

Chronic Mesenteric Ischemia: 20 Year Experience of Open Surgical Treatment

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WHAT THIS PAPER ADDS

This study is the first to include a large sample of patients presenting exclusively with chronic mesenteric ischemia, with a median follow up longer than 5 years. This department has great experience in the field of chronic mesenteric ischemia, and care was always taken to get the optimal follow up for this specific population. Here the experience is reported and the actual long-term good results for open surgery in the modern era are demonstrated.

Objectives: Both open surgery (OS) and endovascular surgery (ES) have been proposed for the treatment of symptomatic chronic mesenteric ischaemia (CMI). OS was considered the gold standard but ES is increasingly proposed as the first option. The aim was to report long-term outcomes associated with OS in patients suffering CMI in the modern era in order to help in choose between the two techniques.

Materials and methods: A retrospective single centre analysis of all consecutive digestive artery revascularizations performed for CMI between January 2003 and December 2012 was carried out. Primary outcomes were 30 day mortality and morbidity, and secondary outcomes were survival, primary patency (PP), secondary patency (SP), and freedom from digestive symptoms, depending on the completeness of the revascularization performed.

Results: Eighty-six revascularizations were performed. Median follow up was 6.9 years (range 0.3–20.0). The 30 day mortality and morbidity rates were respectively 3.5% and 13.9%. Ten year survival was 88% for complete revascularization (CR) and 76% for incomplete revascularization (IR) ($p = .54$). The PP was 84% at 10 years for CR and 87% respectively for IR ($p = .51$). The 10 year SP was 92% for CR and 93% for IR ($p = .63$). Freedom from digestive symptoms was influenced by the completeness of revascularization: 79% for CR versus 65% for IR at 10 years ($p = .04$).

Conclusions: OS for CMI, especially complete revascularization, provides lasting results despite high morbidity.

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INTRODUCTION

Chronic mesenteric ischaemia (CMI) secondary to arterial insufficiency was first recognized and described by Chienne¹ in 1869, followed by Councilman² in 1894 with the anatomical description of the celiac trunk (CT) and superior mesenteric artery (SMA) occlusions. The recognition of abdominal angina as a vascular disease representing a precursor to fatal intestinal vascular occlusion was made by Dunphy in 1936.³ In 1957 Mikkelsen⁴ was the first to propose a surgical treatment for occlusive lesions of the SMA. One year later, Shaw

and Maynard⁵ described the first surgical thromboendarterectomy of the SMA proving its effectiveness in relieving the symptoms associated with CMI. However, the clinical manifestations of CMI can remain poor owing to the extensive collateral development of digestive arteries, but if intestinal blood flow is unable to supply physiological gastrointestinal demands, mesenteric ischemia will occur. If preventive treatment in asymptomatic patients is controversial, treatment of symptomatic CMI is widely accepted in order to prevent acute mesenteric ischemia (AMI), which may cause bowel infarction and death. Open surgery (OS) techniques and options are endarterectomy, re-implantation, and aorto-mesenteric and/or celiac bypass grafting. OS is effective but associated with relatively high peri-operative mortality and morbidity rates, ranging from 1% to 17% for mortality, and from 2% to 33% for morbidity.^{6–8} If OS mesenteric revascularization has been the primary method of treatment for CMI, endovascular surgery (ES) has rapidly

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risen as a valuable option and is now being used more often than surgery in the United States.⁹ Comparisons between OS revascularizations and ES for visceral arterial occlusive disease have been published, but large series studying long-term outcomes associated with OS revascularization are still missing. The purpose of this report was to review the 20 year experience from a single institution of OS treatment of patients with CMI, depending on the completeness of the revascularization.

MATERIALS AND METHODS

A retrospective analysis of all consecutive patients operated on for digestive revascularization for CMI between January 1993 and December 2012 was performed. Inclusion criteria were patients presenting at least two of the following digestive symptoms: typical chronic postprandial abdominal pain, weight loss, a fear of food (because of pain), meals split into smaller portions (food fear with meal splitting), digestive troubles (diarrhoea, nausea, or vomiting), and the presence of a significant diameter stenosis of at least 70% in one or more digestive artery, CT, SMA, or inferior mesenteric artery (IMA) on duplex scan examination, confirmed by pre-operative radiological imaging: arteriography or computed tomography angiography.

Exclusion criteria were incidental digestive artery stenosis without symptoms, treatment of any digestive artery in combination with another aortic procedure without CMI symptoms, and AMI.

During this period, the policy of the team concerning CMI was always the same: OS was carried out, except in patients that were considered too high risk. In fact, surgical risk was always defined pre-operatively according to the guidelines for the peri-operative cardiac management in non-cardiac surgery of the European Society of Anaesthesiology. High risk patients were thus defined as patients with three or more serious comorbidities, including chronic obstructive pulmonary disease (forced expiratory volume in 1 second [FEV₁] < 80% theoretical value), congestive heart failure (left ventricular ejection fraction [LVEF] < 40%), coronary artery occlusive disease (defined as history of any revascularization of the coronary arteries), or chronic renal insufficiency (glomerular filtration rate [GFR] < 30 mL/min/1.73 m²). In these patients where general anaesthesia was mostly contraindicated, endovascular surgery was proposed. For all other patients, OS was proposed, and the policy was to provide antegrade revascularization in all cases, when possible. Retrograde revascularizations were only carried out in cases of heavy calcification of the celiac aorta where clamping was impossible.

The following pre-operative parameters were recorded: demographic data, cardiovascular risk factors (diabetes, hypertension, dyslipidaemia, tobacco use), comorbidities (a history of myocardial infarction, coronary bypass, or stenting corresponding to cardiac comorbidity, a creatinine clearance less than 30 mL/min for renal comorbidity, and a history of stroke or previous carotid endarterectomy for cerebral comorbidity), and blood albumin level.

An angiographic score was assigned, regardless of pre-operative angiography imaging, to evaluate the digestive arterial system in each patient: for each digestive artery (CT, SMA, IMA), occlusion was rated 0, a stenosis greater than 70% was rated 1, a stenosis between 50% and 70% was rated 2, a stenosis of less than 50% was rated 3, and a normal artery was rated 4. This score was developed in order to have an objective and easily quantified value for each patient.

Surgical procedures performed were listed, including the type of revascularization done: complete or incomplete. Thirty day mortality and morbidity were recorded. Morbidity was defined as surgery related morbidity (graft thrombosis, haemorrhagic complication, operative site infection) or systemic morbidity (renal, pulmonary, cardiac, or neurologic failures).

Patients were reviewed in the outpatient clinic at 30 days and at 6 months, and annually thereafter. Ultrasound monitoring was performed in each case, and a CT scan when ultrasound examination was non-contributory. Survival, primary patency, secondary patency, and freedom from digestive symptoms were analysed according to the completeness of the revascularization.

Statistical analysis was performed using GraphPad Prism under the supervision of the University Statistics Department. Non-normally distributed data are presented as median (MED) and interquartile range (IQR). Kaplan–Meier analysis and log-rank test were used to compare survival, primary patency, secondary patency, and freedom from digestive symptoms rates. The chosen significance level was 5% ($p < .05$).

RESULTS

Population

Eighty-six patients, 52 men and 34 women (sex ratio 1.53), with median age 62 (IQR 56–75) years were included. During the same period 31 revascularizations considered as preventive (completed for asymptomatic patients presenting at least 2 lesions regardless of the Mikkelsen rule, or completed during aortobifemoral bypasses done for occlusive disease), 39 endovascular procedures performed in patients with poor clinical status, and 36 procedures performed for AMI were excluded.

Median follow up was 6.9 (range 0.3–20.0) years. No patients dropped out the study. Cardiovascular risk factors were diabetes mellitus in 22 patients (26%), hypertension in 72 patients (84%), dyslipidaemia in 48 patients (56%), and active tobacco use in 42 patients (49%). Cardiac, renal, and cerebral comorbidities were present in 50 (58%), 21 (24%), and seven (8%) patients respectively.

Typical chronic postprandial abdominal pain was present in 73 patients (85%), weight loss in 66 patients (77%), food fear with meal splitting in 54 (63%) and diarrhoea, nausea or vomiting in 48 patients (56%). Mean weight loss was 13.6 kg (median 10.0, interquartile range [IQR] 7.0–12.5). Malnutrition was present in 50 patients (58%), with associated hypoalbuminaemia and body mass index <19 kg/m².

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