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Chronic Mesenteric Ischemia

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Summary And Recommendations

Chronic mesenteric ischemia (CMI) is a rare but serious condition that requires prompt diagnosis and intervention to reduce mortality rates [33005650]. The initial clinical stage of CMI is characterized by sudden onset of strong abdominal pain followed by a painless interval. Depending on the extent of disease, symptoms can be different from those of acute occlusive ischemia [33005650]. Biphasic contrast-enhanced CT is the gold standard for diagnosis of arterial and venous occlusion [33005650]. Endovascular techniques for arterial occlusion have taken on a much greater importance today [33005650]. For stable patients with nonocclusive mesenteric ischemia (NOMI), interventional catheter angiography is recommended because it enables diagnosis and treatment with selective application of vasodilators [33005650].

Multimodal treatment of acute mesenteric ischemia may avoid intestinal resection and is an effective prevention strategy for short bowel syndrome (SBS) [29702489]. New understandings in intestinal adaptation can help optimize this adaptation, including with hormonal therapy [29702489]. Glucagon-like peptide-2 (GLP-2) analog is now the treatment of reference in SBS patients with chronic intestinal failure [297

Introduction

Chronic mesenteric ischemia is a rare condition caused by inadequate blood flow to the intestines due to stenosis or occlusion of the mesenteric arteries [36452880, 36327425]. It typically presents with postprandial abdominal pain, weight loss, and diarrhea [36327425]. The diagnosis is often delayed due to the nonspecific nature of the symptoms and can lead to significant morbidity and mortality [36652773].

Risk factors for chronic mesenteric ischemia include smoking, hypertension, hyperlipidemia, and diabetes [36327425]. Treatment options include medical management, endovascular therapy, and surgical revascularization [36327425].

Anatomy And Pathophysiology

Chronic mesenteric ischemia (CMI) is caused by atherosclerotic stenosis or occlusion of the mesenteric arteries [32982262]. Median arcuate ligament syndrome (MALS) is a symptomatic compression of the celiac artery causing symptoms similar to CMI [32982262]. Physiological tests may aid in diagnosing MALS, and visible light spectroscopy (VLS) and laser doppler flowmetry (LDF) during upper endoscopy may detect microcirculatory changes in these patients [32982262].

Moyamoya disease (MMD) is characterized by chronic progressive steno-occlusion of the intracranial arteries, and extracranial arteriopathy is sporadically described in a few cases and in children with MMD [32954918]. Young adults with MMD may have concomitant extracranial arteriopathy in various locations, including the coronary, superior mesenteric, celiac, renal, and internal iliac artery [32954918].

Nonocclusive mesenteric ischemia (NOMI) is a rare complication of peritoneal dialysis (PD)-related peritonitis, with a high mortality rate [328

Epidemiology And Risk Factors

Chronic mesenteric ischemia (CMI) is a rare condition with an incidence of less than 1% [35137981]. Risk factors for CMI include hypertension, preoperative renal failure requiring dialysis, immunocompromised status, chronic lung disease, history of heart failure, and intraoperative transfusion requirement of >4 RBC units [35137981]. Cannabis use disorder (CUD) has been associated with a higher incidence of admission for acute limb ischemia [35503434]. However, there is no robust association between CLI and CUD [35503434].

Clinical Presentation

Symptoms

Chronic mesenteric ischemia (CMI) is caused by stenosis or occlusion of mesenteric arteries and can progress to potentially life-threatening acute mesenteric ischemia if left untreated [36749272]. Symptoms of CMI are often nonspecific and variable, and may include abdominal pain, anorexia, and weight loss [36749272]. In some cases, patients may present with a gastric double-stripe sign on endoscopy, which is specific for gastric ischemia [36749272]. Other symptoms may include oliguria, hypoalbuminemia, and

moderate anemia [36749272]. Diagnosis of CMI is made based on patient symptoms, imaging tests such as Doppler ultrasound or magnetic resonance angiography, and endoscopy [36749272]. Early clinical-surgical approach is recommended to screen those patients with warning signs and who benefit from an exploratory laparotomy in addition to anticoagulant treatment [36849315].

Physical Examination

Physical examination findings in chronic mesenteric ischemia are often nonspecific and may include abdominal tenderness, weight loss, and signs of malnutrition [26793850]. Patients may also have a bruit over the abdominal aorta or mesenteric arteries [26793850]. In some cases, a pulsatile mass may be palpable [26793850]. It is important to note that physical examination findings may be normal in up to 50% of patients with chronic mesenteric ischemia [29930621].

Diagnosis

Imaging Studies

Imaging studies are essential for the diagnosis of chronic mesenteric ischemia (CMI) [36781442]. Angiography is the gold standard for the diagnosis of mesenteric artery stenosis and occlusion. CT angiography (CTA) and magnetic resonance angiography (MRA) are noninvasive alternatives that can be used to evaluate the mesenteric vasculature [36781442].

In patients with suspected acute mesenteric ischemia (AMI), CTA is the preferred imaging modality [36573778]. In patients with CMI, the angiography images should be analyzed for CT and SMA stenosis rates, and the collateral variations between mesenteric vessels [36781442].

Retrograde open mesenteric stenting (ROMS) is a mainstay in the treatment of mesenteric ischemia, and imaging studies are used to assess the technical success, primary patency, and freedom from clinical recurrence [36404451].

Diagnostic Criteria

The diagnosis of chronic mesenteric ischemia can be made using a combination of imaging studies and clinical presentation [36436968]. Diagnostic criteria include postprandial abdominal pain, weight loss, and a history of smoking or atherosclerotic disease. Imaging studies such as duplex ultrasonography and CT angiography can be used to evaluate for mesenteric artery stenosis and other vascular pathologies [36404064]. In cases where diagnostic angiography is needed, it can be helpful in rendering a diagnosis of median arcuate ligament syndrome, with surgical release being the preferred treatment option [36436968]. Systemic anticoagulation is recommended as initial therapy for venous mesenteric ischemia,

with transcatheter thrombolytic infusion being considered if anticoagulation fails [36436968]. Prior infrarenal aortic surgery is not a predictor of postoperative spinal cord ischemia in patients undergoing thoracic endovascular aortic repair [34742886].

Medical Management

Lifestyle Modifications

Lifestyle modifications are an important aspect of medical management for chronic mesenteric ischemia (CMI) [30286488]. Risk factors for CMI include smoking, hypertension, dyslipidemia, higher age, and female sex [30286488]. Patients with CMI should be counseled to quit smoking and adopt a heart-healthy diet [30286488]. Optimal medical therapy for risk reduction, including platelet inhibition, is also indicated after revascularization [30286488].

In addition to medical management, intervention for mesenteric artery stenosis (MAS) should be dictated by symptoms and not radiological severity [31890451]. Lifestyle modification and medication for atherosclerotic ischemic heart disease probably prevent acute mesenteric ischemia in CAD patients [31890451].

Pharmacologic Therapy

Pharmacologic therapy for chronic mesenteric ischemia is not well established in the literature. However, vasodilators have been suggested as a potential treatment option [29419563]. In addition, medical management may be necessary to optimize nutritional support and electrolyte management in patients with non-occlusive mesenteric ischemia [31129642].

In cases of spontaneous isolated inferior mesenteric artery dissection, the optimal treatment options are debatable and may include medical management [29716480]. Endovascular therapy, including catheter-based thrombolysis, thromboembolectomy, and stenting, may also be used as a primary treatment option when diagnosed early before bowel infarction [29419563]. Anticoagulation is the main form of therapy in mesenteric venous thrombosis [29419563].

Endovascular Therapy

Indications

Endovascular therapy is the first-line treatment for chronic mesenteric ischemia [35578260]. Indications for endovascular therapy include imaging-based evidence of mesenteric vascular occlusive disease and

clinical signs of chronic mesenteric ischemia [35578260]. In elderly patients with exacerbated chronic mesenteric ischemia, an interdisciplinary approach is required to solve both the exacerbation and the underlying conditions in order to prevent further thrombotic events [36143824]. Endovascular therapy may be a suitable option for patients with chronic mesenteric ischemia who are not candidates for open vascular bypass using greater saphenous vein and/or prosthetic conduits [34644634].

Technique

Endovascular therapy for chronic mesenteric ischemia involves the use of retrograde open mesenteric stenting (ROMS) [36404451]. Technical success rates for ROMS are high, with covered stents being used in the majority of cases [36404451]. However, patients with acute mesenteric ischemia (AMI) have a higher risk of morbidity and mortality, with a 35% 30-day mortality rate [36404451]. Patients with chronic mesenteric ischemia may benefit from ROMS, with primary patency rates of 70% at 1 year and 61% at 3 years [36404451]. A recent study found that patients with CMI have intestinal dysbiosis that resolves after revascularization, suggesting that microbiome modulation could be a possible intervention to ameliorate acute and subacute postoperative outcomes in these patients [36970136]. A survey of medical specialists and hospitals worldwide found that diagnosis of AMI is often delayed despite the wide availability of an adequate imaging modality, i.e. CT-scan [36963863]. There is a large variability in anticoagulant treatment, as well as in timing of surgery to restore bowel continuity [36963863].

Outcomes

Endovascular therapy for chronic mesenteric ischemia (CMI) has been the standard of care, but it can result in substantial morbidity and mortality [36970136]. A prospective study of patients with CMI who had undergone mesenteric bypass and/or stenting showed that revascularization partially restored the species richness and evenness in the perioperative and postoperative phases [36970136]. The study also revealed that patients with CMI have intestinal dysbiosis that resolves after revascularization [36970136].

A survey assessing current attitudes and practices to manage acute mesenteric ischemia (AMI) worldwide found that emergency revascularization is often considered for patients with AMI but rarely in cases of transmural ischemia (intestinal infarction) [36963863]. Abdominopelvic CT-scan with intravenous contrast was suggested as the most useful diagnostic test, indicated by approximately 90% of respondents [36963863].

A case report showed that endovascular revascularization for celiac artery stenosis in a patient with CMI resulted in symptomatic relief and resolution of gastric ulcers [36749272].

Surgical Therapy

Indications

Surgical therapy for chronic mesenteric ischemia is indicated in cases where conservative management fails [36143824]. Endovascular therapy, such as stenting, can be considered as a therapeutic option for elderly patients with exacerbated chronic mesenteric ischemia [36143824]. In cases of Wilkie's syndrome, surgical intervention may be necessary for severe weight loss, uncontrolled upper abdominal pain, vomiting, and other gastrointestinal symptoms that significantly impact a patient's daily life [35475250]. Infrarenal transposition of the superior mesenteric artery (SMA) is a safe and feasible surgical option that can restore physiologic duodenal passage of gastroduodenal content without the need for creating a digestive tract anastomosis [35475250]. Conservative therapy should be attempted before considering surgical intervention for chronic mesenteric ischemia [34130025].

Technique

Surgical therapy for chronic mesenteric ischemia typically involves revascularization procedures, such as endarterectomy, bypass grafting, or angioplasty [36963863]. In elderly patients, functional status and chronic steroid therapy should be considered when determining the appropriate surgical approach for bowel perforation [36652773].

In cases of superior mesenteric artery syndrome, infrarenal transposition of the SMA can be considered a safe and feasible surgical option with more physiologically favorable outcomes comparable to gastrointestinal bypasses [35475250]. This procedure restores physiologic duodenal passage of gastroduodenal content without the need for creating a digestive tract anastomosis.

Outcomes

Surgical therapy for chronic mesenteric ischemia (CMI) aims to restore blood flow to the affected area [36963863]. The current approach to managing acute mesenteric ischemia (AMI) varies widely, with delayed diagnosis being common despite the availability of adequate imaging modalities [36963863]. Emergency revascularization is often considered for patients with AMI but rarely in cases of transmural ischemia [36963863]. In elderly patients, a palliative approach is often chosen over extensive bowel resection [36963863].

In geriatric patients undergoing emergency surgery for bowel perforation, functional status and chronic steroid therapy play an important role in determining survival [36652773]. Immediate fascial closure was found to be protective against mortality [36652773].

In patients with Wilkie's syndrome, infrarenal transposition of the superior mesenteric artery (SMA) can be considered a safe and feasible surgical option with more physiologically favorable outcomes comparable

to gastrointestinal bypasses [35475250]. Technical operative and clinical success were achieved in all patients, and upper GI symptoms were resolved in all cases [35475250].

Follow-Up

Patients with chronic mesenteric ischemia (CMI) require close follow-up after treatment [36749272, 36556035]. Endovascular revascularization is a common treatment for CMI [36749272]. Patients who undergo this procedure may experience symptomatic relief and resolution of gastric ulcers [36749272]. However, despite optimal treatment, CMI has a high lethality rate within the first 30 days [36675716]. A new scoring model, the CSI-score, has been developed to estimate the severity of mesenteric artery stenosis and predict the need for treatment and mortality [36556035]. Patients with high CSI-scores are more likely to have comorbidities such as coronary artery disease, chronic renal insufficiency, and peripheral arterial disease [36556035]. The CSI-score has demonstrated excellent ability to discriminate between patients who need treatment and those who do not [36556035]. Follow-up care for patients with CMI should include monitoring for recurrence of stenosis or failure of endovascular treatment, the need for a bypass procedure, and mortality rates [36556035].

Conclusion

Chronic mesenteric ischemia (CMI) is a condition that can result from narrowing or occlusion of the mesenteric vessels. In patients with isolated celiac trunk (CT) or superior mesenteric artery (SMA) stenosis or occlusion, mesenteric circulation is mainly provided by the gastroduodenal artery. However, in patients with stenosis or occlusion of both CT and SMA, mesenteric circulation is mainly provided by the Riolan arch [36781442].

Postoperative intensive care treatment is an important part of the successful surgical treatment of Stanford type A aortic dissection (STAAD) following Sun's procedure. Postoperative complications can include mesenteric arterial embolism [36713953].

COVID-19 can be responsible for both acute and chronic embolic and thrombotic events in the mesenteric vasculature, which acts as a risk factor in the manifestation of small bowel obstruction [36452880].

