



## Clinical Factors Affecting Outcome in Acute Mesenteric Ischemia in Patients from Peripheral Areas

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### Abstract

**Aim:** To analyse the clinical factors affecting the outcomes of patients with AMI.

**Material and Methods:** Clinical data of 11 patients with AMI with gut gangrene were analysed. Presentation, operative findings, peri-operative morbidity and complications were analysed.

**Results:** Pain abdomen, vomiting & distension were common symptoms while few presented with hematemesis, malena, jaundice and fever. X-ray abdomen and chest were suggestive of dilated bowel loops and pleural effusion while CECT abdomen had dilated thickened bowel loops, ascites and in few thrombosis of SMA. The mean interval between onset of symptoms to surgical intervention was 4.6 days due to delayed presentation as well as diagnosis. Ten patients underwent gut resection and ileostomy/jejunostomy while 01 patient underwent resection anastomosis. Seven patients required major bowel resection (> 150 cm) and 04 patient required segmental bowel resection. Six patients required ICU care > 07 days for inotropic and/or ventilatory supports. Post-operative, nutritional and fluid management was achieved with TPN, IV fluids, re-feeding of jejunal output. Six patient survived > 30 days. Early mortality (< 30 days) was due to sepsis, frequent dehydration, PTE and multi-organ failure while late mortality (> 30 days) was due to enterocutaneous fistula, central line thrombosis and sepsis.

**Conclusion:** AMI has high morbidity and mortality. The management is delayed due to initial non-specific presentation. Imaging like CECT abdomen is helpful in late stage. Extent of bowel resection and proximal remaining jejunum has adverse effect on outcome. Early diagnosis and intervention can reduce sepsis related early mortality.

**Keywords:** Gut gangrene, Acute Mesenteric Ischemia, AMI.

### Introduction

Acute mesenteric ischemia (AMI) is an uncommon cause of acute abdomen with non-specific clinical

presentation. It is associated with very high morbidity and mortality (32.1% - 77.4%) depending on the aetiology of mesenteric ischemia<sup>[1]</sup>.

The mortality has not reduced despite advances in clinical, radiological diagnosis and critical care advancements. Cokkins AJ in 1926 offered pessimistic view about this condition “.... the diagnosis is impossible, the prognosis hopeless and the treatment useless....”<sup>[2]</sup>. Unfortunately, this remains valid even after initial description of the condition.

Mesenteric ischemia can be caused by – Arterial embolism, arterial thrombosis, venous congestion or non-occlusive mesenteric ischemia. The aetiology of mesenteric ischemia is directly associated with mortality and outcome of the disease. Arterial embolism and venous congestion have better outcome (54.1 % and 32.1% respectively) than arterial thrombosis and non-occlusive mesenteric ischemia (77.4 % and 72.7 % respectively). Early diagnosis and surgical treatment fare better than late diagnosis and non-surgical or conservative treatment<sup>[1]</sup>. We will review and analyse the clinical presentation, evaluation, surgical management, post-operative complication and management of our cases of acute mesenteric ischemia.

Clinical presentation of AMI are non-specific and radiological investigations are also not useful in early clinical stages. Radiological features are non-specific like bowel obstruction, bowel wall oedema, intraperitoneal free gas, portal venous gas, and pneumatosis intestinalis. These findings are identified late, when bowel ischaemia/infarction has already developed and hence are not so helpful<sup>[3]</sup>. In CECT abdomen in addition to above findings, vascular luminal filling defects and focal decreased of bowel wall enhancement can also be detected (Fig 3), intraperitoneal free gas, and ascites. Thickened bowel wall is the most frequently observed finding has a high sensitivity (85-88%) but much less specific (61-72%)<sup>[4,5]</sup>.

### Aim

Analyse the outcomes of management of Acute mesenteric ischemia (AMI) evacuated from remote operationally active areas to a tertiary care hospital between 2014-2017.

### Material and Methods

We retrospectively analysed clinical data of patients diagnosed with AMI with gut gangrene who were treated at Tertiary Care Hospital of Indian Armed Forces between Jan 2014 to Jun 2017. Clinical presentation, operative findings, length of stay in hospital, peri-operative morbidity and complications were analysed.

### Results

*Clinical Presentation:* 11 patients (09 males, 02 females, age 36 -70 years, mean 48.7 years) diagnosed with AMI with gut gangrene. Pain abdomen, vomiting & distension were most common symptoms in these patients while few had presented late with hematemesis, melena, jaundice, fever and features of sepsis. Those patients who presented and diagnosed late (04/11, 36.36%) were in poor general condition with hypotension, tachypnoea, fever and required inotropic and ventilatory supports pre-operatively for resuscitation.

*Investigations & Imaging:* Chest X-ray and X-ray abdomen were done in all cases. In some, findings on X-ray abdomen and chest X-ray was suggestive of dilated bowel loops and pleural effusion, while in others it was inconsistent (Figure 1). Most prominent features in CECT abdomen were dilated & thickened bowel loops, ascites and in few thrombosis of SMA was also seen (Figure 2).



**Figure 1:** X-ray Abdomen- Dilated Small Bowel Loops

USG abdomen were not found to be useful because of dilated bowel loops. Most patient had leucocytosis and dys-electrolytemia while two had sepsis related jaundice and azotaemia.



**Figure 2:** CECT Abdomen- Thickened Bowel Loops

*Surgical Management:* All patient underwent exploratory laparotomy after resuscitation. The interval between onset of symptoms to surgical intervention was 4.6 days (01- 09 days). This delay was attributable to delay reporting to hospital due to deployment in inaccessible field areas as well as delay in definitive diagnosis.



**Figure 3:** Focal Gut Gangrene

Patients with venous congestion gut gangrene were found to be 10 years younger than the patient with arterial ischemic gut gangrene. 06/11 patient (54.5%, Average 52.8 years) had arterial insufficiency both embolic or thrombosis (Figure 3 & Figure 4) while 05/11 patients (45.5%, Average 43.8 years) had venous congestion gut gangrene (Figure 5).

10 patients underwent gut resection and ileostomy/jejunostomy with mucous fistula while 01 patient underwent gut resection and primary anastomosis.



**Figure 4:** Ischemic Gut Gangrene



**Figure 5:** Congestive Gut Gangrene

07/11 patient required major bowel resection (> 150 cm) and 04/11 patient required segmental bowel resection. 05/11 patient had < 50 cm proximal jejunal length remaining as proximal jejunostomy and subsequently 03 of these died within 30 days. 03/11 patients required re-exploration and re-resection of bowel loop. 04 patients required laparostomy (Figure 6) while in 07 patients only skin was closed. Abdominal closure including rectus sheath was not done to avoid abdominal compartment syndrome in all cases.

Post-operative care: Six patient required ICU care > 07 days for inotropic and/or ventilatory supports while 05 patient required ICU stay < 07 days for inotropic supports. Post-operatively, patients were placed on injection LMWH and oral anti-coagulants for six months.



**Figure 6:** Laparostoma

03 patients had peri-operative pulmonary thromboembolism (PTE) and 01 patient had mortality associated with PTE. Nutritional and fluid management was achieved with TPN, IV fluids, re-feeding of jejunal output. They required prolong central line catheterisation and had frequent central line related sepsis with thrombosis of the neck veins.

**Morbidity & mortality:** Post operatively most common complications were surgical site infection, line sepsis and stoma related problems. 06 patient survived > 30 days and restoration of gut continuity was done in 05 patients after 03 months. 01/06 patient who underwent restoration of gut continuity had mortality due to entero-cutaneous fistula, multiple central line thrombosis with fungal sepsis. After restoration of gut continuity were done, 02 patient developed anastomotic leak and they required re-exploration and jejunal end-stoma. Most patient were able to maintain their nutrition and body weight after restoration of bowel continuity. One patient developed short bowel syndrome, he was managed with parenteral nutrition. However, he eventually died after one-year due to repeated line sepsis and malnutrition.

Total 06/11 (54.5%) patients had mortality, 03/06 patient had early mortality (<30days) due to sepsis and multi organ failure while 03/06 patient had late mortality (>03 months) due to repeated central line sepsis (bacterial/fungal) (01/03), frequent dehydration with hypotension (01/03) and ischemic stroke (01/03). Mean age of patient with mortality was 54 years while mean age of patient who survived were 42.4 years.

## Discussion

Acute mesenteric ischemia (AMI) has been associated with poor outcomes, with very high mortalities rates ranging 50% to 100% [1,6,7]. Arterial ischemic gut gangrene is most common aetiology of AMI - Arterial embolism (50%) Arterial thrombosis (20%) while other cases are Non-occlusive pathologies (20%) and Mesenteric venous thrombosis (10%). Most common artery affected is Superior mesenteric artery (SMA). Arterial emboli are most commonly originated in heart during atrial fibrillation and then it gets lodged usually in distal segmental branches of SMA distal to middle colic artery origin. This causes less length involvement of gangrenous gut than in arterial thrombosis which involves the origin of SMA and causes extensive small bowel gangrene. Venous congestion gut gangrene has generally segmental involvement of gut<sup>[8]</sup>. Although in various series on AMI most common aetiology was arterial origin (> 70%). However, in our series venous congestion gut gangrene were > 40% cases.

AMI has non-specific clinical presentation that leads to delay in diagnosis and hence the definitive management. High index of suspicion with “pain out of proportion to finding” might be help in early diagnosis. Pain abdomen, nausea, vomiting, loose stools, haematochezia and distension abdomen are early but non-specific features. Peritonitis and sepsis are late features and appears when gut is non-salvageable and gangrenous.

Radiological investigation is also not helpful in early clinical stage. Dilated bowel loops, bowel wall oedema, intraperitoneal free gas, portal venous gas, and pneumatosis intestinalis seen on X-ray abdomen are not helpful in early stage of disease and are identified when bowel ischemia/infarction has already developed. Features detected on Contrast Enhanced CT abdomen are vascular luminal filling defects or truncation of the vessels, focal decrease in bowel wall enhancement apart from bowel wall thickening, intraperitoneal free gas, and ascites. Bowel wall thickening is the most frequently observed finding in AMI. It has a high sensitivity (85-88%) but less specific (61-72%) [3,4,5].

Surgical intervention is considered standard treatment and has relatively less mortality than non-surgical intervention. The goal of surgery includes resection of non-salvageable or gangrenous bowel, prevention of further gut gangrene, control of sepsis and save maximum small bowel length. A second look laparotomy may be required to assess the viability of remaining gut. Revascularisation and catheter related balloon angioplasty followed by laparotomy are increasingly being used in AMI. Percutaneous endovascular intervention has become the first-line treatment approach for CMI and is being increasingly used in early presentation AMI<sup>[9]</sup>. The mean time from clinical presentation to surgical intervention was 4.6 days and due to late presentation for definitive care all of our patient required laparotomies while in few re-explorations were also done. The delayed surgical intervention caused sepsis and increased mortality. It is recommended to do early CECT abdomen, surgical exploration and gangrenous bowel resection<sup>[10]</sup>.

### Conclusion

AMI is an uncommon disease with high morbidity and mortality. The diagnosis and the surgical treatment is often delayed due to initial non-specific presentation. Imaging like CECT abdomen is helpful only in late stage. Extent of bowel resection and short proximal remaining jejunum has adverse effect on outcome of the patient. Long term survival depends upon remaining viable small bowel length and presence of short gut syndrome. Early diagnosis and surgical intervention can reduce the sepsis related early mortality.

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