SUPERIOR MESENTERIC ARTERY SYNDROME : A CASE REPORT IN SRISAKET HOSPITAL

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ABSTRACT

Superior Mesenteic Artery Syndrome (SMAS) is a rare condition. The case is often undiagnosed because of the unawareness and the roentgenographic or endoscopic examinations are often negative. It should be considered in patients with long standing abdominal complaints and do not respond to the standard medical regimens.

A case of Superior Mesenteric Artery Syndrome, diagnosed by roentgenographic examination of the upper gastrointestinal tract and treated by surgical intervention in Srisaket Hospital after having been treated by medical conservative treatment without improvement, was reported and the literatures had been reviewed.

Key words : Superior Mesenteric Artery Syndrome (SMAS), Chronic abdominal complaints, Partial duodenal obstruction, Roentgenographic findings.

INTRODUCTION

Superior Mesenteric Artery Syndrome (SMAS) is a rare condition of duodenal obstruction. Its symptoms may mimic closely with a variety of upper gastrointestinal disorders, such as peptic ulcers, gall stones, pancreatitis, etc. Even more, the SMAS may associated with each of the aforementioned diseases. It occurs in any age group but more common in young adults. Females are more than males and most commonly found in asthenic habitus. The pathogenesis of this disorder is reported to be anatomically related - the narrowed arteriomesenteric angle. The most helpful diagnosis is roentgenographic examination of the upper gastrointestinal tract with careful fluoroscopic examination. The characteristic findings are a straight cut-off line at the third part of the duodenum and proximal duodenal dilatation with delayed transit time. Strong churning peristalsis may be observed on fluoroscopy. The treatment of choice is medical and conservative treatment which is aimed to increase the patient's calories, therefore increasing the retroperitoneal mesenteric fat. This is reported to result in decreasing the chance of the duodenal obstruction by the superior mesenteric artery. Surgical treatment is indicated when medical treatment is failed. The procedure of choice is duodenojejunostomy. Because of the high morbidity in the patients with SMAS who were not diagnosed and treated properly, the clinicians should keep the SMAS in mind for every patient who suffers from upper abdominal symptoms and does not respond to the medical regimens.

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CASE REPORT

A 18 years old female presented with a history of prolonged abdominal pain, nausea and vomiting with chronic weight loss for 1 month. Her menstruation history was normal. No pertinent past history was relevant. (Fig. 1)

On examination, the patient looked cachetic and asthenic with scaphoid abdomen. Neither pale nor jaundice was detectable. The body weight was 35 Kg, blood pressure 80/50 mm.Hg. No fever or enlargement of any lymph node was detectable. The abdomen was soft without guarding, rigidity or tenderness. The liver and spleen was not palpable. No abnormality was detectable in the heart, lungs and extremities. The relevant laboratory investigation results were unremarkable.

" Peptic ulcer " was diagnosed at the emergency room and medical treatment was then given. She was observed in the observation room without clinical improvement so she was admitted and roentgenographic examination was performed. The Upper G.I. study showed dilatation of the second part and proximal third part of the duodenum. The stomach was dilated. Churning peristalsis at the dilated segment on careful fluoroscopic examination and delayed transit time were observed. An abrupt linear extrinsic compression band at the third part of the duodenum at the right side of the lumbar spine with proximal dilatation was detected. The duodenal mucosa was intact. The impression was a partial duodenal obstruction from external compression at the third part duodenum. Superior Mesenteric Artery Syndrome was considered. (Fig. 2)

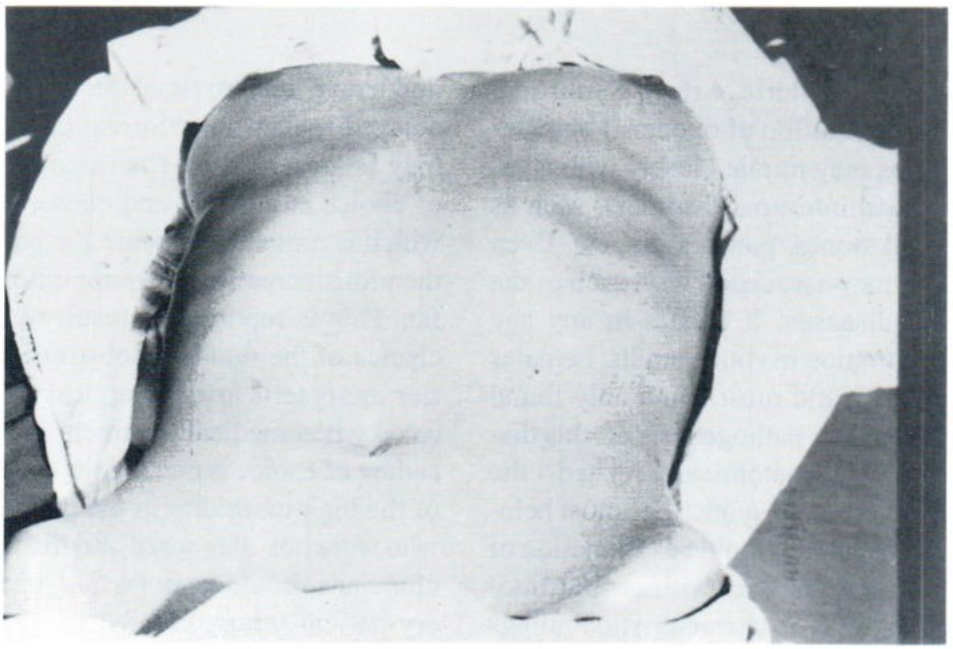

Fig. 1 A female 18-year-old woman with asthenic habitus and scaphoid abdomen.

Fig. 2 Upper gastrointestinal study reveals dilatation of the stomach and second part of the duodenum. A straight cut-off line at the third part of duodenum.

TREATMENT

Conservative medical treatment was given without clinical improvement. Surgical treatment was then performed. The operative findings were: The second part of duodenum appeared dilated. The third part of duodenum was compressed by superior mesenteric artery at its anterior aspect with an abrupt change of the caliber of the duodenum at the point of obstruction. There was no evidence of mass or mucosal destruction detectable. Duodenojejunostomy was performed. (Fig 3).

POST OPERATIVE FOLLOW UP

There were no clinical symptoms of gastrointestinal obstruction persisting postoperatively. The patient gained more than ten kilograms of body weight in two months on follow up examination.

REVISION OF THE LITERATURES

Superior Mesenteric Artery Syndrome (SMAS) was first described by Rokitanski[30] in 1842 and was later analysed by Wilkies, Barner and Sherman[30] in 1963. This condition has many synonyms such as; Vascular compression of the duodenum,[11] Wilkies ' syndrome,[11] Chronic intermittent arterio- mesenteric occlusion of the duodenum,[4] Chronic duodenal ileus,[2] Arterio-mesenteric artery syndrome,[6] Superior mesenteric artery syndrome[25], Duodenal regurgitation,[4] duodenal stasis,[4] Arteriomesenteric ileus,[7] Cast Syndrome.[3]

Fig. 3 Surgical findings reveals marked dilatation of th second part of the duodenum (Arrow head and dots). The dilated portion of duodenum is endedd at the site of the superior mesenteric artery (Arrowheads). Distal from this line the duodenum was collapse.

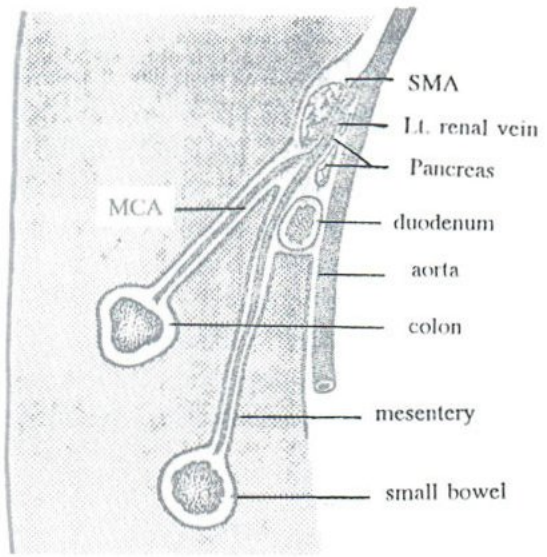

Fig. 4 The third portion of duodenum is trapped in the arteriomesenteric angle which is formed by the Superior mesenteric artery (SMA) and the aorta like a nut in between a "nutcracker" or "scissors"

MCA = Middle Colic Artery

ANATOMIC CONSIDERATION

Superior mesenteric artery arises from the aorta at the level of L1 vertebral body. It runs inferiorly to the right lower quadrant of the abdomen and forming an angle of 45-60^0 to it. The duodenum usually crosses the vertebral column at the level of the thrid lumbar vertebra. In average-sized person this distance is about 5 inches. The thrid part of the duodenum is trapped in the space like a nut in between a **"nutcracker"** or **"scissors".**[21] (Figure 4).

The ascending and the transverse segments of the duodenum is the most fixed portion of the alimentary tract and were in retroperitoneal space. It is limitted in its distal part by the ligament of Treitz and is bounded posteriorly by the vertebral body, the abdominal aorta and the neurovascular bundle of the superior mesenteric artery.

Marchant EA., et al, analysed 11 patients of Superior Mesenteric Artery Syndrome angiographically and found that the arteriomesenteric angle is between 6-15^0 and is in a range of 25-60^0 in normal population.[12]

Retroperitoneal mesenteric fat plays a significant role in Superior Mesenteric Artery Syndrome. It maintains arteriomesenteric angle and keeps the aorta and the root of the mesentery away from the abdominal aorta. Perinephric and retroperitoneal fat help pushing the second part of the duodenum anteriorly and so decrease the chance of duodenal obstruction by the superior mesenteric artery.

In acute weight loss the duodenum is prone to be compressed because of the loss of the retroperitoneal mesenteric fat, but not in every cases. Many other anatomic factors also play some role such as follow : Tight ligament of Treitz, Abnormally high position of the third part of duodenum, Unusual take off superior mesenteric artery from the aorta, Increased lumbar lordosis especially in women,[19] Short mesentery, redundant relaxed abdominal wall increased the dragging effect of the mesenteric root and consequently narrow the space anteriorly,[1] Immobilization in the supine position may cause the superior mesenteric artery to compress the third portion of the duodenum by gravity. The symptoms of Superior Mesenteric Artery Syndrome can be relieved by knee-to-chest or prone position. Because they increased the arteriomesenteric angle,[2] Middle colic artery, a brach of the superior mesenteric artery also crosses the third part of the duodenum and causes Superior Mesenteric Artery Syndrome in some patients.

AGE AND SEX

All age groups can be affected but more often in young adults. It is much more common in females than in males.[4] Seventy five percents of the patients are between 10 and 39 years.[23]

SYMPTOMS

Characteristically, the symptoms are of a recurrent, intermittent nature and partial or complete relief is often obtained in the knee-chest or recumbent position. The chief complaints are vomiting and epigastric pain after meals. Vomiting usually produces immediate relief. The patients usually suffer from the symptoms for a long duration. The abdominal symptoms are vague and often cannot be differentiated from those caused by other more common upper abdominal diseases such as peptic ulcer diseases, gall stones, chronic pancreatitis and cholelithiasis.[4]

The frequent association with other diseases which cause similar symptoms including peptic ulcer disease, bile reflux gastritis,[19] cholelithiasis, cholycystitis, pancreatitis, duodenitis, irritable colon[11] were reported.

The clinical symptoms enlisted in the literatures are post-prandial epigastric pain, fullness, nausea , bile stained vomiting, weight loss, partial or complete relief when the patient adopts the knee-elbow, knee-chest, left lateral or recumbent positions.[25]

DIAGNOSIS

Physical examination often reveals the presence of gastric dilatation. The most helpful diagnostic evaluation of the patients with superior mesenteric artery syndrome is roentgenographic examination of the upper gastrointestinal tract (UGI).[33]

Hayes described "pressure paradox" (Hayes' maneuver)[11] in which pressure is made by the hand placed below the umbilicus in a backward and upward direction for 30 seconds to undo the duodenojejunal kink. This manipulation was claimed to be valuable in the diagnostic relief of the vascular duodenal obstruction.[11]

RADIOLOGICAL FEATURES

The pertinent findings are as follow[5] : 1) Dilatation of the first and second portions of the duodenum with or without gastric dilatation.[31] 2) To-and-fro peristalsis of second and third part of duodenum during fluoroscopy. 3) Abrupt but in-

complete hold up of barium in the third part and dilatation proximal to the point of hold up (along lateral border of right psoas shadow). 4) Vertical cut-off compression at the third part duodenum when the patient is in the left anterior oblique position. 5) Delay in transit of 4 to 6 hours through the gastroduodenal region.[31] 6) Relief of obstruction is obtained when the patient is placed in a position that diminishes the drag of the small bowel mesentery (the left lateral decubitus, prone position, knee-chest position).[31] The patients should be examined in prone or left lateral decubitus to evaluate the degree of obstruction. If the obstruction is decreased, operation may not be nescessary.

Similar roentgenographic findings of dilatation of proximal duodenum can be found in patients with progressive systemic sclerosis or pancreatitis whose compression defect of the duodenum is different from that caused by superior mesenteric artery.[24]

TREATMENT

Medical treatment should be considered first. Surgical treatment is indicated only when the medical therapy is failed.[15,16]

The medical treatment consists of total parenteral nutrition, nasogastric suction and electrolyte correction. Medical treatment should aim to increase the patients' calories and then to increase the body fat , especially the mesenteric fat. This helps to increase the arteriomesenteric angle and decreases the chance of duodenal obstruction.

Positional treatment by simple gravitational maneuvers after meals can relieve the symptoms in some cases. The patient was lied on the side or prone or knee-chest position.

Surgical management : Operation should be performed when the medical treatment is failed.

The criterias for operative intervention are[28]: 1) Confirmation of diagnosis. 2) Radiographic or endoscopic or psychologic evaluation to rule out other causes. 3) Failure of a strict medical regime. 4) The present of associated disease such as peptic ulcer , pancreatitis, etc. 5) Severe cachectic and difficult to gain body weight. 6) Preference of the patient for surgical correction rather than prolonged conservative management.

Surgical treatment of choice is duodenojejunostomy.[7,8,16] Devision of the duodenum with reanastomosis anterior to the superior mesenteric artery is an alternative.

Many surgical techniques were performed such as : lysis of the Ligament of Treitz,[9] mobilization of the entire duodenum, freeing up of the retroperitoneal attachments of the mesentery, positioning the duodenum and most of the small bowel in the right side of the abdomen. Other alternative surgical procedures are gastrojejunostomy, duodenoduodenostomy and inferior displacement of the duodenal junction.

DISCUSSION

Superior mesenteric artery syndrome is an uncommon condition found in young persons especially in women. Narrowing of the arteriomesenteric angle which is formed between the aorta and the superior mesenteric artery is reported to be the predisposing factor. Other anatomical factors also play the role such as high position and tight ligament of Treitz.[23] The duodenum is hung superiorly in the arteriomesenteic angle and the chance for vascular duodenal obstruction is increased. Acute weight loss from any causes that decreased the mesenteric fat such as in anorexia nervosa,[27] prolonged supine position as in burned patient, cancer, head trauma, debilitated state,[20] various generalized systemic diseases, body cast - increased lumbar lordotic curve,[26,29,32] postoperative state[17] especially abdominal surgery, loss of muscle tone of the abdominal wall leading to visceroptosis.[10]

There are two forms of Superior Mesenteric Artery Syndrome - intermittent and chronic.[4] The degree of severity depends on the arteriomesenteric angle. This condition should be considered in the differential diagnosis of upper abdominal symptoms and signs of intestinal obstruction, especially when the symptoms are not relieved by the more common disease regimens.

The most helpful diagnosis is roentgenographic examination of the upper gastrointestional tract. The most important diagnostic criteria is obstruction at the third portion of the duodenum with a straight cut-off line and proximal duodenal dilataion.[28] The examination should be performed during attacks for proper diagnosis. However, negative UGI study does not exclude it. It should be remembered that this condition is intermittent in nature. The diagnosis can be made during careful fluoroscopic examination especially in erect position to accentuate the condition- decreases the arteriomesenteric angle. In prone position, the duodenal retention is usually disappeared more or less completely-as compared to the knee-chest position. The dilated portion of the duodenum exhibits strong churning peristalsis. Reverse peristalsis is quite prominent but this is not a pathognomonic sign[4] since it is observed under various conditions.

Basic principles of therapy of this disorder are important. Medical and postural treatment will relieve and cure a considerable number of patients[2] Surgery is indicated only in cases of failure of medical and conservative treatment. The operation of choice is duodenojejunostomy.

Because of the high morbidity in the patients with Superior Mesenteric Artery Syndrome who were not diagnosed and properly treated, the clinicians should keep in mind, the Superior Mesenteric Artery Syndrome in every patient who suffers from upper abdominal symptoms and does not respond to the medical regimens.

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