"Stuck in the Middle"

A Case of Superior Mesenteric Artery Syndrome on a 68 year-old Male

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ABSTRACT

Superior mesenteric artery (SMA) syndrome, also called Wilkie's syndrome or Cast syndrome, reported to have an incidence of 0.1-0.3% of a population, is a rare disorder in which acute angulation of the SMA causes compression of the third part of the duodenum between the SMA and the aorta, leading to obstruction.

The patient presented in this case is a 68-year-old male who presented with a 1 year history of chronic bilious post-prandial vomiting, associated with intermittent abdominal pain, weight loss and early satiety. This prompted him to seek consultation where numerous diagnostic procedures were done. All of which were inconclusive of the patient's presenting symptoms. Upper GI Endoscopy revealed Severe Esophagitis, To Consider Partial Intestinal Obstruction. Colonoscopy was then done, only revealing a solitary rectal polyp and Grade I Internal Hemorrhoids. CT Scan of the Whole Abdomen done at another institution was read to be unremarkable save for Atherosclerosis and Sponylosis Deformans. The patient was then managed conservatively and was given due medications to relieve him of his symptoms. Despite medical management, the patients symptoms still persisted and was maintained on soft diet since then, hence the patient decided to seek for consult in our institituion. His previous CT-Scan images were then reviewed in our instituition and was read as Upper GI Obstruction likely secondary to Superior Mesentric Artery Syndrome with Inflammatory Changes in the Duodenal Junction at the Level of the Ligament of Treitz. The patient was then advised for nutritional build-up and referred to General Surgery service, and was scheduled for Open Duodenojejunostomy.

Intraoperatively, abdominal exploration was done where in no masses were palpated on the small and large intestines, the liver and no peritoneal signs of carcinomatosis were evident. The transverse colon was retracted superiorly to visualize the duodenum. The stomach, 1st and 2nd part of the duodenum were noted to be dilated, while the 3rd part of the duodenum was identified to be compressed by the superior mesenteric artery and the duodenum and was noted to have a smaller diameter in comparson with D1 and D2.

Post-operatively the patient's course in the ward was unremarkable. His diet was progressed slowly. He was maintained on nothing per orem and NGT was kept open to drain with minimal gastric ouput on post-op day 1-2 . He was started on sips of water on post op day 3. On post op day 4, his diet was then progressed to general liquids and was tolerated. On post op day 5, NGT was removed and his diet was progressed to soft diet. The patient was then progressed to full diet and discharged on post-op day 6, with no post-operative complications, no episodes of bilious vomiting, abdominal distention or abdominal pain.

CLINICAL PICTURE, LABORATORY AND IMAGING RESULTS, OPERATIVE PROCEDURE, AND COURSE IN THE WARDS

CLINICAL PICTURE

The patient presented is a 68 year-old hypertensive and diabetic male with good compliance of his maintenance medications. This patient presented with a 1 year history of post-prandial bilious vomiting, early satiety and intermittent vague abdominal pain. He initially sought consult 7 months prior to consultation with General Surgery Service, with an internist where he was managed initially as a case of Diabetic Gastropathy, Non-peptic Ulcer Disease at a Local Hospital and was given Omeprazole 40mg/tab 1 tab OD for 1 week, Metoclopramide 10mg/tab 1 tab q8 for vomiting, which only afforded temporary relief. 3 months prior, his symptoms still persisted and the patient now had the fear of eating solid food, anorexia and approximately 4 kilogram weight loss in a span of 6 months. He then sought consult with a gastroenterologist where he underwent different diagnostic procedures. Upper GI Endoscopy revealed Severe Esophagitis, To Consider Partial Intestinal Obstruction. Colonoscopy was then done, only revealing a solitary rectal polyp and Grade I Internal Hemorrhoids. CT Scan of the Whole Abdomen done at another institution was read to be unremarkable save for Atherosclerosis and Sponylosis Deformans. The patient was then advised to have soft diet and avoid solid food. He was started on Beneprotein 1 scoop and Peptamen 8 scoops to be alternated with Ensure 9 scoops every 4 hours for nutiritional support. He was then referred to our institution and service for further management. His previous CT-Scan done outside was reviewed in our institution and was interpreted as Upper GI Obstruction likely secondary to Superior Mesentric Artery Syndrome with Inflammatory Changes in the Duodenal Junction at the Level of the Ligament of Treitz(Figure 1). In Figure 1, the image reveals a collapsed 3rd part of the duodenum(D3) which is found in between the superior mesentery and the duodenum and a dilated(D2). The patient was then referred to our service for further management.

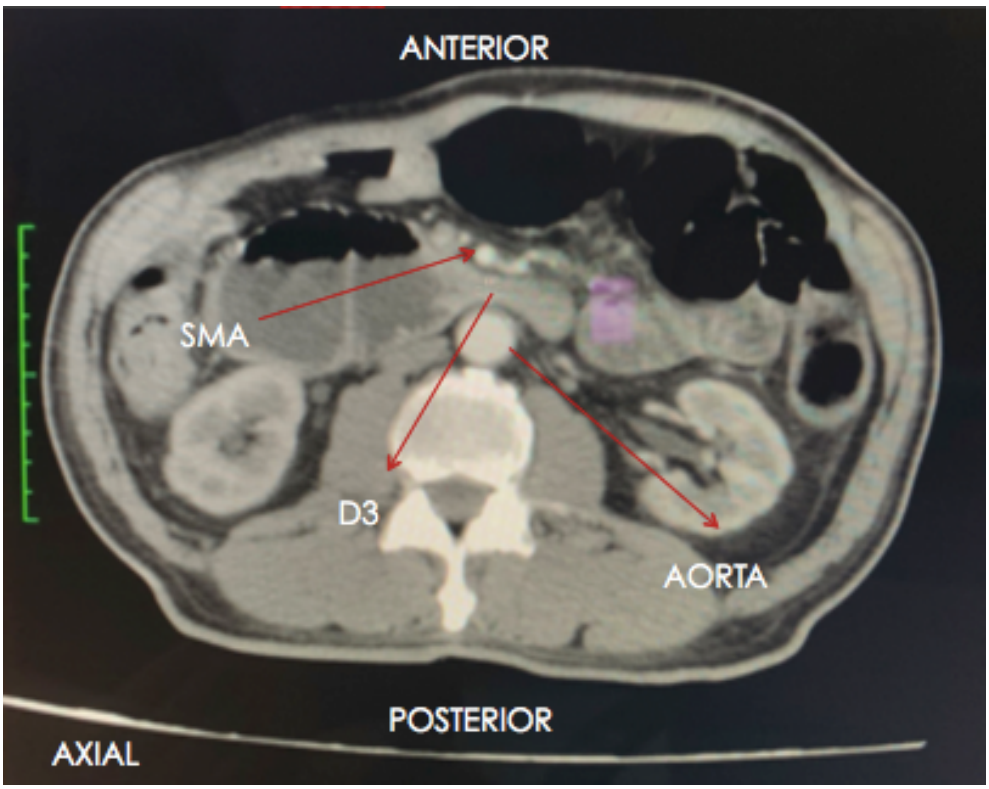


Figure 1. CT Scan of Whole Abdomen with IV Contrast in Axial View

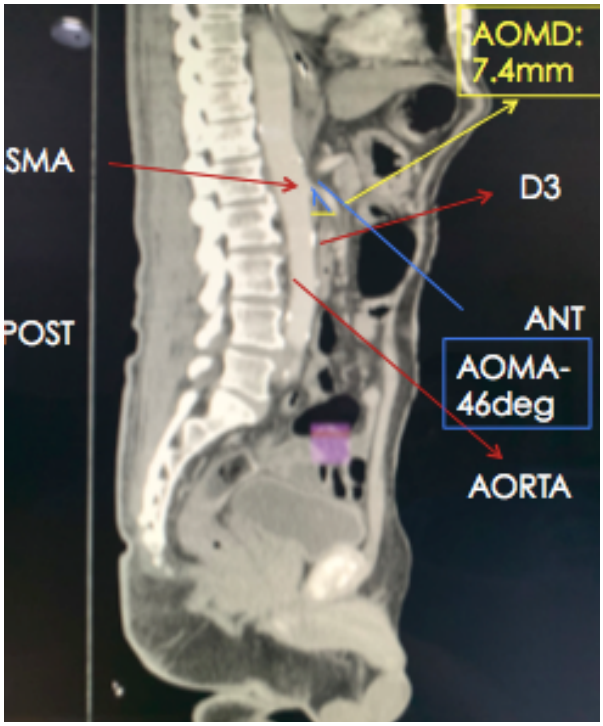


Figure 2. CT Scan of Whole Abdomen with IV Contrast in Sagital View

In sagittal view (Figure 2), the Aorto-Mesenteric Angle(AOMA) measures 46 degrees, and the Aorto-Mesenteric Distance(AOMD) is only 7.4mm. Figure 3 in coronal view, reveals a collapsed D3 located just inferior to the origin of the superior mesenteric artery along with a dilated D2. With the above mentioned CT-Scan findings, and inadequacy of medical management, the patient was then referred to our service for further management.

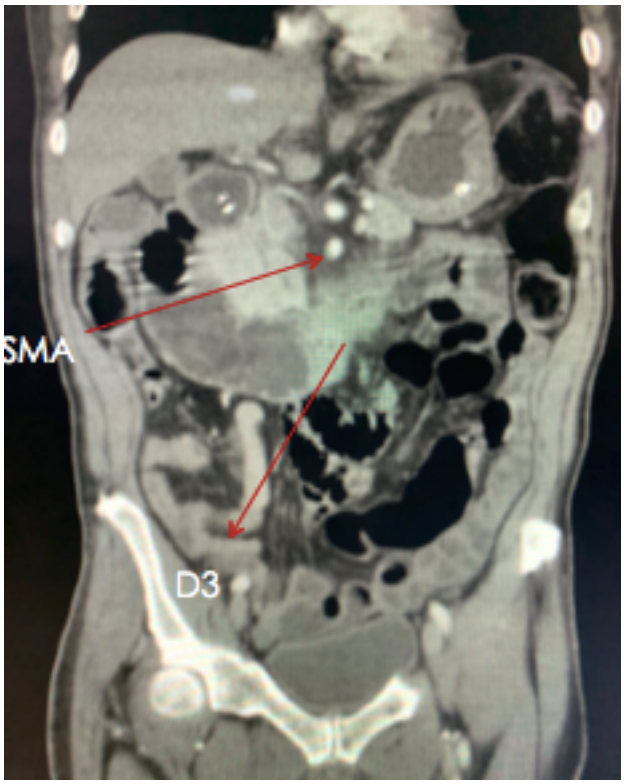


Figure 3. CT Scan of Whole Abdomen with IV Contrast in Coronal View

The patient was seen awake, comfortable, not in respiratory distress and not in pain. The patient had an over-all asthenic habitus with a BMI of 19.8. Upon assessment, vital signs were all within normal range, flatus and bowel movement were still present upon assessment, and his abdomen was soft, nontender and nondistended with normoactive bowel sounds, the rest of his physical examination was unremarkable. Preoperative preparations were done, cardiopulmonary clearances were secured and the patient was scheduled for Open Duodenojejunostomy.

Pre-operative Laboratory Results

Complete Blood Count	
Hgb	136
Hct	0.40
RBC	4.32
WBC	12.52
Platelet	145
Neu	0.82
Lympho	0.14
Eos	0.00
Baso	0.00

Table 1. Complete Blood Count

Blood Chemistry	
Na	143
K	5.00
Albumin	38
Ca	2.26
Mg	0.82
Crea	95.50

Table 2. Blood Chemistry

Bleeding Parameters	
Protime	
Control	14.5sec
Test	16.6 seconds
INR	1.213
% Activty	82
APTT	
Control	27.7seconds
Test	24.8seconds

Table 3. Bleeding Parameters

Chest Xray	**Negative**
12 L ECG	Left Bundle Branch Block, Incomplete

Table 4. Chest Xray and 12 L ECG

Conduct of Surgery

The patient was placed in supine position and induction of regional anesthesia was done. Asepsis and antisepsis, routine skin preparation, and placement of sterile drapes were carried out. A supraumbilical incision was done extending 2cm below the xiphoid process down to 3cm below the umbilicus. The incision was deepened and carried down to the peritoneum.

Abdominal exploration was done where in no masses were palpated on the small and large intestines, the liver and no peritoneal signs of carcinomatosis were evident. The transverse colon was retracted superiorly to visualize the duodenum. The stomach, 1st and 2nd part of the duodenum were noted to be dilated, while the 3rd part of the duodenum was identified to be compressed by the superior mesenteric artery and the duodenum and was noted to have a smaller diameter in comparson with D1 and D2 (Figure 4).

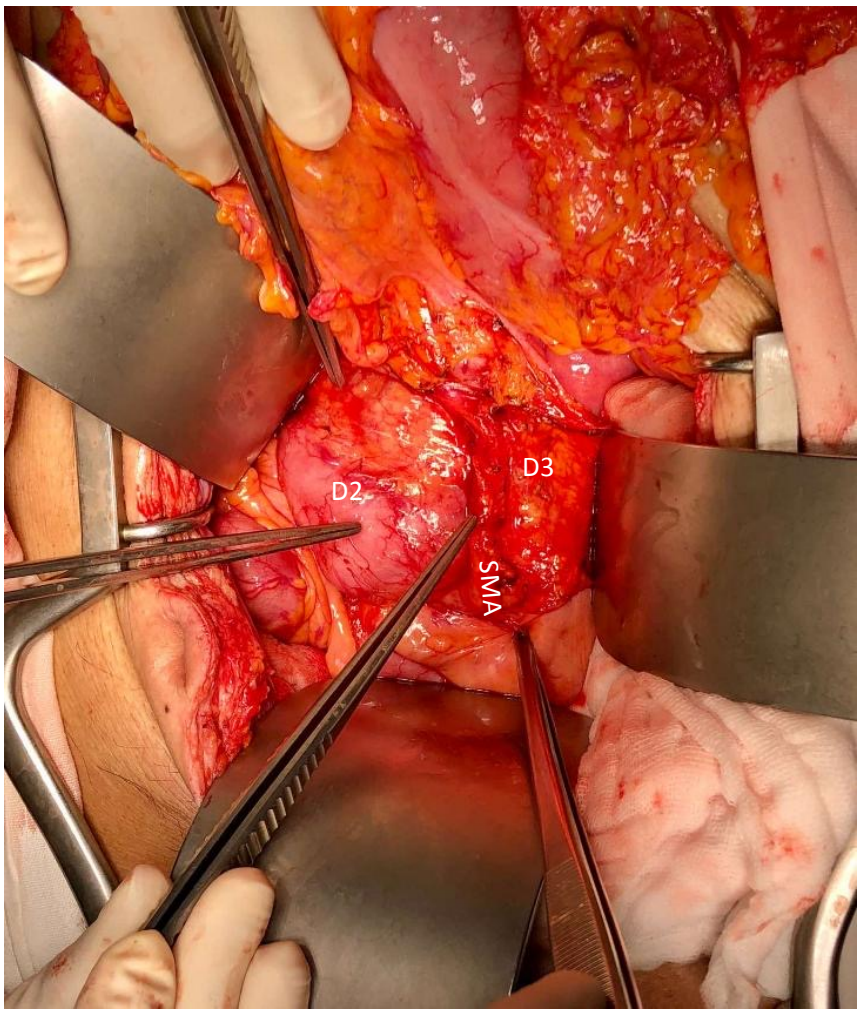


Figure 4. Intraoperative Photos: Dilated D2, The Superior Mesenteric Artery, Compressed D3

After performing the Kocher Maneuver, the retroperitoneal area was accessed and the duodenum was mobilized. Proceeded with enterotomy on the inferior border of D2 and the anti-mesenteric bored of the jejunum 40cms from the Ligament of Treitz. A side-side anastomosis was created using Silk 3.0 Sutures in a continuous fashion, and was reinforced with Interrupted Lembert Sutures (Figure 5) in a retrocolic manner. The patency of the anastomosis was assessed and was tested to ensure no anastomotic leak. Meticulous hemostasis was carried out and a Jackson-Pratt drain was placed. The abdominal wall was closed layer by layer. Skin was closed and Steri Strips and Dressing applied.

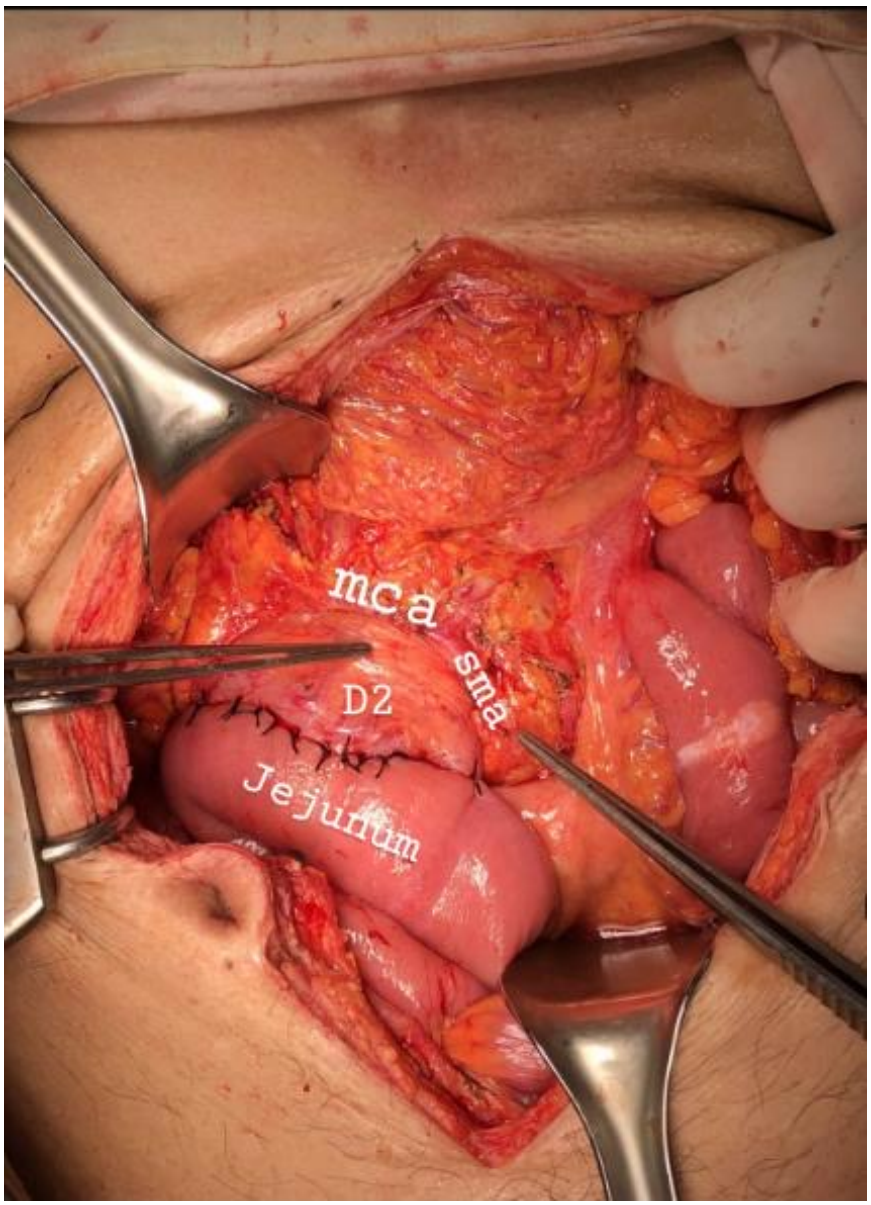


Figure 5. Side-Side Anastomosis between the second part of the duoednm proximal to the crossing SMA and the jejunum 40cms from the LOT

Course In The Wards

Post-operatively the patient's course in the ward was unremarkable. His diet was progressed slowly. He was maintained on nothing per orem and NGT was kept open to drain with minimal gastric ouput on post-op day 1-2 . He was started on sips of water on post op day 3. On post op day 4, his diet was then progressed to general liquids and was tolerated. On post op day 5, NGT was removed and his diet was progressed to soft diet. The patient was then progressed to full diet and discharged on post-op day 6, with no post-operative complications, no episodes of bilious vomiting, abdominal distention or abdominal pain.

Follow up

Upon follow up after 3 months, the patient had no recurrences of post-prandial bilious vomiting, early satiety and abdominal pain. He was completely relieved of the symptoms that tormented him for the last year. The patient gained 6kilograms and now weighs 58kg. His previous body habitus was almost never there. He is now able to eat anything he wants with ease and without the fear of vomiting. Definitely, his quality of life has markedly improved after the conducted surgery.

DISCUSSION

The most proximal portion of the small intestine is the duodenum. It is divided into 4th parts- the 1st part is a continuation of the pylorus, the 2nd part begins at the inferior duodenal flexure and descends then turns horizontally in a medial direction at the inferior duodenal flexure, and then passes between the SMA and the abdominal aorta at the level of the 3rd lumbar vertebrae. Normally, the AMA is 38 to 65 degrees, and the normal distance from the Aorta to the SMA at the level of the duodenal crossing is 13-34 mm. The 4th part of the duodenum then passes upward and joins the jejunum at the duodeno-jejunal flexure.

Superior mesenteric artery (SMA) syndrome is a rare disease defined as compression of the third portion of the duodenum between the abdominal aorta and the superior mesenteric artery. Other names for SMA syndrome have included chronic duodenal ileus, Wilkie syndrome, arterio-mesenteric duodenal compression syndrome and cast syndrome. The disease was first reported as a case report in 1842 by Carl Von Rokitansky, and in 1927, Wilkie further detailed the pathophysiology and diagnostic findings of the disease

Duodenal compression is usually due to the loss of the intervening mesenteric fat pad between the aorta and SMA, which in turn, results in a narrower angle between the vessels. The fat pad cushion functions to hold the SMA off the spine and protect it from duodenal compression. A normal aortomesenteric angle is 38 to 65 degrees; however, decreasing the angle less than 25 degrees will decrease the distance to less than 10 mm and cause compression to the third part of the duodenum. Decreases in the aortomesenteric angle can be either congenital or acquired. SMA syndrome is associated with significant weight loss including situations of hypermetabolism (trauma and burns) dietary conditions (anorexia nervosa and malabsorptive diseases) and cachexia causing conditions (AIDS, cancer, paraplegia). Other risk factors include surgical correction of scoliosis, congenitally short or hypertrophic

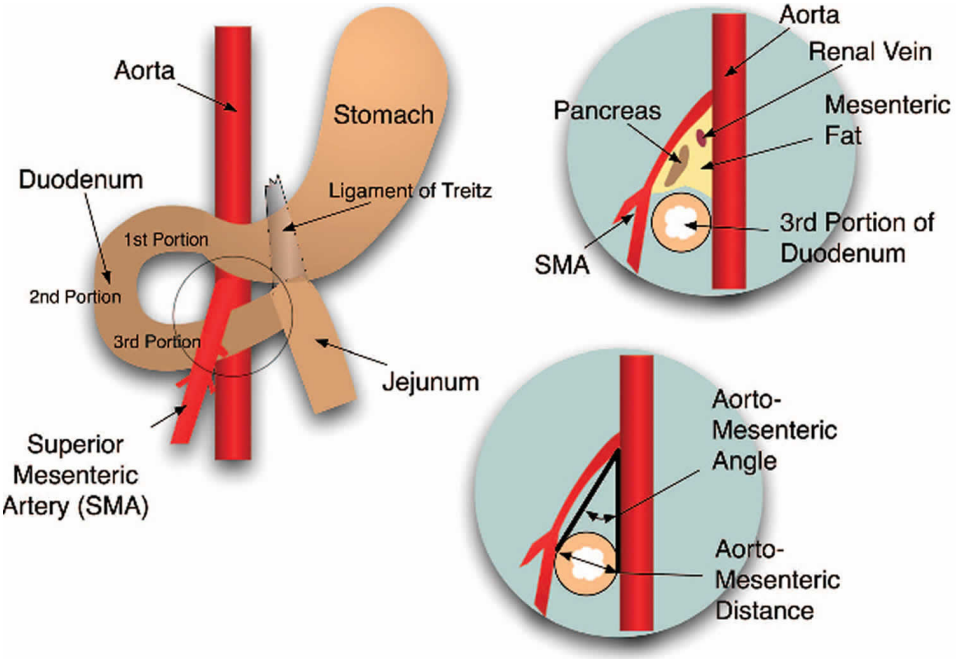


Figure 5. Anatomy and Pathophysiology of SMA Syndrome

ligament of Treitz, peritoneal adhesions, duodenal malrotation, Ladd's bands, abdominal aortic aneurysm, lumbar hyperlordosis, and mesenteric root neoplasm.

SMA syndrome presents with vague symptoms of bowel obstruction. However, diagnosis is based on interpreting clinical symptoms alongside radiological testing which can confirm its presence. Various imaging modalities that can be used include plain film x-ray, barium x-ray, endoscopy, computed tomography (CT), Doppler ultrasound, and magnetic resonance angiography (MRA). Plain radiographs may reveal a dilated stomach and diminished distal bowel gas. Endoscopy and barium studies can be used but are often nonspecific and not available in an emergency setting. Endoscopy, rather, can be used to investigate complications of the disease including gastric stasis, biliary reflux, gastritis and duodenal ulcers and to rule out other cause of the duodenal compression. CT scan is helpful in diagnostics in that it allows for measurement of aortomesenteric (AO) angle which aids in confirmation of SMA syndrome and has thus replaced MRA as the standard for diagnosis.

Conservative management of Superior Mesenteric Artery Syndrome would include fluid resuscitation and proper positioning during feeding, like the knee-chest position, prone or left-lateral decubitus position which increases the AMA. It is recommended that patients place themselves in a left lateral decubitus position, in a prone position, or in a knee-to-chest position (Hayes Maneuver) after meals, as this facilitates the passage of food through the duodenum. The condition is aggravated when the patient is in a supine position. Other recommendations include small frequent feedings with pureed or blenderized food; approximately 180 to 240 mL every 4 hours should be consumed.

Treatment of SMA syndrome initially involves conservative management. However, surgical intervention will be requited if medical treatment fails or the condition is severe. The alternative operations mainly included open duodenojejunostomy and laparoscopic duodenojejunostomy. Various surgical procedures have been considered for surgical management including gastrojejunostomy, Strong procedure (a division of the ligament of Treitz), transabdominal duodenojejunostomy and laparoscopic duodenojejunostomy. Traditional open bypass surgery was the standard of care until 1998 when the first successful laparoscopic duodenojejunostomy was performed**.** This technique has since surpassed open bypass as the most common surgical treatment. Laparoscopic duodenojejunostomy has recently replaced open bypass at the standard operative treatment.

Indications for surgery include failure of medical management and patient preference. As for this patient, the patient has been experiencing post-prandial bilious vomiting for a year and has never been relieved by medical management. His quality of life has become poorer and he has developed the fear of eating. Hence, surgery was advised.

To conclude, this 68-year old male, who presented with chronic bilious vomiting which deteriorated his quality of life, medical management was insufficient to relieve him of his symptoms. The procedure done on this patient was ideally the treatment of choice. Postoperatively, he had no recurrence of vomiting, had tolerated full diet and most importantly he gained 6kgs in a 3 month period. True enough, the bowel "stuck in the middle" was the root problem of his demise.

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