

## CASE REPORT OPEN ACCESS

# Superior Mesenteric Artery Syndrome in a Young Woman: A Case Report From Low-Resource Settings

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## ABSTRACT

A 31-year-old woman presented with a 7-year history of recurrent upper abdominal pain and vomiting that exacerbated after meals, and a history of substantial weight loss. At presentation, her weight and BMI were 26 kg and 15.6 kg/m<sup>2</sup>, respectively. Routine blood tests and an abdominal ultrasonogram did not reveal any abnormality. However, endoscopy revealed mild duodenal bulb deformity, while barium studies and CT scans demonstrated narrowing of the third part of the duodenum. Consequently, after exclusion of other potential causes, the patient was diagnosed with Superior Mesenteric Artery Syndrome (SMAS), a rare condition where the duodenum becomes compressed between the aorta and superior mesenteric artery, often due to weight loss. Treatment began with naso-jejunal feeding, with plans for surgical intervention if no improvement was seen after 6 weeks. However, two weeks after starting treatment, she improved symptomatically, gained five kilograms of weight, and was able to take food without pain. So, the naso-jejunal tube was removed. This case highlights the importance of considering SMAS in patients with unexplained weight loss, abdominal pain, and vomiting, particularly in young women. Early diagnosis through careful clinical evaluation and radiological investigations is crucial for effective management.

## 1 | Background

The superior mesenteric artery (SMA) forms an angle of 28°–65° while branching off from the anterior part of the abdominal aorta (AA) and remains at a distance of 10–34 mm [1, 2]. The third part of the duodenum, which lies posterior to the SMA, can get entrapped between the aorta and the SMA [3]. The entrapment occurs when the aorto-mesenteric angle and distance narrow down to 6°–22° and 2–8 mm, respectively [3, 4]. This relatively uncommon condition is known as the Superior Mesenteric Artery Syndrome (SMAS) or Wilkie's syndrome, where a patient mainly presents with epigastric pain, post-prandial nausea and vomiting, and a recent history of weight loss [5].

The reduction in aorto-mesenteric angle and distance is often attributed to loss of intra-abdominal adipose tissue due to weight loss or poor nutritional intake [1]. Normally, the angle and distance are maintained by the presence of adipose tissue between AA and SMA, which allows enough space for the duodenum to pass without compression [3]. However, the loss of this fat narrows the angle, giving rise to functional obstruction. The disease follows a diagnosis of exclusion and needs to be confirmed by radiologic investigations [6].

The prevalence of SMAS in the general population is low and ranges from 0.0024% to 0.34% [7], with an incidence estimated at 0.1%–0.3% [8]. Until 2022, only 2400 cases were described since

## Summary

- Superior Mesenteric Artery Syndrome (SMAS) should be considered in patients with unexplained weight loss, abdominal pain, and vomiting, especially in young women.
- Early diagnosis and appropriate treatment, such as nutritional support, can lead to symptomatic improvement and weight gain, potentially avoiding surgery.

it was first mentioned in the literature in 1861 [9]. Here, the case of a woman diagnosed with SMAS in Bangladesh is presented.

## 2 | Case Presentation

A 31-year-old female presented with a long-standing history of recurrent upper abdominal pain and vomiting for the past 7 years. The pain was colicky in nature, exacerbated after meals, accompanied by abdominal fullness and vomiting. The patient experienced relief from pain after vomiting, with the vomitus containing gastric contents. Additionally, she reported significant weight loss over the past years, evidenced by the loosening of her clothes. Despite seeking treatment at a primary care hospital, her symptoms persisted. On admission, her vital signs were stable, with a weight of 26 kg and a body mass index (BMI) of 15.6 kg/m<sup>2</sup>. Abdominal examination revealed no abnormalities.

## 3 | Investigation

Complete blood count, blood sugar, creatinine, electrolytes, liver function tests, and the abdominal ultrasonogram (USG) were all within normal limits. As the patient was not suspected to have SMAS initially, measurements of the SMA—AA angle and distance were not done at the abdominal USG. However, endoscopy revealed mild deformity of the duodenal bulb due to external compression. Figure 1 shows the narrowed duodenal lumen seen during endoscopy.

A barium meal x-ray demonstrated narrowing at the third part of the duodenum with proximal dilatation. The barium follow-through x-ray showed distended duodenal loops due to narrowing in the third part of the duodenum (Figure 2).

A CT scan of the abdomen revealed the narrowed caliber of the third part of the duodenum (Figure 3).

## 4 | Treatment

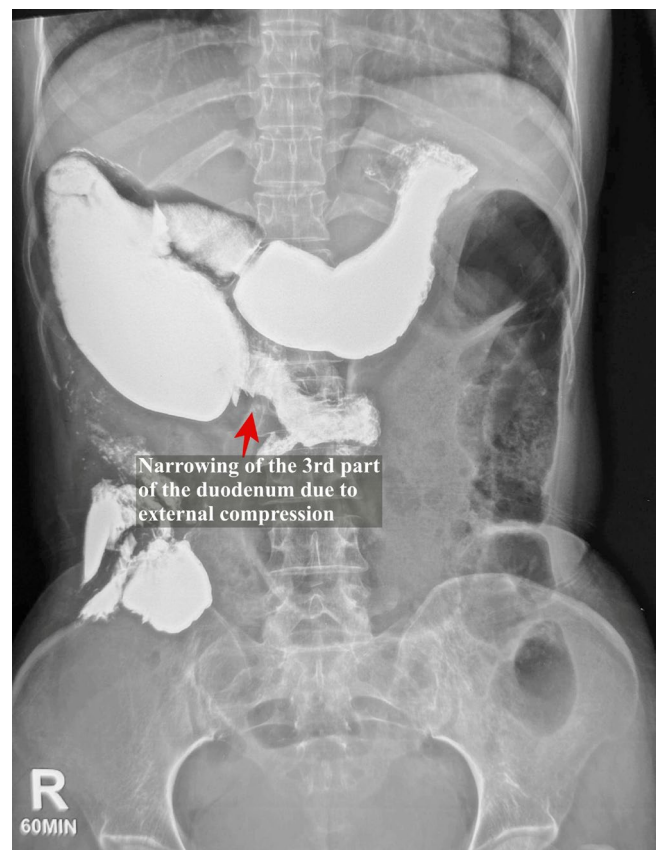
Based on the clinical presentation, imaging findings, and the exclusion of other potential causes, the patient was diagnosed with Superior Mesenteric Artery Syndrome. Her management was discussed with experts in internal medicine, radiology, surgery, and gastroenterology. She was then treated with feeding through a nasojejunal tube. A duodenojejunostomy was planned if no improvements were noted in the symptoms and nutritional status of the patient over a period of 6 weeks.

## 5 | Outcome and Follow-Up

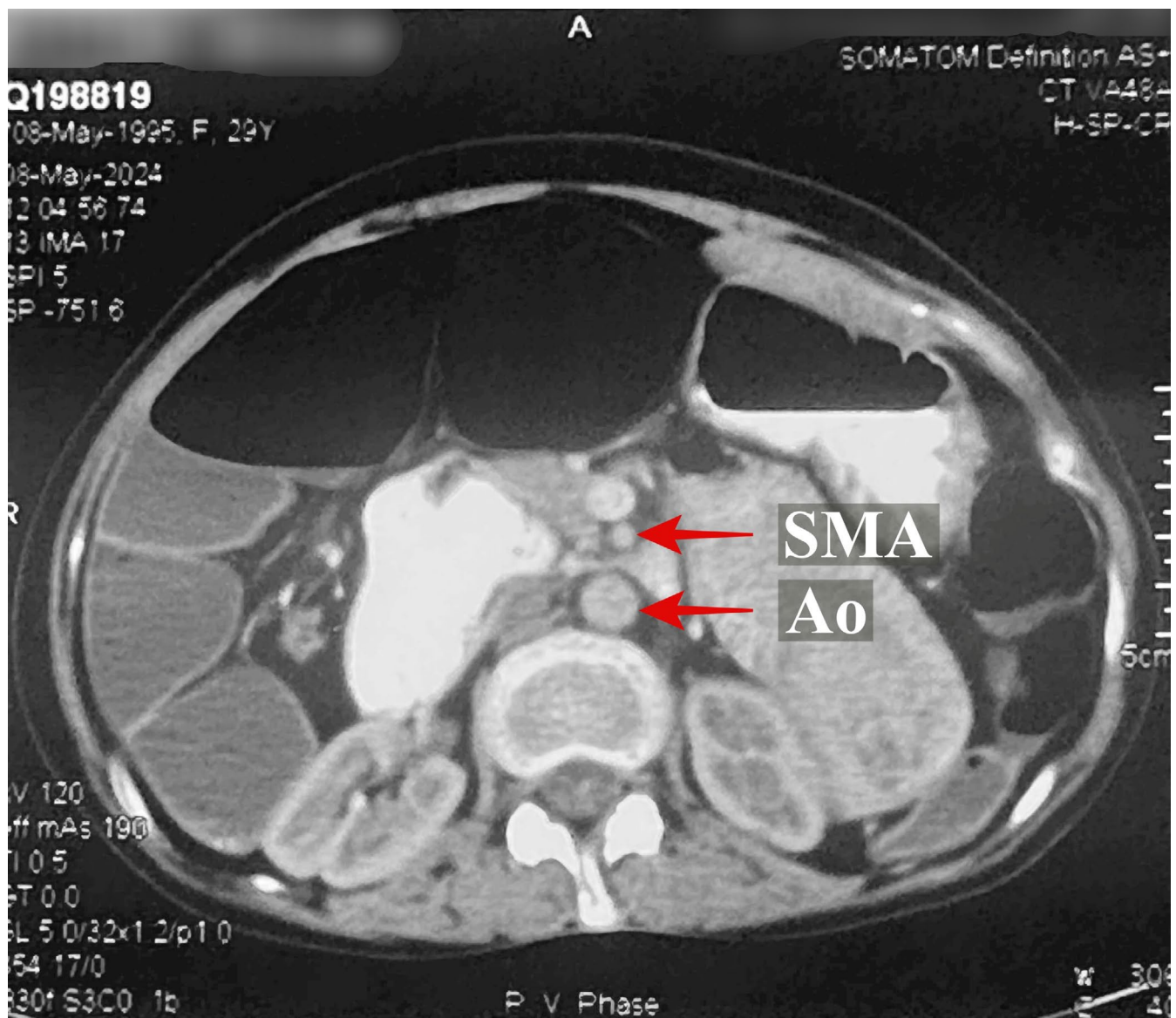
After 2 weeks of naso-jejunal feeding and mental health counseling, the patient gained a weight of five kilograms. The patient was now mostly relieved of her symptoms and was declared free from SMAS.



**FIGURE 1** | An endoscopic view of the duodenum showing food contents unable to pass through the narrowed duodenal lumen.



**FIGURE 2** | A barium follow-through x-ray showing the impaired passage of barium in the third part of the duodenum.



**FIGURE 3** | CT scan of the abdomen shows the entrapped duodenum between the superior mesenteric artery and the abdominal aorta. [Ao, Aorta; SMA, Superior Mesenteric Artery].

## 6 | Discussion

SMAS was first described by Von Rokitansky in 1842 [10]. Subsequently, in 1927, Wilkie published a series of 75 patients with SMAS describing the pathophysiology of the illness [7]. This is one of the earliest descriptions of a young woman with recurrent abdominal pain being diagnosed with SMAS from Bangladesh.

Although SMAS can occur at any age, like the age of the present case, it most commonly occurs in females and young adults (18–35 years) [3]. The cause of SMAS falls broadly into two categories. One group of patients develops the condition following surgery or compression. Particularly, it is commonly seen after scoliosis surgery [10]. The second group develops the condition following severe weight loss due to reasons like Acquired Immunodeficiency syndrome (AIDS), malabsorption, cancer, cerebral palsy, burns, drug use, and eating

disorders such as anorexia nervosa [3]. According to the patient's statement, prior to the development of symptoms of SMAS, she experienced considerable weight loss. She was divorced eight years ago, after which she went through depressive symptoms and loss of appetite, leading to a considerable reduction in body weight. One year later, she started to have abdominal pain and vomiting. These symptoms persisted for a short period only to come back later. However, progressively, the symptom frequency increased, and the interval between symptoms decreased, and the patient went into a vicious cycle of weight loss. Previous research has linked depression with both weight gain and loss [11]. Hence, based on this history and the presentations of SMAS, it can be reasonably assumed that the patient might have suffered from clinical depression and associated weight loss 7 years ago, which remained undiagnosed. When the weight-loss-induced SMAS symptoms became unbearable, the patient came for management in the center.



Young women often develop anorexia nervosa, which is one of the causes of chronic weight loss. Gibson, Hong, and Mehler described such a young case of a 22-year-old woman with a 10-year history of anorexia nervosa who presented with diffuse abdominal pain and nonvolitional vomiting shortly after food consumption at Mayo Clinic [12]. In these cases, vomiting leads to further weight loss. Kardiles and Gras reported a patient with pulmonary tuberculosis who developed epigastric pain and postprandial vomiting due to 18 kg of weight loss [13]. In Bangladesh, where tuberculosis still constitutes a substantial infectious disease burden, SMAS should be considered among those presenting with epigastric pain and intractable vomiting following weight loss.

Because the diagnosis of SMAS is often delayed, a careful exploration of the medical history and subsequent radiological investigations is required for a confirmatory diagnosis [7]. In the present case, after getting normal laboratory test results and a normal ultrasound of the abdomen, the patient was advised to undergo an endoscopy of the upper GI tract. The endoscopy revealed a deformed bulb with no evidence of erosion or ulcer. However, as the patient had a significant weight loss, further investigation through barium meal and barium follow-through was planned, which revealed the compression of the third part of the duodenum. The subsequent CT of the abdomen then confirmed the entrapment. Although CT allows clear depiction of the problem in SMAS, dynamic ultrasound of the abdomen, as described in Hasegawa et al. [14], can also confirm duodenal compression between SMA and AA, which was not done in the present case. Some patients may have their left renal vein compressed between SMA and AA. The vein runs above the third part of the duodenum, which also gets trapped, giving rise to the “Nutcracker Syndrome” [5]. Fortunately, such abnormalities were not found in this case.

The treatment of SMAS is either conservative, or surgical when conservative treatment fails. The conservative management includes fluid resuscitation, bowel rest, total parenteral nutrition, and enteric feeding with a nasojejun tube inserted past the obstruction [3]. In the present case, the latter option was chosen as some patients, like that described by Gibson and colleagues [12], may gain sufficient weight with conservative management and achieve resolution of symptoms suggestive of SMAS. This strategy worked for this patient. She is now completely relieved of her symptoms and can eat well without the aid of a nasojejun tube. However, she was referred for psychiatric evaluation of depression with management if required.

## 7 | Learning Points

- Superior Mesenteric Artery Syndrome (SMAS) should be considered in patients with unexplained weight loss, abdominal pain, and vomiting, especially in young women.
- Early diagnosis of SMAS through a high degree of suspicion, careful clinical evaluation, and radiologic investigations is crucial in patients with weight loss, abdominal pain, and vomiting.
- Conservative management, including nutritional support, may effectively resolve symptoms and improve outcomes in SMAS.

## Author Contributions

**Md Muhibur Rahman:** conceptualization, data curation, investigation, methodology, project administration, resources, writing – review and editing. **Md Jahangir Alam:** conceptualization, supervision, writing – review and editing. **Mostak Uddin Ahmed:** conceptualization, supervision, writing – review and editing. **Kabir Ahmed:** conceptualization, supervision, writing – review and editing. **Md Abdullah Saeed Khan:** conceptualization, methodology, writing – original draft, writing – review and editing.

## Consent

Informed written consent was taken from the patient for the use of her management information.

## Conflicts of Interest

The authors declare no conflicts of interest.

## Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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