A rare cause of duodenal obstruction: Superior mesenteric artery syndrome

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ABSTRACT

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CASE REPORT

A 73-year-old male was admitted to the emergency department complaining of abdominal pain, abdominal distention, nausea and vomiting lasting for one day. The patient showed a weight loss of 6 kg in five months. The physical examination revealed diffuse abdominal tenderness and abdominal distention. He was normotensive at 136/85 mmHg and tachycardic at 110 beats per minute. Serum chemistries were unremarkable. A plain abdominal X-ray showed gastric and proximal duodenal dilatation. Contrast-enhanced abdominal computed tomography (CT) scan showed that the third part of duodenum was compressed between the superior mesenteric artery (SMA) and aorta, a massively distended stomach and dilated proximal duodenum due to obstruction (Figure 1A). Both the aortomesenteric angle and distance were decreased to 14.2° and 4.27 mm, respectively (normal angle and distance are $38-60^\circ$ and 10–28 mm, respectively) (Figures 1B–C). According to the symptoms and radiologic findings, a diagnosis of superior mesenteric artery syndrome (SMAS) accompanied by duodenal obstruction was made. A nasogastric tube was inserted for decompression with six liters of gastric content immediately evacuated. The

patient was resuscitated and managed medically with enteral and parenteral nutrition support. Ten hours after the nasogastric decompression the follow-up abdominal CT scan showed a normal stomach and duodenum (Figure 1D). The patient was discharged in a stable condition.

DISCUSSION

The SMAS is a rare cause of intestinal obstruction. This syndrome is characterized by the compression of the third part of the duodenum secondary to the narrowing of the space between the SMA, aorta and the vertebral column [1]. The SMA leaves the aorta at an acute downward angle as compared to the complete right angle as it does in quadrupeds, as result of the erect posture of humans [2]. Ozkurt et al. found that the “angle” and the distance were

Figure 1: Computed tomography (CT) scan of abdomen. (A) Contrast-enhanced computed tomography scan of the abdomen and pelvis with axial images demonstrating compression of the third part of the duodenum (white star) by the superior mesenteric artery (black star). The abdominal CT scan also showed fluid-filled dilatation of the stomach (white star) and proximal duodenum (black star). (B, C) A decreased aortomesenteric distance (4.27 mm) (arrow) and a decreased aortomesenteric angle (14.2°) (arrow) were observed. After nasogastric tube, the control CT revealed completely regression of the duodenal dilatation.

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positively correlated to the body mass index [3]. In SMAS, the angle between SMA and aorta (Normal of 38° – 65°) can be narrowed resulting in a shortened aortomesenteric distance (Normal of 10–28 mm) that leads to duodenal impingement between the SMA anteriorly, and the aorta and vertebral column posteriorly [3]. Normally, the duodenum is protected by the perivascular and lymphatic tissue around the origin of SMA thereby preventing compression. When a patient loses weight rapidly, then the amount of fatty tissue around the SMA decreases. More common conditions that cause weight loss and SMAS include malignancy, malabsorption syndromes, AIDS, trauma, burn, spinal cord injury, paraplegia, drug abuse and anorexia nervosa. It may occur also after bariatric surgery, corrective spinal surgery for scoliosis or due to the distortion of normal anatomy after surgical procedures such as esophagectomy, total proctocolectomy with ileoanal anastomosis without weight loss [4]. Other rare causes of SMAS include the anatomical variant when the duodenum passes at the L3 vertebral body level, with a short suspensory ligament which can elevate the duodenum cranially into the narrowed vascular angle between the SMA and aorta resulting in impingement [2].

The symptoms of SMAS mirror with those of duodenal obstruction and may include nausea, vomiting, abdominal pain, distension, early satiety, tenderness, bilious emesis and weight loss [2]. Physical examination findings are nonspecific and electrolyte abnormalities may be present secondary to vomiting. Patients may present acutely or insidiously with these symptoms. The positions which increase the angle between the SMA and the aorta such as lying prone in the left lateral decubitus or in a knee-chest position improve the symptoms. The Hayes maneuver elevates the root of the SMA, also slightly easing the constriction by applying pressure below the umbilicus in a cephalad and dorsal direction.

A diagnosis of SMA syndrome is confirmed by imaging modalities. Plain abdominal X-ray shows gastric dilatation. Upper gastrointestinal X-ray series demonstrates duodenal distension, delayed transition of the contrast agent from the duodenum into the more distal small bowel and a sudden stop of the passage of the contrast agent at the third portion of the duodenum. Computed tomography scan is a safe, rapid and relatively noninvasive technique for the diagnosing allowing to confirm the characteristic duodenal distension by the SMA compression. The CT scan can also be used to assess the retroperitoneal and intra-abdominal fat. Computed tomography scan criteria for the diagnosis of SMAS include an aortomesenteric angle of less than 22 degrees and an aortomesenteric distance of less than 8–10 mm. [1, 2, 5].

Mechanical causes of duodenal obstruction can be ruled out by an endoscopy. The combination of upper gastrointestinal endoscopy and abdominal ultrasonography may be helpful in measuring the angle of the SMA and the aortomesenteric distance. This combination may offer an alternative way to diagnose

SMAS in children in order to avoid other tests with a risk of radiation exposure [6].

The differential diagnosis of SMAS includes diabetes mellitus associated gastroparesis, collagen vascular disease, scleroderma and chronic idiopathic intestinal pseudo-obstruction that cause bowel obstruction and associated with duodenal dysmotility [7].

The initial treatment for this syndrome is generally conservative with decompression of obstruction via a nasogastric tube, fluid and electrolyte replacement and nutritional support. Surgery is indicated only in case of a long complaints history, progressive weight loss, pronounced dilatation of the duodenum and failure of conservative treatment. Surgery procedures include a duodenojejunostomy or duodenal derotation (otherwise known as the Strong procedure) to alter the aortomesenteric angle and place the third and fourth portions of the duodenum to the right of the superior mesenteric artery [8]. Duodenojejunostomy is the gold standard surgical treatment for this disease if conservative management fails.

CONCLUSION

In patients who are admitted to the emergency department with signs of intestinal obstruction and a history of weight loss, superior mesenteric artery syndrome (SMAS) should be part of the differential diagnosis. The diagnosis is confirmed with radiological examinations, as in this case. The initial treatment of SMAS is conservative but surgery may be necessary in patients who do not respond to conservative methods.

Keywords: Duodenal obstruction, Duodenojejunostomy, Intestinal obstruction, Superior mesenteric artery syndrome (SMAS).

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Iskender Ekinci – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Jamshid Hamdard – Substantial contributions to conception and design, Acquisition of data, Analysis

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Musa Atay – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Final approval of the version to be published

Ertan Sönmez – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Revising it critically for important intellectual content, Final approval of the version to be published

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The corresponding author is the guarantor of submission.

Conflict of Interest

Authors declare no conflict of interest.

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