Open Surgical Bypass for Chronic Mesenteric Ischemia in the Era of Endovascular Surgery

Original Article

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ABSTRACT

Background: Chronic mesenteric ischemia (CMI) is a rare condition which affects up to 10% of the population over 65 years of age. The classical symptomology is a triad of postprandial abdominal pain, weight loss and/or unexplained diarrhea. As expected, CMI has been treated extensively by endovascular interventions owing to the fewer in-hospital complications and 30-day mortality rates. By reviewing the literature, some review articles showed better long-term outcomes with primary and secondary patency rates being significantly higher for open repair.

Patients and Methods: This was a retrospective review of patients who underwent open surgical revascularization for CMI at Alexandria University during the period between July 2013 and November 2021. Patients included were all older than 18 years old and presented with CMI with documented weight loss and computed tomography (CTA) evidence of atherosclerotic mesenteric occlusive disease. The primary endpoints were intra and postoperative complications.

Results: Nine cases of Ilio-mesenteric bypass were presented. The average age was 67 years, six out of nine were male patients. Five patients had a Dacron graft used as the conduit for bypass and the rest had the great saphenous vein as the chosen conduit. Two patients with a vein bypass had vein stenosis picked on CTA done for postoperative surveillance. These were managed endovascularly, 1 patient had angioplasty and the other had veinoplasty and stenting. Another patient had common iliac artery stenosis on follow-up CTA, this was managed by stenting. The minimum patency period was 3 years, 5 cases had graft occlusion at some point after 3 years and 4 cases had their grafts patent for 3, 7, 8, and 11 years.

Conclusion: Open surgical bypass for CMI still has a place in the era of endovascular surgery. It is safe and effective even following the failed endovascular intervention. Clinical and radiological surveillance are both mandatory to ensure long-term patency of the bypass.

Key Words: Chronic mesenteric ischemia, ilio-mesenteric bypass, superior mesenteric artery stenting.

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INTRODUCTION

Chronic mesenteric ischemia (CMI) is a fairly rare condition which affects up to 10% of the population over 65 years of age[1]. In Egypt, although it is not commonly diagnosed, it carries significant morbidity, mortality, and a decreased quality of life [2]. The classical symptomology is a triad of postprandial abdominal pain, weight loss, and/or unexplained diarrhea. Because of the extensive collaterals, at least two of the three visceral arteries should be affected[3]. Abdominal duplex ultrasound could only serve as a screening tool for CMI [4], while computed tomography angiography (CTA) is the gold standard diagnostic modality and is mandatory before any intervention [5].

Management intends to improve quality of life, help patients gain some weight, and avoid intestinal infarction. As expected, CMI has been treated extensively by endovascular interventions owing to the fewer in-hospital complications and 30-day mortality rates. This has been shown by a meta-analysis [6] that compared open to endovascular repair for CMI. However, in a governmental health service where the cost matters, comes the role of the classical open surgical techniques that often new vascular trainees lack their skills. By reviewing the literature, some review articles [7,8] showed better long-term outcomes with primary and secondary patency rates being significantly higher for open repair. Looking into the European guidelines [9], it was concluded that reduction in short-term mortality and morbidity of endovascular interventions for CMI overshadow the superior long-term results of open revascularization, especially since CMI affects mostly the elderly population. In this series, we present 9 cases of ilo-mesenteric bypass done for management of chronic mesenteric ischemia.

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PATIENTS AND METHODS

This was a retrospective review of patients who underwent open surgical revascularization for CMI at Alexandria University during the period between July 2013 and November 2021. Patients included were all older than 18 years old and presented with CMI with documented weight loss and CTA evidence of atherosclerotic mesenteric occlusive disease. Exclusion criteria were patients who presented with acute mesenteric ischemia, nonatherosclerotic ischemia, bypasses done as part of the debranching procedure for the management of thoracoabdominal aneurysmal disease, and patients with malignancy.

Hospital records for patients' demography, presentation, co-morbidities, and intervention were studied. The primary endpoints were intra and postoperative complications. Unless a patient had died or had a postoperative surveillance CTA that showed the bypass was occluded, they were recalled in June 2024 to look at the secondary endpoints; recurrence of symptoms, and graft patency.

Upon obtaining informed consent from all patients, bowel preparation was commenced 24 h before surgery. All patients underwent left common iliac artery (CIA) to superior mesenteric artery (SMA) bypass through a classical midline laparotomy incision. Exposure of the SMA was carried out over the root of the mesentery after retracting the transverse colon upwards and the intestinal loops medially. The left CIA was dissected retroperitoneally lateral to the sigmoid colon. Full anticoagulation was maintained by giving 5000 IU of Heparin intravenously. Upon arterial clamping, the chosen conduit was tunneled retroperitoneally in a C-shaped orientation. Always, the anastomosis to the CIA was constructed first, then the one to the SMA.

RESULTS

During the period from 2013 to 2021, 9 cases of Ilio-mesenteric bypass were performed at the vascular department of Alexandria University Hospitals. Detailed data of the patients are elaborated in (Table 1) below. The average age was 67 years, 6 out of 9 were male patients. All patients presented with abdominal pain +/- diarrhea +/- weight loss. Two patients had an initial trial for endovascular stenting of SMA, one had a failed cannulation of the SMA occlusion and the other had SMA stent thrombosis after 1.5 years of the procedure. Preoperative CTA of all cases had shown SMA stenosis or occlusion +/- IMA +/- CA disease. Five patients had a Dacron graft used as the conduit for bypass and the rest had the great saphenous vein as the chosen conduit. Only one patient had intraoperative graft thrombosis of unknown cause, this was managed by thrombectomy using a Fogarty catheter and redo of SMA anastomosis. Two patients with a vein bypass had vein stenosis, probably torsion, picked on CTA done for postoperative surveillance. These were managed endovascularly, one patient had angioplasty and the other had veinoplasty and stenting. Another patient had CIA stenosis on follow-up CTA, this was managed by stenting. The minimum patency period was 3 years, 5 cases had graft occlusion at some point after 3 years and 4 cases had their grafts patent for 3, 7, 8, and 11 years. Three cases had died at the time of the study, none of them related to the procedure.

Table 1: Demographic data, operative details, and follow-up of the 9 cases included in the study.

Case	Age	Sex	Background	Preoperative CTA	Surgery	Date of procedure	Intraoperative complica-tions	Postoperative complica-tions	Recurrence of Symptoms	Graft patency	Mortality
1	68	M	HTN IHD Smoker Abdominal Pain + weight loss	Proximal SMA occlusion + IMA extensive disease	Ilio-mesenteric bypass using GSV	2013	Nil	Ilieus for 1 week, managed conservatively	Intermittent abdominal pain	Occluded after 3 years, patient refused redo	Died 2019
2	59	M	HTN DM COPD RA Abdominal pain + diarrhea + weight loss	SMA high grade proximal stenosis + CA disease + IMA occlusion	Ilio-mesenteric bypass using Dacron graft	2013	Ureteric injury	Nil	Nil	Patent after 11 years	Nil
3	66	F	HTN Anemia DVT Smoker Abdominal pain + diarrhea + weight loss	SMA proximal + IMA occlusion	Ilio-mesenteric bypass using Dacron graft	2014	Nil	Pneumonia	Postprandial abdominal pain. CTA after 4 years: CIA stenosis, managed by stenting	Occluded after 6 years from surgery	Nil
4	74	M	IHD CABG AF Scoliosis CKD Smoker Abdominal pain + diarrhea	SMA and Ca proximal occlusion	Ilio-mesenteric bypass using Dacron graft	2014	Graft thrombosis, managed by thrombecto-my and redo of SMA anastomosis	MI Pneumonia	Nil	Occluded after 3 years during admission for NSTEMI	Died 2017
5	65	M	HTN IHD Coronary stent PAD Abdominal pain + diarrhea + weight loss	SMA high grade proximal stenosis + Ca + IMA occlusion	Ilio-mesenteric bypass using Dacron graft	2016	Intestinal tear, managed by direct repair	Intestinal leakage, managed by exploration and intestinal repair	Nil	Patent after 8 years	Nil
6	63	F	HTN History of ovarian cancer Osteoporosis Abdominal pain	SMA high grade proximal stenosis + CA occlusion	Ilio-mesenteric bypass using GSV	2017	Nil	DVT	Postprandial abdominal pain + weight loss CTA after 4 years: mid graft 80% stenosis, managed by balloon angioplasty	Patent after 7 years	Nil
7	68	M	Bronchiectasis Liver impairment CKD Abdominal pain + diarrhea + weight loss	SMA high grade proximal stenosis	Ilio-mesenteric bypass using GSV	2017	Liver retractor injury, managed by direct repair	Pancreatitis	Nil	Occluded after 5 years.	Nil
8	70	M	IHD DM Neuropathy PAD CVS Smoker Abdominal pain + weight loss	SMA high grade proximal stenosis + CA and IMA extensive disease	Ilio-mesenteric bypass using GSV	2019	Iliac vein injury, managed by direct repair	DVT	Post-prandial abdominal pain CTA after 1 year: proximal vein stenosis (?? Torsion) Managed by venoplasty and stenting	Occluded after 3 years from surgery	Died 2023
9	71	F	CVS IHD AS Abdominal pain + diarrhea + weight loss	SMA proximal occlusion + Ca and IMA extensive disease	Ilio-mesenteric bypass using Dacron graft	2021	Nil	Psychosis AKI	Postprandial abdominal pain CTA after 2 years: stenotic SMA anastomosisand newly diagnosed RCC	Patent after 3 years	Nil

AF, atrial fibrillation; AKI, acute kidney injury; AS, ankylosing spondylitis; CA, coeliac artery; CABG coronary artery bypass graft; CKD, chronic kidney disease; COPD, chronic obstructive lung disease; CTA, computed tomography angiography; CVS, cerebro-vascular stroke; DM, diabetes mellitus; DVT, deep vein thrombosis; GSV, great saphenous vein; HTN, hypertension; IHD, ischemic heart disease; IMA, inferior mesenteric artery; NSTEMI, non-ST elevation myocardial infarction; PAD, peripheral arterial disease; RA, rheumatoid arthritis; RCC, renal cell carcinoma; SMA, superior mesenteric artery.

DISCUSSION

This was a case series of a rarely performed vascular procedure nowadays; ilio-mesenteric bypass for chronic mesenteric ischemia. This condition often has a gradual onset of symptoms and is frequently diagnosed late in its course. Surgical open repair has been always the standard treatment before the era of angioplasty and stenting dominates. In this series, nine cases of ilio-mesenteric bypass performed for chronic mesenteric ischemia were studied.

Although the literature lacks proper RCT s comparing open to endovascular repair for CMI, most interventionists opt to endovascular-first approach given the likelihood of less perioperative morbidity and mortality. This strategy is being more adopted, especially in the era of the emergence of interventional radiology. It is difficult to dispute that as publications since more than 17 years support the endovascular-first modality. A meta-analysis in 2007 [10] evaluated 16 studies involving 328 patients and demonstrated high technical and clinical success rates. They had 9% complication rate and 3% 30-days mortality which were considered advantageous when compared with published rates in patients treated with open surgery at that time. In 2017 a meta-analysis comparing open to endovascular repair for CMI, which included 100 observational studies and 18 726 patients, demonstrated that endovascular-first treatment was associated with significantly decreased risk of in-hospital complications and less 30-day mortality [6]. In 2021 a large Danish cohort study involving 245 cases concluded that endovascular-first treatment for CMI had a 3-year mortality rate of 25% and a low risk of symptom recurrence [11]. Fairly, since then most centers worldwide advocate endovascular interventions as the first choice for CMI in anatomically feasible patients.

Having said that, other series [12–15] which were dated before 2007 showed promising results towards open surgical repair; with high technical success rates and resolution of symptoms in 90–100% of patients. However, they could not deny the significant morbidity (5–30%) and mortality (5–12%) rates. In favor in our management approach, other researches [7,8] have compared open to endovascular treatment for CMI in terms of patency and concluded that open repair had better primary, assisted primary, and secondary patency rates.

Nobody can disagree that secondary interventions after open surgical repair are inevitable to maintain the patency of mesenteric bypass. Three cases in our series needed either inflow or conduit adjunctive endovascular interventions for lesions picked up on CTA done for recurrence of symptoms. This highlights the importance of close clinical and duplex ultrasound surveillance for these patients, which our unit lacks. According to the European Society of Vascular Surgery [9] there is no rational for routine follow-up scanning, but high-volume centers [16] recommend routine duplex evaluation at 1, 3, and 6 months initially, and every 6 to 12 months thereafter.

This series shows that open surgical bypass for symptomatic chronic mesenteric ischemia still has a place in the era of endovascular surgery. It is safe and effective even following failed endovascular intervention. Clinical and radiological surveillance are both mandatory to ensure long-term patency of the bypass.

CONFLICTS OF INTEREST

There are no conflicts of interest.

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