ORIGINAL RESEARCH PAPER

General Surgery

'MESENTERIC ISCHAEMIA' - NOT A MYTH ANYMORE!

KEY WORDS: Acute mesenteric ischaemia, SMA thrombosis, Gangrene, Infarction

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ABSTRACT

Acute Mesenteric Ischaemia had remained a nemesis for the surgeons since time immemorial especially because of the highly staggering mortality rates associated with this condition. However, with the evolution of advanced imaging techniques and growing awareness among the public, coupled with surgical expertise and multidisciplinary care, this catastrophe has been better tamed with time and in fact, the surgical fraternity has gained a substantial strange-hold over it. We hereby report two cases of Acute Mesenteric Ischaemia, admitted in our unit and discuss how they were managed in the acute phase and in the long-run, therey enabling patients to lead better lives.

INTRODUCTION:

Mesenteric Vascular Ischaemia can present as one among the two distinct clinical syndromes: Acute Mesenteric Ischaemia and Chronic Mesenteric Ischaemia. Acute Mesenteric Ischaemia usually occurs as a result of one of four distinct pathophysiologic mechanisms - Arterial embolus, Arterial thrombosis, Venous thrombosis and Vasospasm (also known as Non-Occlusive Mesenteric Ischemia or NOMI). Among these, embolus is the most common cause of acute mesenteric ischaemia and is responsible for more than 50% of cases. The source for emboli is usually in the heart, most often the left atrial or ventricular thrombi or the valvular lesions. Irrespective of the pathophysiologic mechanism, acute mesenteric ischaemia can lead to intestinal mucosal sloughing within 3 hours of onset and full-thickness intestinal infarction by 6 hours. Severe abdominal pain, out of proportion to the degree of tenderness on examination is the hallmark of acute mesenteric ischaemia. The pain is typically perceived to be colicky and most severe in the mid abdomen. Associated symptoms can include nausea, vomiting, and diarrhoea. Physical findings are characteristically absent early in the course of ischaemia. However, with the onset of bowel infarction, abdominal distension, peritonitis, and passage of bloody stools occur. Despite recent progress in perioperative management and better understanding of pathophysiology, mesenteric ischaemia is considered to be one of the most catastrophic vascular disorders with mortality rates ranging from 50% to 75%. Delays in diagnosis and treatment are the main contributing factors in its high mortality. Thus, early recognition and prompt treatment before the onset of rapid progression of irreversible ischaemia are crucial to improve the outcome.

Cases' Report:

Case - 1:

A 30 years old male patient presented with complaints of severe abdominal pain, predominantly over epigastrium & left lumbar regions with one episode of melena 2 days back. On admission, patient's vitals were stable with slightly distended and tender abdomen, with presence of faecal staining & a collapsed rectum. CT Abdomen was done that was suggestive of SMA Thrombosis with normally enhancing bowel loops & warranted further evaluation by Abdominal Angio. CT Abdominal Angiogram was done that revealed Superior Mesenteric Artery Thrombosis at its origin causing small bowel infarction (distal jejunum) and possible gangrene formation. Patient was immediately taken up for surgery and Diagnostic laparoscopy was performed that confirmed bowel gangrene and it was converted to open laparotomy & proceeded. Intraoperatively, about 40 cm of Jejunum (in its mid portion), 40 cm from DJ flexure was found to be gangrenous with no other significant pathology and was resected followed by Double Barrel Jejunostomy. Postoperatively, Heparin injection was given initially and then switched over to oral anti-coagulants. He was advised to continue oral anticoagulants on discharge besides improving his nutrition status.

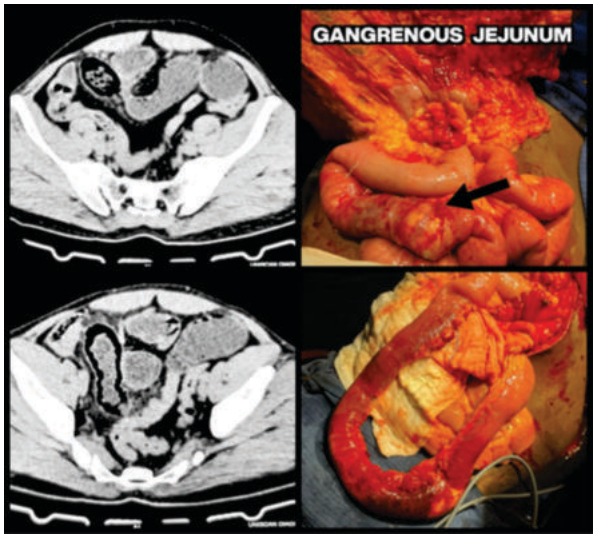

Figure 1: Preop CECT films and Intra-op pictures showing Gangrenous segment

Patient reported back after 2 months for ostomy reversal and a repeat contrast study was done to ensure adequate collateral circulation with normal bowel patency on Colonoscopy & Looposcopy. Ostomy reversal (Jejuno-jejunal anastomosis) was done and patient was once again given Heparin followed by oral anti-coagulants. Patient was discharged with oral anti-coagulants & he was advised to review periodically with coagulation profile (PT-INR values). He was doing fine until last review.

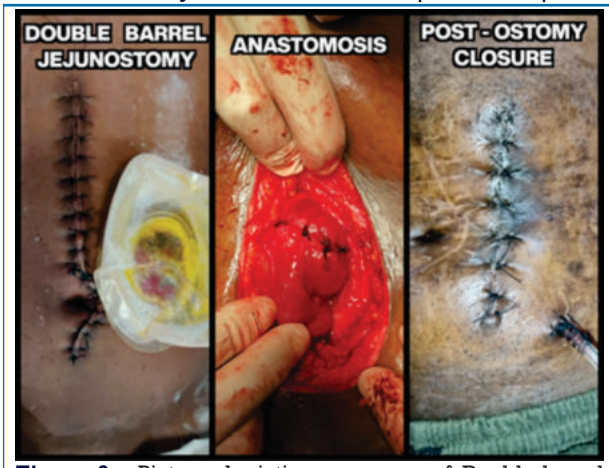

Figure 2 : Picture depicting sequence of Double-barrel Jejunostomy closure

Case - 2:

A 38 years old male patient presented with complaints of diffuse abdominal pain for the past 4 days with history of abdominal distension & multiple episodes of vomiting over the last 2 days. On admission, patient's vitals were unremarkable except for tachycardia and his abdomen was distended & tender on palpation with diminished bowel sounds. Contrast study was done that showed partial thrombosis of SMA near its origin with dilated small bowel bowels upto mid Ileum. Patient was immediately taken up for Exploratory laparotomy after obtaining high risk consent. Intraoperatively, there were multiple focal necrotic patches over small bowel, about 30 cm from DJ flexure for a length of 30 cm with similar findings noted for another 30 cm around Mid to Distal Ileum, about 120 cm from IC junction. Frank bowel ischaemia noted for a length of about 100 cm between these two segments. Interestingly, Meckel's diverticulum was found incidentally on thorough laparotomy, about 2 feet from IC junction. It was proceeded with complete resection of necrotic & ischaemic segments followed by Proximal Jejunostomy and Distal Ileostomy. Patient was started on Heparin and provided intensive care as he made good progress and was switched over to oral anti-coagulants following oral intake and was discharged on 10th POD.

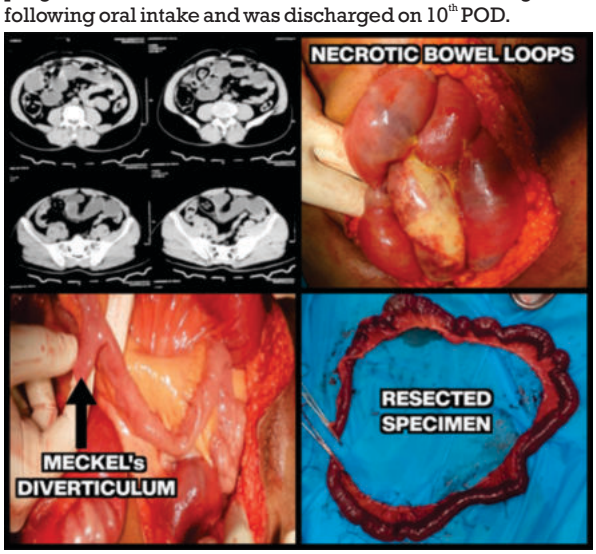

Figure 3 : Image showing typical CECT findings with Necrotic bowel loops intraoperatively

Patient was severely malnourished owing to effects of massive bowel loss and he was re-admitted & treated vigorously with adequate fluids and nutritional supplementation and then discharged. He came back for ostomy reversal and after ensuring normal loopogram study, Stoma reversal was done for the patient and he was continued on Anti-coagulants. Postoperatively, patient recovered well with good weight gain following oral intake and he was discharged & advised periodical follow-up.

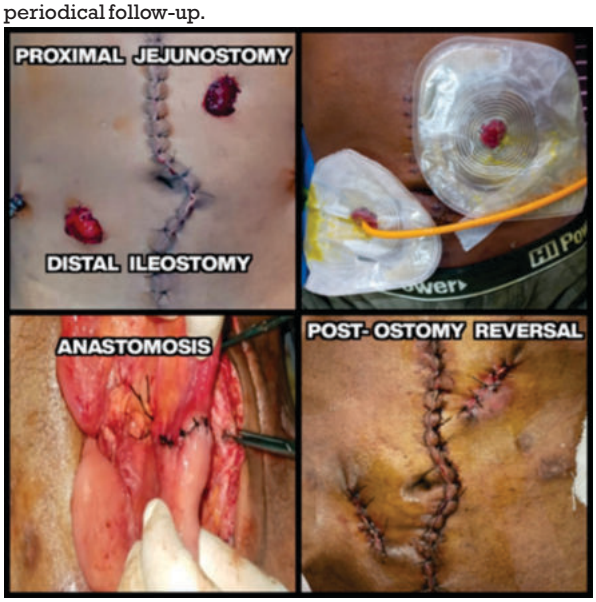

Figure 4: Images showing both the Ostomies followed by Ostomy reversal

DISCUSSION:

Vascular occlusive disease of the mesenteric vessels is a relatively uncommon but potentially devastating condition that generally presents in patients over 60 years of age, but not so uncommon in middle-aged individuals as evident from our case series. The most common cause of mesenteric ischemia is atherosclerotic vascular disease. Other possible aetiologies include Fibromuscular Dysplasia, Polyarteritis nodosa, Arteritis, and Celiac artery compression from a median arcuate ligament. Among the pathophysiologic mechanisms, embolism remain the leading cause and about 95% of patients with acute mesenteric ischaemia due to emboli will have an antecedent history of cardiac disease. Embolism to the superior mesenteric artery accounts for 50% of cases and most of these emboli become wedged & cause occlusion at branch points in the mid- to distal superior mesenteric artery, usually distal to the origin of the middle colic artery. On the contrary, acute thrombotic occlusions tend to occur in the proximal mesenteric arteries, close to their origins, as seen in both the cases. Acute thrombosis is usually superimposed on pre-existing atherosclerotic lesions at these sites. While acute occlusion of the celiac or the inferior mesenteric arteries is usually well tolerated, acute SMA occlusion produces widespread infarction throughout the small bowel and colon. With abrupt cessation of SMA inflow, small intestinal ischemia rapidly initiates within the bowel mucosa, where epithelial and endothelial cell damage lowers mucosal barrier function, leading to the vicious cycle of bacterial invasion, susceptibility to degrading enzymes, micro-circulatory stasis, oedema and ultimately intravascular thrombosis sets-in. Abdominal pain out of proportion to physical findings is the classical presentation in patients with acute mesenteric ischaemia as is the case with our patients and it usually occurs following an embolic or thrombotic ischaemic event of the SMA. Other manifestations include sudden onset of abdominal cramps in patients with underlying cardiac or atherosclerotic disease, often associated with bloody diarrhoea, as a result of mucosal sloughing secondary to ischaemia. Fever, nausea, vomiting and abdominal distention are common but non-specific features. Diffuse abdominal tenderness, rebound and rigidity are usually late signs & might indicate underlying bowel infarction and necrosis. The key factor limiting clinical progress in lowering the high morbidity & mortality in acute

mesenteric ischaemia remains prompt diagnosis. Thus, symptoms and signs require careful scrutiny. A key to diagnosis is a high index of clinical suspicion, especially in high-risk patients. A contrast-enhanced CT scan will show reduced or absent bowel wall enhancement and there may be free-fluid in the abdomen. Radiographic appearance of an adynamic ileus with a gasless abdomen is the most common finding in patients with acute mesenteric ischaemia. Arteriography is the gold standard for the diagnosis of mesenteric occlusive disease. However, it can be a time-consuming diagnostic modality, resulting in progression of bowel ischaemia. Surgeons may reasonably immediately proceed with operative exploration in patients presenting with classical history and physical findings with minimal laboratory testing and even without preoperative imaging. An immediate laparotomy with embolectomy or revascularisation of the SMA by vascular bypass may be considered in early cases of arterial ischaemia, followed by postoperative anticoagulation. However, the condition is usually diagnosed late in the disease process and the mortality rate is extremely high. In the young, all affected bowel should be resected as in our study which may not be feasible in the elderly. In cases where embolectomy or revascularisation is not done, and in cases with peritonitis, it is always better to perform an ostomy following resection of gangrenous bowel than primary anastomosis. Ostomy reversal may be undertaken beyond six weeks after improving patient's general condition & nutrition status. Where the demarcation between viable and non-viable bowel is uncertain a planned re-look laparotomy may be useful. Small bowel transplantation may be required, especially in the young patients following extensive bowel resection, to overcome the consequences of short gut syndrome. Lifelong anticoagulation is essential to keep this demon under check.

CONCLUSION :

Mesenteric Ischaemia owing to SMA thrombosis can cause deleterious effects on the lives of patients if not diagnosed & intervened early. From our case series, it is safe to conclude that, eliciting a detailed clinical history, especially in high-risk individuals, coupled with thorough physical examination can enhance early preoperative diagnosis and with further assistance from imaging techniques can prompt us towards timely surgical intervention thereby reducing the morbidity and the mortality of the patient. Long-term follow-up with lifelong anticoagulation also forms a critical component in its management.

REFERENCES

1. Gnanapandithan K, Feuerstadt P. Review Article: Mesenteric Ischemia. Curr Gastroenterol Rep. 2020 Mar 17;22(4):17. doi: 10.1007/s11894-020-0754-x. PMID:32185509.
2. Lawson RM. Mesenteric Ischemia. Crit Care Nurs Clin North Am. 2018 Mar;30(1):29-39. doi: 10.1016/j.cnc.2017.10.003. Epub 2017 Nov 20. PMID: 29413213.
3. Ehlert BA. Acute Gut Ischemia. Surg Clin North Am. 2018 Oct;98(5):995-1004. doi:10.1016/j.suc.2018.06.002. Epub 2018 Jul 29. PMID:30243457.
4. SCHWARTZ's PRINCIPLES OF SURGERY (11th Edition) Chapter 23: Arterial Disease -

a. Peter H. Lin, Carlos F. Bechara, Changyi Chen, and Frank J. Veith ; Chapter 28 : Small Intestine - Ali Tavakkoli, Stanley W. Ashley, and Michael J. Zinner

5. BAILEY & LOVE's SHORT PRACTICE OF SURGERY (28th Edition) Chapter 74 : The Small Intestine - *Gordon L. Carlson and Jonathan C. Epstein*
6. FISCHER'S MASTERY OF SURGERY (SEVENTH EDITION) Chapter 217: Acute Mesenteric Artery Ischemia: Open and Endovascular - *James T. McPhee, Edward Kelly, and C. Keith Ozaki*