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PRIMARY ENDOVASCULAR INTERVENTION OF ACUTE MESENTERIC ISCHEMIA PERFORMED THROUGH AN ANTEROGRADE TRANSRADIAL APPROACH



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Acute Mesenteric Ischaemia

Acute mesenteric ischemia (AMI) is a rare disorder defined as a critical reduction in blood flow and perfusion to the intestines. AMI consists of four pathologic processes with similar clinical presentation and one potentially fatal pathological endpoint - intestinal gangrene:

1. Arterial thrombosis
2. Arterial embolism
3. Non Occlusive Mesenteric Ischaemia (NOMI)
4. Mesenteric Venous Thrombosis (MVT)

Risk factors : advanced age, smoking, prothrombotic tendency, antiphospholipid antibodies, valvular/cardiac abnormalities, mechanical heart valve, atrial fibrillation, AMI/ventricular aneurysm, right to left shunt, PFO/ASD with paradoxical embolism etc.

1) Emboli (50%):

Cardiac Causes- Atrial Fibrillation, Valvular Diseases, Mural Thrombosis, Aortic Causes, Tumours, Iatrogenic, Cholesterol Embolisation

2) Thrombosis (25%):

Acute occlusion of Chronic Mesenteric Ischaemia, Vasculitis, Fibromuscular Dysplasia, Trauma, Dissection, Cocaine Abuse

3) Non Occlusive Mesenteric Ischaemia (20%):

Cardiac Failure, Cardio Pulmonary Bypass, Systemic Hypotension, Septic Shock

4) Mesenteric Venous Thrombosis (5%):

Coagulation disorders, Paraneoplastic Sy, Pancreatitis, Portal Hypertension, Previous sclerotherapy for oesophageal varices, Postoperative Trauma, Oral contraceptives

5) Extravascular Causes:

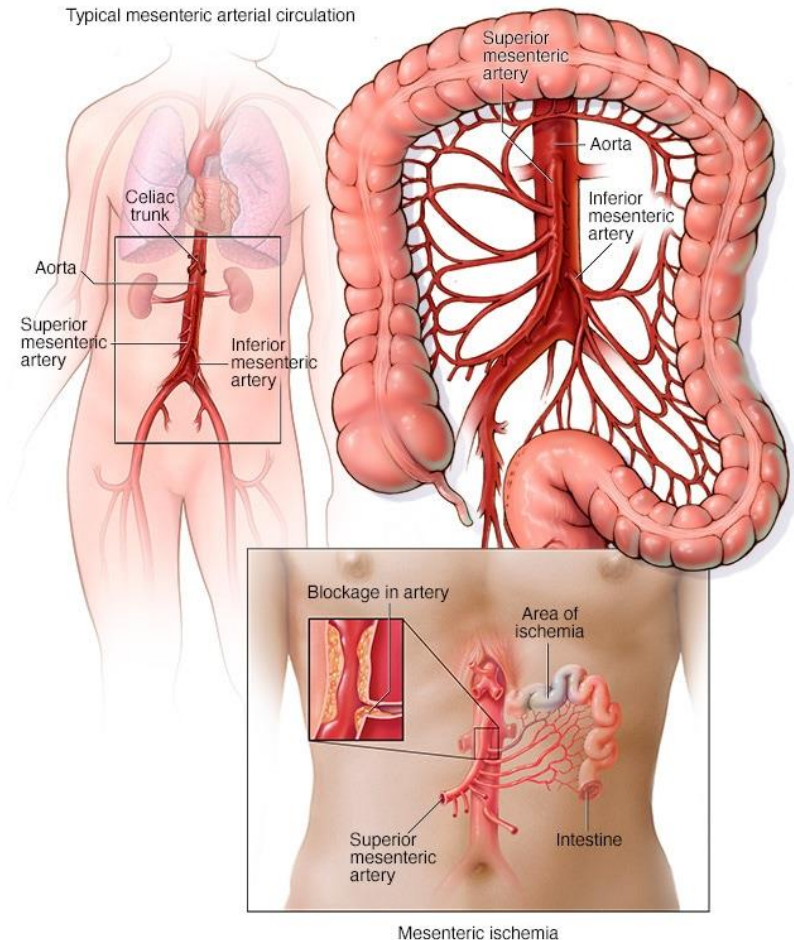
Strangulated Hernia, Volvulus, Intussusception etc.

Anatomy

1. Celiac artery (CA)- branches almost immediately into the left gastric (and occasionally the dorsal pancreatic), splenic, and hepatic arteries. It's supplying the liver, spleen, stomach, duodenum, and the pancreas.

2. Superior mesenteric artery (SMA)- supplying from the jejunum to the splenic flexure. In order, the branches are the inferior pancreaticoduodenal, jejunal and ileal and then the middle, right colic arteries, and ileocolic arteries.

3. Inferior mesenteric artery (IMA)- branches include the left colic, marginal, superior rectal, and sigmoid arteries, supplying from the splenic flexure to the rectum.



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Critical stenoses may occur in all three major vessels, and the patient can remain asymptomatic due to extensive collateralization.

Acute mesenteric ischemia

With the increase in average life expectancy, AMI represents one of the most threatening abdominal conditions in elderly patients. Rare or not, AMI should never be overlooked as a possible cause of acute abdomen especially in the elderly or those with heart failure and cardiac arrhythmia.

The incidence of AMI increases exponentially with age. In patients aged 75 years or older, AMI is a more prevalent cause of acute abdomen than appendicitis.

Acute mesenteric ischemia is generally caused by a thrombotic or embolic occlusion of the superior mesenteric artery (SMA), which is a life-threatening event related to the artery supplying the majority of the small bowel and right side of the colon.

Despite recent advances, surgical treatment is still associated with a 60% to 70% mortality.

One of the most important reasons for this high mortality are the delays in arriving at the correct diagnosis and undergoing surgical treatment.

Endovascular therapy

Despite advances in the understanding of the pathogenesis of mesenteric ischemia and the development of modern treatment modalities, acute mesenteric ischemia remains a diagnostic challenge for clinicians, and delays in diagnosis contribute to a continued high mortality rate. Early diagnosis and timely effective treatment are essential to improve clinical outcome.

Endovascular therapy has several theoretical advantages for the treatment of AMI. Avoidance of emergency laparotomy may limit secondary injury after initial ischemic injury. Revascularization increases survival and reduces the risk of intestinal resection and may lead to faster restoration of intestinal perfusion than open laparotomy, surgical embolectomy, or surgical bypass techniques.

All these situations strongly suggest that an early invasive protocol is important in diagnosis and treatment of this condition in real-world practice.

In our hospital, interventional cardiologist is available 24-hours a day.

Recommendations on the management of acute mesenteric ischaemia

Recommendations	Class ^a	Level ^b
Diagnosis		
In patients with suspected acute mesenteric ischaemia, urgent CTA is recommended. ¹⁷⁹	I	C
In patients with suspicion of acute mesenteric ischaemia, the measurement of D-dimer should be considered to rule out the diagnosis. ¹⁷⁷⁻¹⁷⁹	IIa	B
Treatment		
In patients with acute thrombotic occlusion of the superior mesenteric artery, endovascular therapy should be considered as first-line therapy for revascularization. ^{182,184,187,188}	IIa	B
In patients with acute embolic occlusion of the superior mesenteric artery, both endovascular and open surgery therapy should be considered. ^{182,184,187,188}	IIa	B

CTA = computed tomography angiography.

^aClass of recommendation.

^bLevel of evidence.

Case presentation

An 85-year-old woman was hospitalized with acute mesenteric ischemia. The clinical presentation was dominated by pronounced abdominal pain, nausea, vomiting lasting 3-4 hours and still persisting on admission.

Computed tomography showed occlusion of the superior mesenteric artery and a rudimentary inferior mesenteric artery. In other words, all intestinal vascularization originates from the superior mesenteric artery (SMA) and its branches.

Physical exam: low grade fever, tachycardia, abdominal tenderness, decreased bowel sounds, abdominal distension. BP 130/90mmHg; HR-75/min.

Laboratory examinations: PT, aPTT, complete blood count (elevated Le), Na, K, Cl and chemistries (for metabolic acidosis), **elevated D-dimer**= 7800(<500).

In consultation with an abdominal surgeon, an interventional cardiologist and a radiologist, a consilium decision was made for **emergency endovascular intervention** and the patient was immediately admitted to the angiography room.

Case presentation

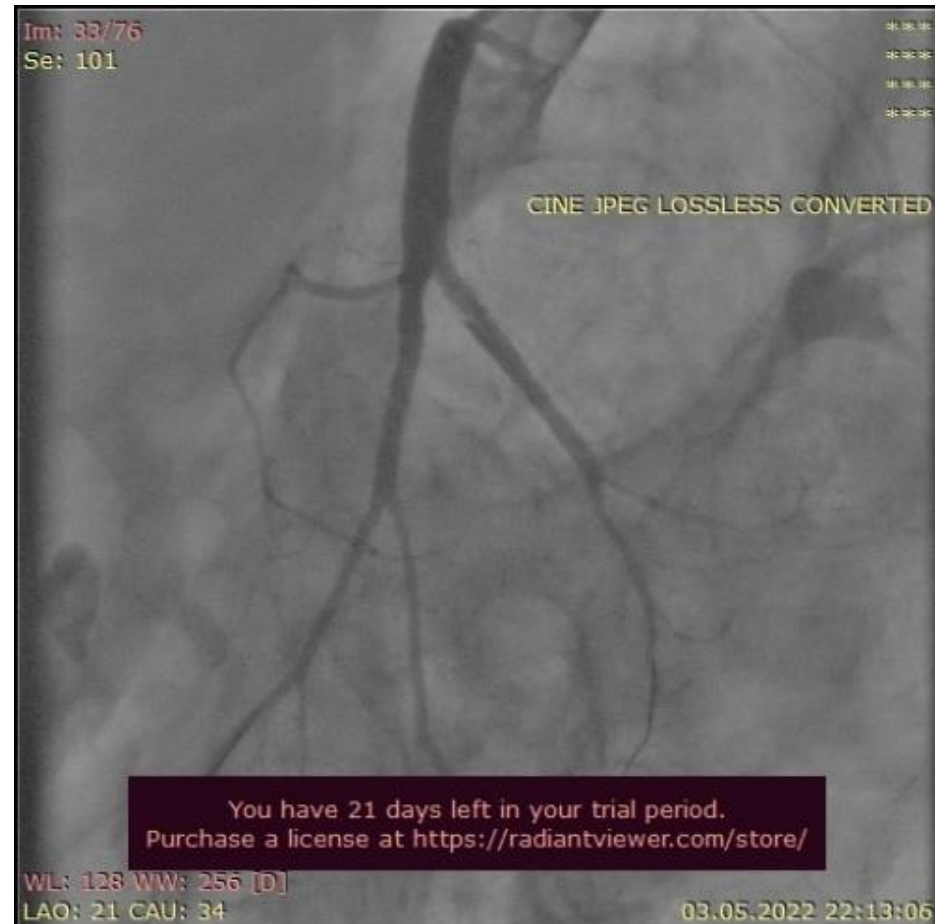
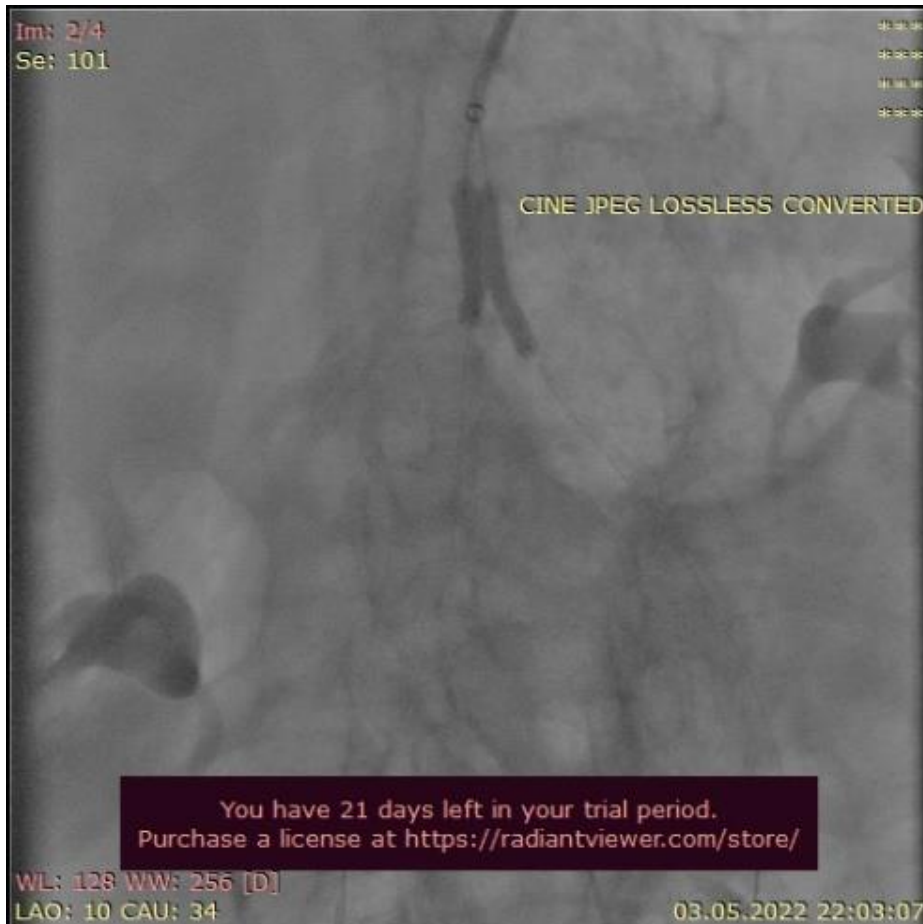
Figure 1,2,3 - TRA® Intrdoducer 6F, G.C. JR 6F: THROMBOASPIRATION JR6F – SMA



Case presentation

Figura 4,5 - Balloon dilatation of the stenosed areas of the SMA

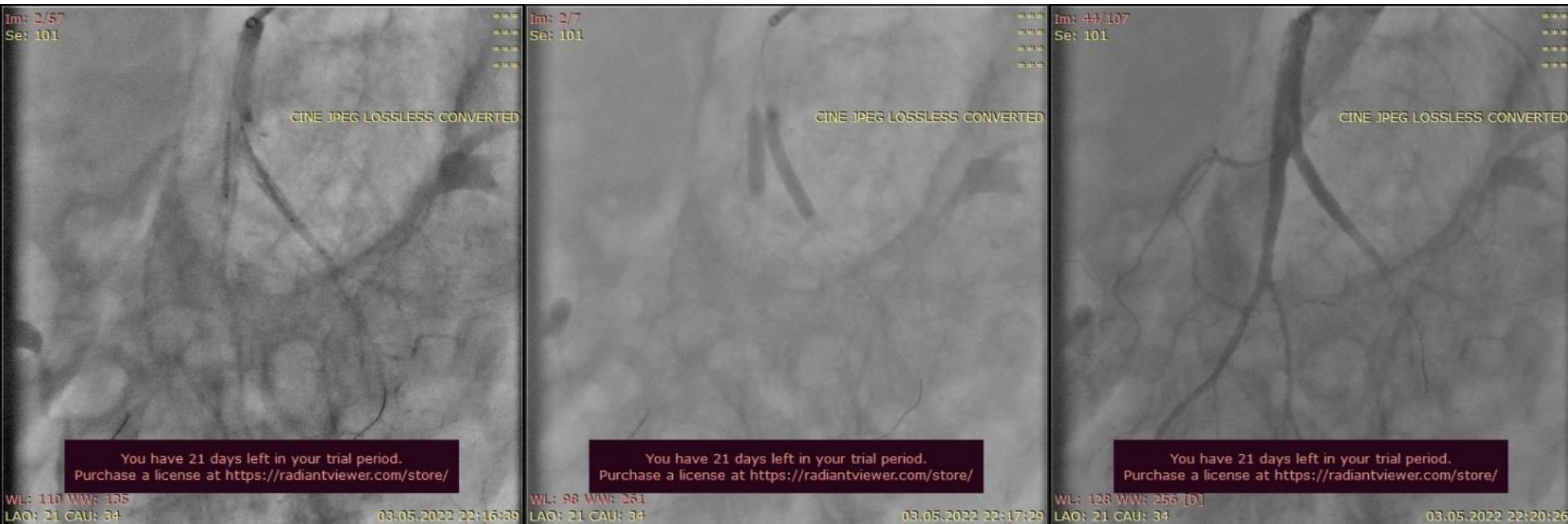
Predilatation: Balloon 3.0x30mm, 16atm, NoIII, Balloon 4.0x30mm, 16atm, NoIII, Balloon 5.0x30mm, 10atm



Case presentation

Figure 6,7,8 - Two stents (shotgun type of stenting) were placed, one in the jejunal and the other in the ileal branch, after which an excellent flow result was obtained through both branches of the SMA.

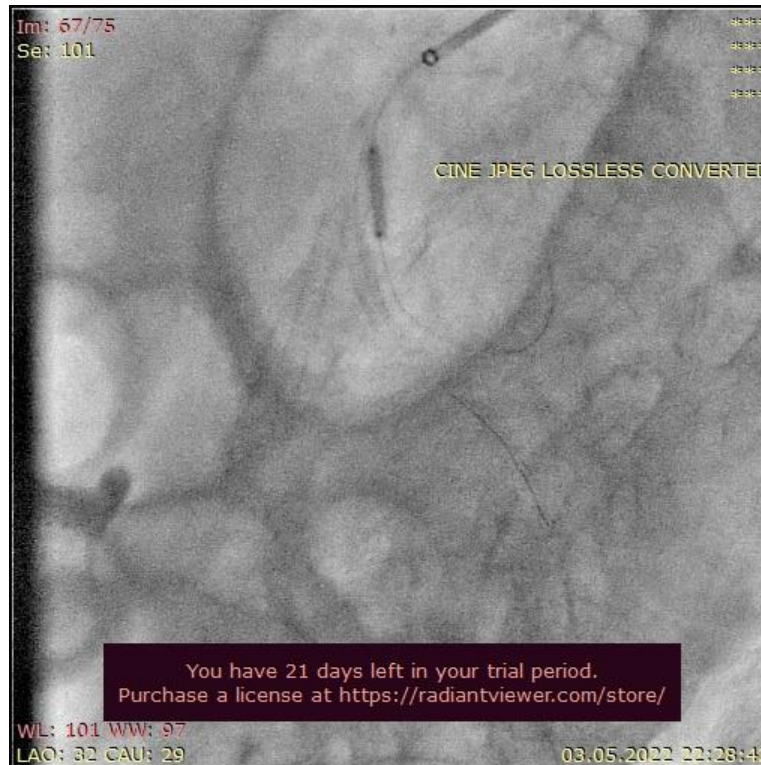
1. PTA/stent A.Mesenterica sup - A.Jejunalis: REBEL 4.0x32mm, 1.4atm+REBEL 4.5x24mm, 1.4atm
2. PTA/stent A.Mesenterica sup - A.Ileocolica: REBEL 4.0x32mm, 1.6atm



Case presentation

Figura 9 - TRA®: G.C. JR 6F: **POBA to ileojejunal artery**: Balloon 4.0x30mm, 12atm, Nolllx120sec

Intervention 60 min of intervention, Radiation time 30 min of radiation, contrast 200 ml



Case presentation

FINAL RESULT: SMA 100% → 0% TIMI
Figure 10 - (before and after intervention)



Conclusion

Early recognition and intervention of AMI is crucial. The potential for intestinal viability is 100% when symptoms are less than 12 hours, 56% if symptoms are 12 to 24 hours and only 18% if symptoms have been neglected for over 24 hours before diagnosis.

In patients with AMI, new trends require endovascular treatment to be the first choice of treatment compared to open surgical revascularization and resection.

Endovascular treatment is used in a select group of patients to limit signs of bowel necrosis, but there is a tendency to start endovascular revascularization in all patients because it is associated with reduced mortality, a reduced laparotomy rate, and a reduction in the length of resected colon.

The choice of the strategy and treatment should be team decision by surgeon, endovascular interventionalist and intensive care specialist taken together and in all stages.

The last century conclusion for the AMI “~~the diagnosis is impossible, the prognosis hopeless and the treatment useless~~” is transforming now a days- **“THE EARLY DIAGNOSIS IS A CHALLENGE, THE PROGNOSIS IS IMPROVABLE, IF THE TREATMENT IS AT TIME AND APPROPRIATE”**.

Thanks

for your attention!

