CASE REPORT

Increase body weight to treat superior mesenteric artery syndrome

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SUMMARY

Introduction Superior mesenteric artery (SMA) syndrome is a rare cause of duodenal obstruction resulting from vascular compression of the third part of the duodenum in the angle between the abdominal aorta and SMA.

Case presentation A 19-year-old woman with anorexia nervosa with upper gastrointestinal obstruction symptoms resorted to the emergency department. A diagnosis of SMA syndrome was made. Symptoms were solved with conservative treatment aimed at increase body weight.

Discussion SMA syndrome is most commonly associated with debilitating illnesses. Patients present with acute or insidious upper gastrointestinal obstruction symptoms. Aortomesenteric artery angle of $\leq 25^\circ$ is the most sensitive measure of diagnosis. Advances in both enteral and parenteral nutrition led to a shift towards conservative treatment.

Conclusions Low threshold of suspicion is important to make a timely diagnosis and treatment. A conservative treatment aimed at increasing body weight is the first-line approach, leaving surgical intervention for failure cases.

and an aortomesenteric distance of 4 mm (figures 1, 2). An SMA syndrome diagnosis was made, probably due to eating disorder (anorexia nervosa).

TREATMENT

Medical treatment was the first option and surgical intervention was postponed. A nasogastric tube was placed for decompression and intravenous fluid therapy and antiemetic medication were started, leading to the gradual resolution of symptoms. Feeding was initiated through the nasogastric tube with hypercaloric liquids. Three days later, nasogastric tube was removed and oral feeding was started and tolerated by the patient. No parenteral feeding was needed. Cognitive behavioural therapy was performed.

OUTCOME AND FOLLOW-UP

After 10 days in-hospital, she was asymptomatic, gaining weight and was discharged home.

One month later, the patient already had a 5 kg weight gain and was doing well. Since medical treatment had such good results, surgical intervention was not performed. At 3 months follow-up, she was free of symptoms.

BACKGROUND

This is a case of a superior mesenteric artery (SMA) syndrome in a patient with anorexia nervosa managed only with conservative treatment aimed at increasing body weight. Being a case of a rare disease which treatment is still changing, the case presented supports the shift towards conservative treatment due to the advances in both enteral and parental nutrition.

CASE PRESENTATION

A 19-year-old woman with anorexia nervosa resorted to the emergency department because of epigastric pain, early satiety, nausea and vomiting, non-selective anorexia, with a 10 kg weight loss over the past month. On physical examination, she had mild epigastric tenderness, no signs of peritoneal irritation and hyperactive bowel sounds. She had no surgical operations in her medical history. Plain abdominal radiograph only revealed a dilated air-filled stomach. Upper gastrointestinal barium series were obtained and a severely delayed transit into the fourth portion of the duodenum was evident. A contrast-enhanced CT scan was performed showing an aortomesenteric angle of 24°

DISCUSSION

Von Rokitansky first described the SMA syndrome in 1861. It is a rare entity characterised by symptoms resulting from vascular compression of the third part of duodenum in an angle between the aorta and the SMA.^{1 2} The normal angle and distance between the SMA and the aorta is 38° to 65° and 10 to 28 mm, respectively. The aortomesenteric angle correlates with body mass index.^{3 4} In SMA syndrome, the angle can be narrowed up to a value of 6° , with an aortomesenteric distance reduced to 2 mm, which causes duodenal compression and obstruction.⁵

This syndrome is most commonly associated with severe debilitating illnesses, such as malignancy, malabsorption syndromes, AIDS, trauma, burns and disorders associated with weight loss including bariatric surgery, spinal cord injury and correction, paraplegia, drug abuse, prolonged bed rest and anorexia nervosa.^{6–19}

Clinical presentation can be acute or insidious. Symptoms are non-specific and include nausea, vomiting and postprandial epigastric abdominal pain. Weight loss and anorexia can also be present at diagnosis.^{1 20} Diagnosis is difficult and is a matter

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Figure 1 Enhanced CT scan: aortomesenteric angle of 24° and aortomesenteric distance of 4 mm.

Figure 2 Enhanced CT scan with three-dimensional reconstruction: aortomesenteric angle of 24° and aortomesenteric distance of 4 mm.

of debate. Since symptoms do not correlate with the abnormal anatomic findings on image studies and may not completely resolve following treatment, SMA is usually an exclusion diagnosis.^{20 21} Although image study begins with plain abdominal films and gastrointestinal barium series, contrast-enhanced CT or MRI angiography are crucial for making diagnosis because they give a better anatomic detail with identification of SMA syndrome aetiology.¹

The most sensitive imaging criteria for the diagnosis, considered by our references, is an aortomesenteric artery angle of $\leq 25^\circ$, principally if associated with a aortomesenteric distance ≤ 8 mm. It is also important for diagnosis to identify a duodenal obstruction with an abrupt cut-off in the third portion and active peristalsis and the finding of a high fixation of the duodenum by the ligament of Treitz, abnormally low origin of the SMA or anomalies of the SMA.^{20 22 23}

Unless the aetiology of SMA syndrome requires immediate surgical intervention, such as an aneurysm or abdominal mass, conservative treatment is the first-line approach.¹ Medical treatment include intravenous fluids to correct fluid and electrolyte imbalance, nasogastric tube placement for duodenal and gastric decompression, placement of patient in prone or left lateral decubitus position to ease pressure on duodenum and relieve abdominal pain and enteral jejunal tube feeding or parenteral nutrition to increase body weight. The response to conservative treatment tends to be better if symptoms last for less than a month.^{1 24} Surgery is indicated in symptomatic patients when conservative treatment fails. The duration of conservative treatment until the choice of surgical treatment is not well established, and the decision must be made by the surgeon responsible and is dependent on the clinical and radiological evolution of the patient. According to the existing literature, there are no known specific causes for the failure of conservative treatment. Gastrojejunostomy, duodenojejunostomy and Strong's procedure are the three surgical options available. Duodenojejunostomy is the most frequent surgical procedure and appears to have better outcomes with an 80% success rate. The gastrojejunostomy has the worst results, as it is less efficient in releasing the duodenal obstruction. Although Strong's procedure is simpler, faster, safer and with easier recovery, duodenum displacement is difficult to perform due to adhesions and anatomic variations.¹

A literature review of 21 case reports, listed on [table 1](#), of SMA syndrome due to eating disorders has shown that in 14 patients, medical treatment was the only one instituted, with complete resolution in 12. Four patients were only submitted to surgical treatment, with resolution in two and relapse in one patient. The remaining three patients required both types of treatment, with complete remission in all.^{17 18 25–42}

In the case presented, the SMA syndrome was caused by malnutrition secondary to an eating disorder, anorexia nervosa. Malnutrition was probably exacerbated by the syndrome itself because of epigastric pain, early satiety, nausea and vomiting, which worsened the duodenal compression and caused a 10 kg weight loss over the last month. Upper gastrointestinal barium series demonstrating a severely delayed transit into the fourth portion of the duodenum and a CT showing an aortomesenteric artery angle of 24° and a aortomesenteric distance of 4 mm made the diagnosis, matching the image criteria described in the literature. Like other case reports and reviews, conservative treatment aiming at increasing body weight was our first-line approach. However, different from other publications, enteral jejunal tube or parenteral nutrition were not needed to increase body weight. Simple nasogastric tube feeding followed by oral feeding was all that was necessary. If patient's condition had not improved with

Table 1 Literature review of 21 case reports of SAMS due to eating disorders. In 14 patients, medical treatment was the only one instituted, with complete resolution in 12. Four patients were only submitted to surgical treatment, with resolution in two and relapse in one patient. The remaining three patients required both types of treatment, with complete remission in all. Medical treatment: nasogastric tube (NGT), intravenous fluids, correction of hydroelectrolytic disturbances, enteral and/or parenteral feeding, postural change.

Reference	Eating disorder diagnosis	Age (year)	Gender	BMI (kg/m ²)	Treatment		Outcome
					Medical	Surgical	
Froese <i>et al</i> ²⁵	AN	16	M	N/A	Yes	—	Recovered
Sours <i>et al</i> ²⁶	AN	17	F	N/A	Yes	—	Recovered
Pentlow <i>et al</i> ¹⁷	AN	21	F	N/A	Yes	—	Recovered
Kornmehl <i>et al</i> ²⁷	AN	16	F	N/A	Yes	—	Recovered
Elbadaway ²⁸	AN	18	F	12.7	Yes	Yes	Recovered
Stheneur <i>et al</i> ²⁹	AN	14	F	14.5	Yes	—	Recovered
Adson <i>et al</i> ³⁰	AN	35	F	22.8	Yes	—	Recovered
	BN	30	F	N/A	Yes	—	Recovered
Verhoef <i>et al</i> ³¹	AN	16	F	15	Yes	—	Recovered
Gwee <i>et al</i> ¹⁸	AN	17	F	16.4	Yes	—	Recovered
Lee <i>et al</i> ³²	AN	15	F	19	Yes	—	Recovered
Mascolo <i>et al</i> ³³	AN	47	F	10.6	Yes	—	Recovered
Si-Yuan Yao <i>et al</i> ³⁴	AN	20	F	14	—	Yes	Recovered
Kalouche <i>et al</i> ³⁵	AN	20	F	16.7	—	Yes	Recovered
Jordaan <i>et al</i> ³⁶	AN	13	F	11.9	—	Yes	Symptoms reappeared
De Silva <i>et al</i> ³⁷	AN	28	F	N/A	Yes	—	Recovered
Schmidt-Troschke <i>et al</i> ³⁸	AN	11	F	14.5	Yes	—	N/A
Listernick ³⁹	AN	15	M	14.8	Yes	—	N/A
Fernandez Lopez <i>et al</i> ⁴⁰	AN	31	F	16.7	—	Yes	N/A
Rehman <i>et al</i> ⁴¹	AN	15	F	N/A	Yes	Yes	Recovered
Mearelli <i>et al</i> ⁴²	AN	47	M	N/A	Yes	Yes	Recovered

AN, anorexia nervosa; BMI, body mass index; BN, bulimia nervosa; N/A, not available.

conservative treatment, surgical management should have been performed.

Thus, our clinical case is in agreement with most of the literature found, in which the conservative management appears to be sufficient for short-term improvement and subsequent resolution of symptoms in long term, of a complicated chronic medical condition, such as the SMA syndrome associated with anorexia nervosa.

Learning points

- Superior mesenteric artery syndrome is a rare condition that must be suspected in an anorexia nervosa patient with upper gastrointestinal obstruction symptoms.
- A low threshold of suspicion is extremely important in order to make a timely diagnosis and treatment.
- A conservative treatment aimed at increasing body weight is the first-line approach, leaving surgical intervention for failure cases.

Contributors MNA data collection, study design, manuscript writing, manuscript review. CCA manuscript writing, manuscript review. JML manuscript writing, manuscript review. GM data collection, manuscript review.

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