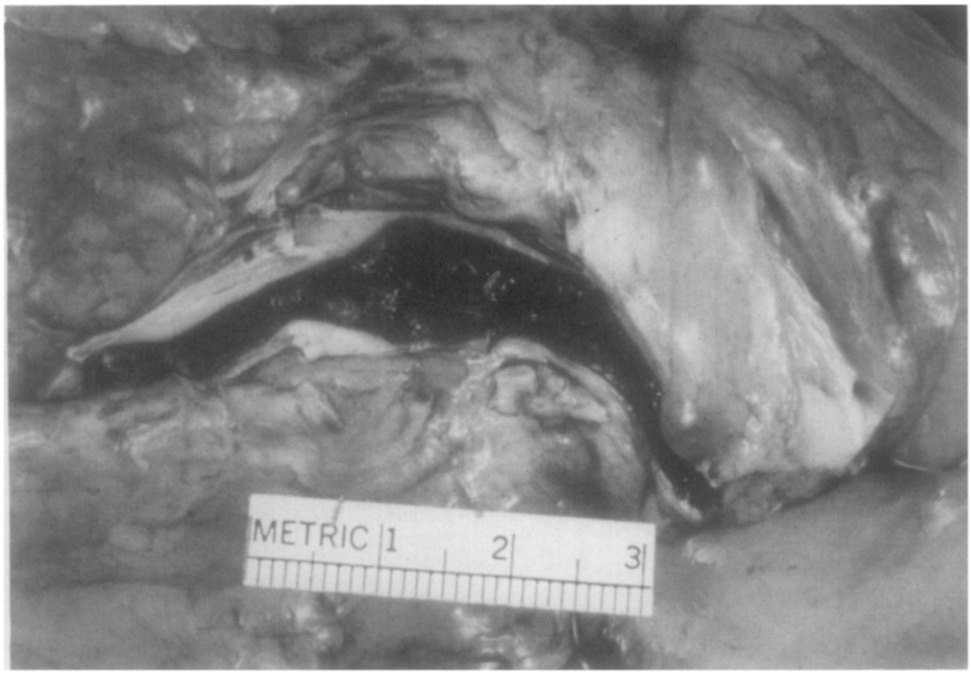

Fig. 3. Disease specimen of small bowel mesentery showing thrombus in superior mesenteric vein.

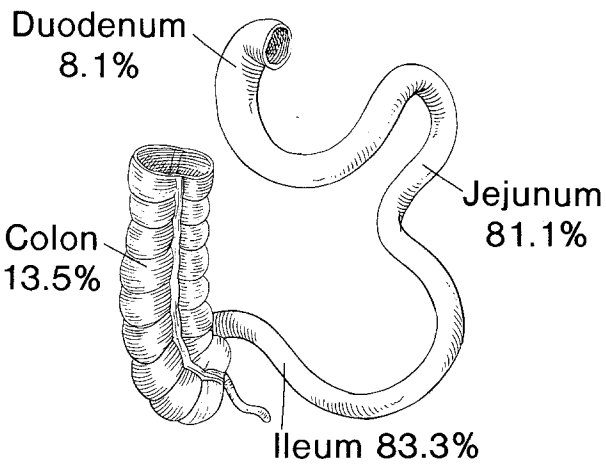

Fig. 4. Intraoperative findings of distribution of infarcted bowel secondary to acute mesenteric venous thrombosis.

event. The other four patients subsequently underwent anticoagulation in the usual manner. The 30-day mortality rate was 27%. It decreased from 32.3% in the early period to 23.7% in the last decade ($p > 0.05$). The overall survival between the two time periods was similar (Fig. 5). The long-term survival (as shown by Kaplan-Meier estimates) was only 36.4% (95% confidence interval: 23 to 57) at 3 years (Fig. 6). Twenty (38%) patients died of MVT.

Table IV. Complications in 53 patients with acute MVT

Complication	*No. of patients (%)*
Short bowel syndrome	12 (22.6)
Wound infection	11 (20.8)
Sepsis	9 (17.0)
Pneumonia	7 (13.2)
Pulmonary embolus	5 (9.4)
Renal failure	5 (9.4)
Gastrointestinal bleeding	3 (5.7)

Eight (15%) patients died of comorbid conditions: cancer (three); pulmonary embolus (two); liver failure (one); gastrointestinal bleeding (one); and multisystem organ failure (one). Those treated surgically and with anticoagulation had improved survival as did those who only underwent anticoagulation, when compared with those patients who were observed without any treatment (Fig. 7). The patient who underwent thrombectomy of the SMV died of recurrent MVT 2 weeks after the operation. Mesenteric venous thrombosis recurred in 19 (36%) patients. Most of the recurrences occurred during the same hospitalization or within 30 (74%) days. Anticoagulation alone had a higher recurrence rate than surgical procedure plus anticoagulation (71% vs 32%).

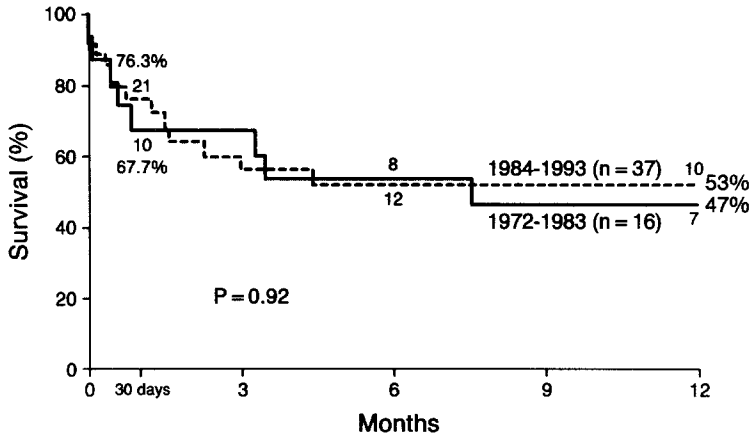

Fig. 5. Short-term (Kaplan-Meier) survival curves of patients with acute mesenteric venous thrombosis during Early (1972 to 1983) and Late (1984 to 1993) Periods.

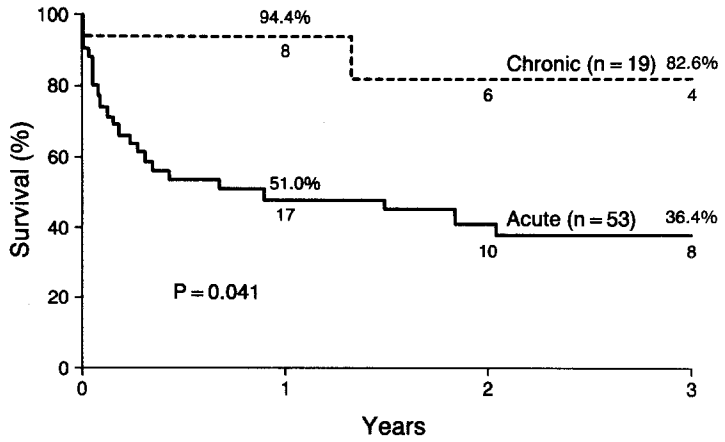

Fig. 6. Long-term (Kaplan-Meier) survival curves of patients with acute and chronic mesenteric venous thrombosis.

Chronic mesenteric venous thrombosis.

Presentation. Nineteen (15 men and four women) patients were diagnosed to have chronic MVT. The mean age was 58.5 ± 2.5 years (range 42 to 78 years). Fifteen patients had history of vague, diffuse abdominal pain (Table II). Four had no symptoms. The only abnormal laboratory study was the presence of mild leukocytosis in 44% (Table III).

Diagnosis and radiographic imaging. Computed tomography revealed changes characteristic of chronic venous occlusion in 13 of 14 patients (sensitivity, 92.9%). Angiography showed occlusion of the SMV with venous collateralization in seven of 10 patients (sensitivity, 70%) (Fig. 8). Ultrasonography demonstrated cavernous transformation of the recanalized mesenteric veins with decreased or absent flow in five of eight patients studied (sensitivity, 62.5%).

Treatment. Three patients required surgical intervention for comorbid conditions (distal pancreatectomy for chronic pancreatitis, exploratory laparotomy for cancer and bleeding esophageal varices). Sixteen were treated without an operation. Nine of the 19 patients received anticoagulation.

Outcome. The mean length of follow-up was 13.7 ± 4 months (range 1 day to 3.9 years). No patient's condition progressed to bowel infarction. Survival was higher when compared with that of the acute group ($p = 0.041$) (Fig. 6). The 30-day survival for this group was 94.4% (95% confidence interval: 84 to 100). Three patients died from complications of the comorbid conditions: pancreatitis, liver failure, and cardiomyopathy.

DISCUSSION

Mesenteric venous thrombosis continues to be an unusual condition. At our institution only 6.2% of all

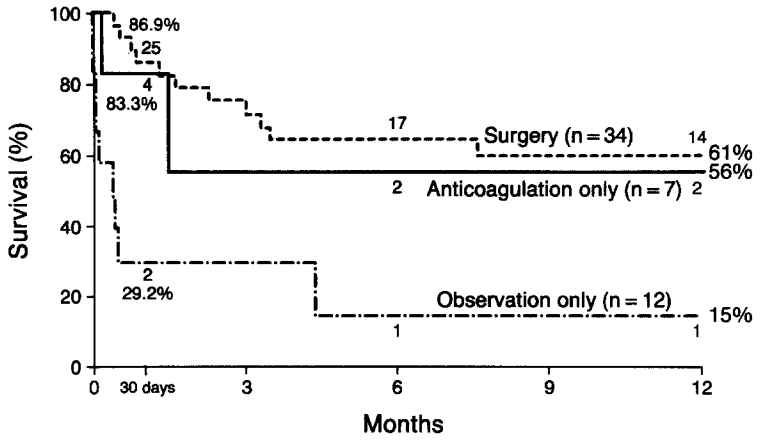

Fig. 7. Short-term (Kaplan-Meier) survival curves of acute mesenteric venous thrombosis treated with surgical procedure and anticoagulation, anticoagulation alone, and observation.

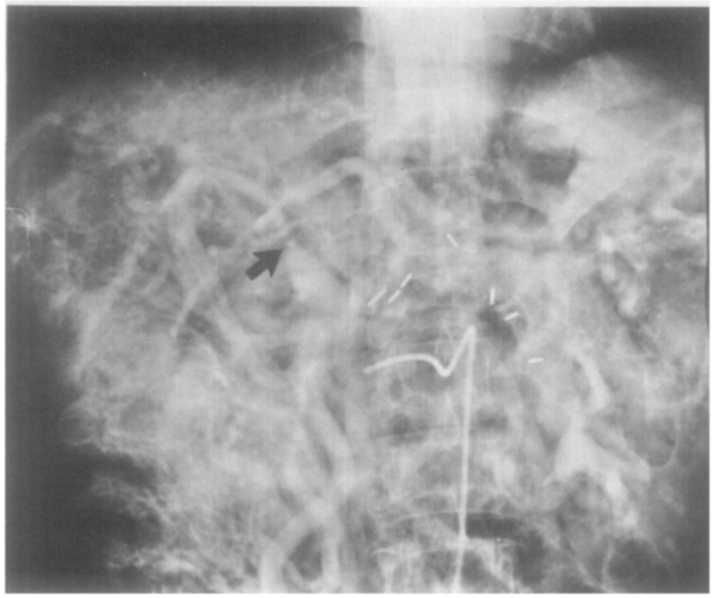

Fig. 8. Mesenteric arteriography with venous phase of patient with chronic mesenteric venous thrombosis. *Arrow* indicates portal and superior mesenteric venous occlusion. Note abundant venous collateralization around occlusion.

cases of mesenteric ischemia were due to venous thrombosis, and 17.9% of the patients with acute mesenteric ischemia had acute MVT. In other series MVT was reported to be the cause of bowel infarction in 5% to 25% of the patients with acute mesenteric ischemia as well.[3-5] Computed tomography and duplex ultrasonography have delineated a subgroup of patients with chronic MVT. Boley et al.[9] have characterized a group of patients with symptoms of abdominal pain of several weeks to months duration but without bowel infarction as having subacute MVT. They have characterized patients without symptoms or those with symptoms of portal hypertension such as gastrointestinal bleeding as having chronic MVT. For practical reasons we chose to combine the subacute and chronic groups as defined by Boley et al.[9] into our *chronic* group. We arbitrarily decided on 4 weeks, because this period seemed the most suitable to separate the acute from the chronic form of the disease. When we reviewed our data it was evident that if the patient remained without symptoms or had minimal abdominal pain for greater than 4 weeks, the chance of complications related to MVT decreased significantly. Indeed, none

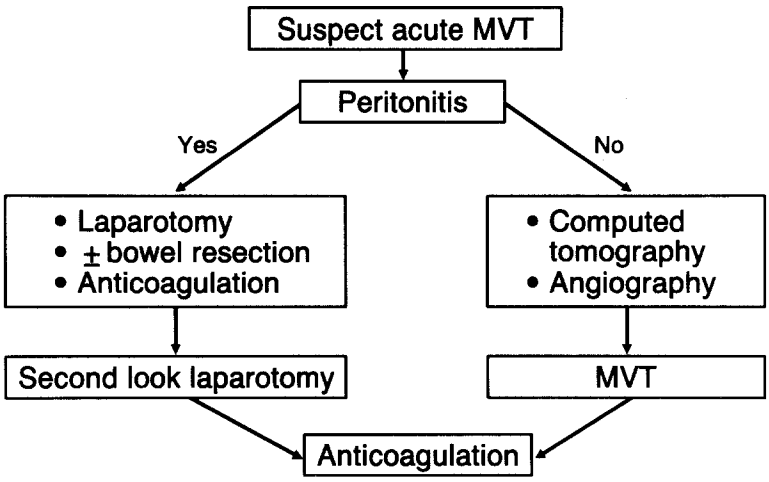

Fig. 9. Management algorithm for acute mesenteric venous thrombosis.

of our patients with chronic MVT progressed to bowel infarction. Because of the paucity of symptoms, recognition of chronic disease is frequently accidental, and the true incidence is unknown. During a study of mesenteric vascular emergencies, when 21 arterial thromboses were identified Bergan et al.[23] also diagnosed 16 patients with symptoms who had documented splenic vein thrombosis without bowel infarction.

The number of patients with primary, idiopathic MVT is continuously decreasing. Increasing numbers of patients are now diagnosed with secondary MVT as the result of an increased awareness of disorders predisposing to MVT.[9,24] Comorbid states such as hypercoagulability, cirrhosis, splenomegaly, cancer, trauma, pancreatitis, or diverticular disease are responsible for most cases of MVT. Deficiency of physiologic anticoagulants such as antithrombin III, protein C, and protein S are known to be etiologic factors of MVT.[25-28] Hematologic hypercoagulable states such as polycythemia vera, thrombocytosis, hyperfibrinogenemia, and myeloproliferative diseases are also associated with MVT[29] as are estrogen hormonal changes.[30,31] Thirty (42%) patients in our study had a hypercoagulable state. In a classic autopsy study from 1948, Johnson and Baggenstoss[32] from the Mayo Clinic identified 99 cases of MVT. All but eight (12.4%) in their series had etiologic factors associated with the thrombosis. In a recent review of the literature, Abdu et al.[6] found that 81% of all cases of MVT were secondary. In our series the prevalence of secondary MVT was also high (79%). Computed tomography was the most sensitive test in detecting thrombus in the mesenteric system in acute disease. When evidence for bowel ischemia or presence of venous thrombosis were considered together, sensitivity of the CT in showing an abnormality was 100%. It was also the most sensitive test to diagnose chronic disease. Mesenteric arteriography with venous phase demonstrated thrombus in 12 of the 17 patients studied. However, it continues to be the test of choice in patients with a clinical suspicion for arterial cause of mesenteric ischemia from arterial occlusion or insufficiency, or if the CT is equivocal or nondiagnostic of suspected venous thrombosis. However, the availability and use of these modern tests of imaging did not reduce the delay in diagnosis at our institution during the 22-year study period.

The decision to proceed with surgical exploration should be guided by clinical judgment. All patients with localized or diffuse peritonitis require exploration (Fig. 9). The radiographic findings of MVT alone, however, do not necessarily mandate laparotomy. Indeed, with acute MVT the patients treated with anticoagulation alone had equivalent short-term survival when compared with those who had surgical treatment. One must acknowledge, however, that a selection bias undoubtedly existed. Laboratory studies were nonspecific (Table III), and normal results should not deter surgical exploration. Preoperative laparoscopic[33] and endoscopic[34] evaluation of the small bowel have been used but with limited success in predicting bowel infarction in patients with MVT. Ninety-one percent of our patients who underwent exploration required bowel resection. If there was any question regarding the viability of the bowel after the resection, a second-look laparotomy after 24 hours was performed. We have used intravenous fluorescein to confirm viability of the bowel under Wood's light illumination with good predictive

Table V. Management and early death of 164 patients with acute MVT

Author (yr)	*No. of patients*	*Surgical procedure*		*Nonoperative*	*Anticoagulation*	*Mortality (%)*
		Bowel resection	*Laparotomy only*			
Sack and Aldrete (1982)[8]	9	9	0	0	6	2 (22)
Wilson et al.(1987)[26]	16	10	3	3	6	8 (50)
Clavien and Harder (1988)[38]	12	12	0	0	12	5 (42)
Kaleya and Boley (1989)[39]	22	22	0	0	22	7 (32)
Harward et al. (1989)[7]	16	5	0	11	7	3 (19)
Levy et al. (1990)[17]	21	19	2	2	17	8 (38)
Grieshop et al. (1991)[10]	15	5	0	10	9	2 (13)
Present series	53	30	4	19	33	14 (27)
Totals	164	112	9	45	112	

value.[35] We did not believe that all patients required a second-look procedure, especially those who had localized disease and underwent resection with viable margins. In our series 41% of the patients underwent a second-look operation, and bowel resection was required in 100% of the patients. Although successful thrombectomy of the superior mesenteric vein has been described,[36,37] only one patient in our series underwent thrombectomy, but early rethrombosis occurred requiring later resection of additional bowel. We have not encountered a patient with a fresh proximal thrombus in the superior mesenteric vein without mechanical cause of the venous thrombosis (i.e., tumor) suitable for thrombectomy. Most patients with acute MVT have diffuse venous thrombosis with distal extension not suitable for venous thrombectomy.

Anticoagulation significantly prolonged survival in our study ($p = 0.043$). Similar to Boley et al.[9] we begin administering intravenous heparin at the time of diagnosis, even during the operation, and maintain most patients on lifelong anticoagulation to decrease chances of recurrence. Effort should also be made to investigate the patient and his or her family for underlying coagulopathy and to treat any correctable abnormality.

In conclusion, similar to results of other series, our study also suggests that acute MVT is still a lethal disease with a 30-day mortality rate of 27% (Table V). Early mortality rate was 32% in the first period of our study and 24% in the last decade, but this improvement was not statistically significant. In spite of advances in imaging modalities, delay in diagnosis of acute MVT did not decrease significantly in the last decade. Computed tomography appears to be the most sensitive diagnostic test to confirm both acute and chronic MVT. For patients with acute MVT and peritonitis, early exploration with resection of the infarcted bowel and immediate anticoagulation affords the best prognosis. Those without peritonitis should undergo anticoagulation and be observed. However, the recurrence rate is high in spite of anticoagulation. For those with chronic MVT, survival is determined by the underlying disease.

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Submitted March 2, 1994; accepted June 13, 1994.