

Can superior mesenteric artery syndrome really be treated surgically?



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Can superior mesenteric artery syndrome really be treated surgically?

AIM: Superior mesenteric artery (SMA) syndrome is a rare reason of small bowel obstruction (SBO). It is a complicated sickness. We aim to analyze the diagnosis, clinical presentation, SMAS management and postoperative outcomes after laparoscopic duodenojejunostomy.

MATERIAL AND METHODS: A total of 19 patients who were diagnosed with SMAS and did not respond to the traditional treatment between January 2010 and November 2017 in Afyon Health Sciences University Hospital were included in the study.

RESULTS: Their average age was 22.3 years (17-31 years). Number of males and females were 6 and 13, respectively. Clinical presentations of patients are as follow: 14 patients were referred to as postprandial distress syndrome, 3 were unexplained weight loss, and 2 were gastroesophageal reflux disease. Considering CT angiography findings, 14 patients had duodenal dilatation. The mean aortamesenteric angle was 10.6 mm. The mean of aorta-SMA distance was 5.1 mm. The mean hospital stay and follow-up times were 3.7 days and 40.2 months, respectively. No morbidity or mortality was found within patients. Preoperative, postoperative 6th month and postoperative 12th month CONUT scores were 9.1, 3.7, and 0.8, respectively.

CONCLUSIONS: Laparoscopic duodenojejunostomy can be performed safely to the patients who do not benefit from conservative treatment.

KEY WORDS: Aortamesenteric angle, Duodenojejunostomy, Weight loss

Introduction

Superior mesenteric artery (SMA) syndrome is firstly described by Rokitsky in an anatomy textbook in 1842¹. It is a rare reason of small bowel obstruction (SBO). Although superior mesenteric artery syndrome (SMAS) is seen rarely, it is a complicated sickness. Kwan *et al.* also entitled SMAS as chronic duodenal ileus, Cast syndrome, and Wilkie's syndrome². Its incidence varies from 0.013 to 0.3%³. Duodenum's compressed third part between anterior SMA and posterior aorta that leads to upper gastrointestinal obstruction is the defined fea-

ture of SMAS. It has causative syndromes such as surgical anatomy alterations, externally compressed abdomen, weight loss, and anatomic variations⁴. Post-prandial epigastric fullness together with eructation, pain, and bilious vomiting are the most significant SMA symptoms⁵. According to the observed cases, adolescents and young adults have higher SMAS risks. It is seen more frequently among females. Gaining weight helps to resolve the compression; thus, nutritional management is vital in this context. However, it is unknown whether nutritional or surgical management should be preferred for this condition⁶. Furthermore, optimal SMAS treatment has been still a challenge. Indeed, after its diagnosis, firstly nutritional support and positioning, which is the traditional treatment, should be applied firstly, and surgery may represent a lasting therapeutic option in case of failure. Bloodgood suggested duodenojejunostomy for the treatment of chronic duodenal ileus⁷. After Stavely performed duodenojejunostomy first time in 1908⁸, it has been a main method of those patients. Since Bermas *et*

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al. proposed a laparoscopic duodenojejunostomy method as an operative SMAS management in 1997⁹, this laparoscopic approach has been determined only in small number of case reports and series¹⁰.

In this study, we aim to analyze the diagnosis, clinical presentation, SMAS management and postoperative outcomes after laparoscopic duodenojejunostomy.

Material and Methods

A total of 19 patients who were diagnosed with SMAS and did not respond to the traditional treatment between January 2010 and November 2017 in Afyon Health Sciences University Hospital were included in the study. This study was approved by the Ethics Committee of Afyonkarahisar Health Science University. CT angiography was used to exclude asymptomatic patients who presented with different complaints to our clinic and who had incidentally had a narrow aortamesenteric range and an aortamesenteric angle. We also confirmed the

diagnosis of all patients with CT angiography. In addition, gastroduodenoscopy was performed in all patients. The diagnosis of SMA was made by CT angiography, dilatation in the duodenum, degradation of the aortamesenteric angle (6-16 degrees), and at least two of the findings in the aortamesenteric range (2-8mm) (Figs. 1 a, b, c). All patients underwent laparoscopic duodenojejunostomy side by side. Patients were evaluated according to their age, gender, body mass index, complaints, CT angiography findings, endoscopy findings, preoperative and postoperative CONUT scores. The success of the surgery was evaluated according to the CONUT scores that were calculated in the 6th and 12th months of the postoperative period.

MANAGEMENT OF TREATMENT

Nutritional support therapy was started primarily as a conservative approach within all symptomatic patients in our study. Six to eight weeks after the beginning of con-

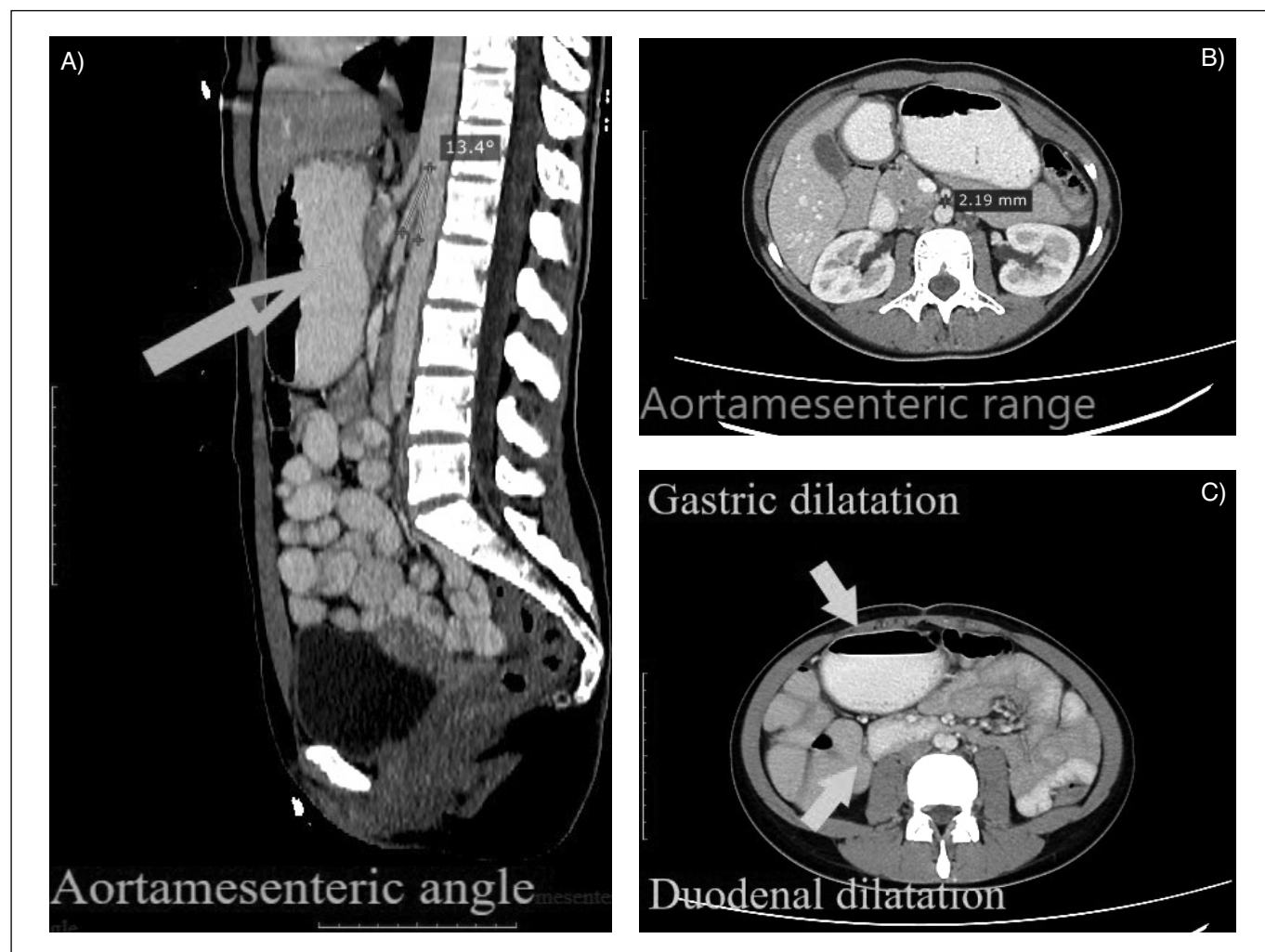


Fig. 1: A) Aortamesenteric angle; B) Aortamesenteric range; C) Duodenal and gastric dilatation.

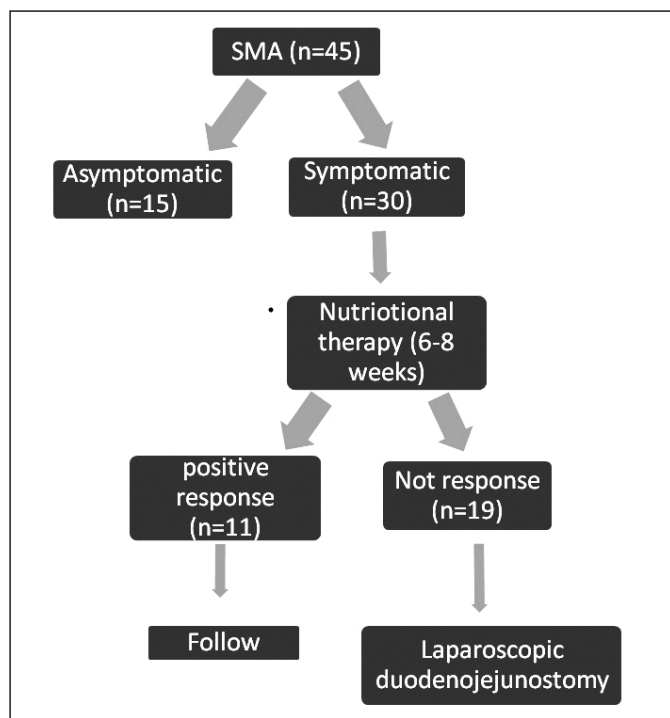


Fig. 2: Management of treatment.

servative therapy, surgery was performed in the absence of response to the treatment (Fig. 2).

OPERATION TECHNIQUE

Open technique is used to place a 12-mm trocar via umbilicus. Fig. 3 shows that 2 extra 5-mm trocars were inserted laterally into the muscle of rectus abdominis at the right and left sides. The 12-mm trocar was below the flank in the right side. We performed duodenojejunostomy with side-to-side anastomosis between duodenum's third part and jejunum loop which was approximately 30 cm beyond to Treitz ligament. Retrocolic anastomosis was done with a 45-mm EndoGIA stapling device (Echelon, Ethicon Endo-Surgery Cincinnati, OH) as shown in Fig. 4. A running suture is employed to close the defect after inserting the stapler.

Results

A total of 19 patients were determined from the hospital records in the period of time between January 2010 and November 2017 (Table I). Their average age was 22.3 years (17-31 years). Number of males and females were 6 and 13, respectively. Clinical presentations of patients are as follow: 14 patients were referred to as postprandial distress syndrome, 3 were unexplained weight loss, and 2 were gastroesophageal reflux disease. Considering CT angiography findings, 14 patients had

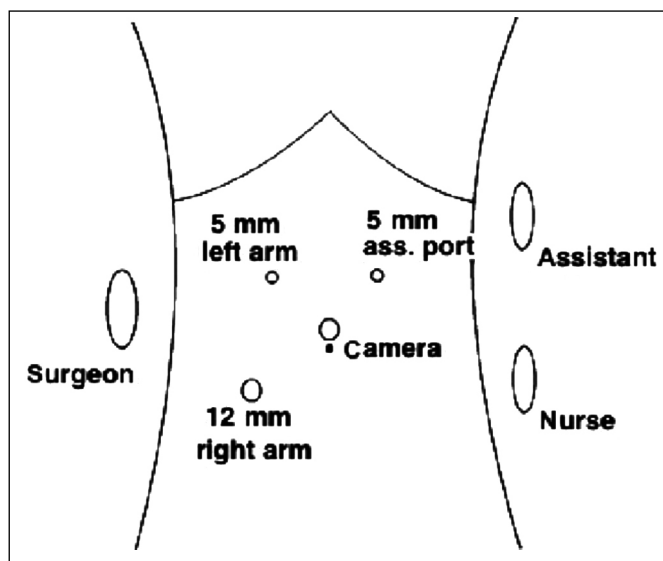


Fig. 3: Trocar placement.



Fig. 4: Side to side anastomosis with duodenojejunostomy.

duodenal dilatation. The mean aortamesenteric angle was 10.6 mm. The mean of aorta-SMA distance was 5.1 mm. Gastroduodenoscopy findings are as follow: 14 patients had duodenal dilatation, 6 patients had alkaline reflux gastritis and 4 patients had pulsatile duodenal compression. The mean hospital stay and follow-up times were 3.7 days and 40.2 months, respectively. No morbidity or mortality was found within patients. Preoperative, postoperative 6th month and postoperative 12th month CONUT scores were 9.1, 3.7, and 0.8, respectively.

Discussion

Factors, which develop SMAS, are congenital. These factors consist of low SMA origin and short Treitz ligament¹¹. Iwaoka *et al.* also proposed genetic factors¹². SMAS mostly has higher clinical suspicion index. SMAS

TABLE I - Characteristics of SMA patients

Parameters	Patients with SMA
Age (years)	22.3
Gender (F/M)	13/6
Body mass index (kg/m ²)	19.2
CT angiography findings	
Duodenal dilatation (n)	14
Aortomesenteric angle (mm)	10.6
Aorta-SMA distance (mm)	5.1
Clinical symptoms at onset (n)	
Postprandial distress syndrome	14
Otherwise unexplained weight loss	3
Gastroesophageal reflux disease	2
Gastroduodenoscopy findings (n)	
Duodenal dilatation	14
Alkalen reflux gastritis	6
Pulsatile duodenal compression	4
Average follow-up time (month)	40.2
Average hospital stay time (day)	3.7
Morbidity	0
Mortality	0
CONUT Score (mean)	
Preoperative	9.1
6 th month	3.7
12 th month	0.8

is diagnosed according to radiological tests, physical examinations and clinical histories¹³. Massy fat and lymphatic tissue close to SMA origin protects healthy people for duodenum compression¹⁴.

However, this condition affects female patients, older children, adolescents, and even slim cases who lost weight fastly¹⁵. In this study, a female preponderance and a higher prevalence of the syndrome among young-adult age group are confirmed. Usually, SMA syndrome presents with an acute occurrence such as duodenal obstruction, or more insidious such as patients who presented with protracted abdominal pain, anorexia, early satiety and repeated abdominal pain episodes with vomiting¹⁶. However, because of insidious presentation, SMAS diagnosis is complicated and mostly delayed¹⁷. In our study, postprandial distress syndrome (epigastric pain and discomfort, nausea, and vomiting) was the most frequent presentation, which is seen among 14 patients. Recent developments in CT imaging improves diagnostic rate with determining aortomesenteric angle and distance more accurate¹⁸. The average aortomesenteric angle was calculated as 10.6 degrees.

An "experienced" endoscopist may recognize a pulsatile extrinsic compression as an SMAS indicative in an upper endoscopic examination¹⁷. Other mechanical obstruction causes can be prevented with upper gastrointestinal endoscopy. In our study, pulsatile extrinsic compression was observed in 4 patients. The patients with these findings were 4 of the last 8 patients. This can be characterized as an awareness of the development of our clinical experience with SMA syndrome. Traditional measurements such as the support of aggressive nutrition, intra-

venous rehydration, correction of electrolyte abnormalities, and decompression of nasogastric are part of SMAS management. If nutritional support in the form of parenteral and/or postpyloric feeding is possible, oral diet is afterwards applied. Medical treatment usually achieves success among patients who have moderate symptoms, shorter medical histories and incomplete duodenal obstructions. Considering traditional management, there is not a definite time limit¹⁹.

Nutritional support therapy was started primarily as a conservative approach within all patients in our study. Six to eight weeks after the beginning of conservative therapy, surgery was performed in the absence of response to the treatment.

In the literature²⁰⁻²², laparoscopic duodenojejunostomy is given as a feasible approach for SMAS treatment. It takes advantages of minimally invasive surgery and its significant results. Duodenojejunostomy, gastrojejunostomy, relocation of the duodenojejunal junction, duodenal anterior replacement, and section of Treitz ligament are possible surgical methods. Proximal duodenal obstruction is not relived with gastrojejunostomy so postoperative vomiting still exists²³. Different surgical methods have been not compared with non-random trials because SMAS seen very rarely. Possible surgical methods should be taken into consideration when the traditional approaches are not successful or the patient prefers a surgery²⁰.

Laparoscopic duodenojejunostomy was performed within all patients in our study. It was the preferred method due to required single anastomosis and functionality. There was no morbidity and mortality.

Nutritional status is assessed with CONUT scored, which were suitable and practical tool. CONUT scores evaluate items in blood tests and objective nutrition indices, which are the total cholesterol, lymphocyte count and albumin (Alb) score. A 4-point scale was used to grade mal-nutrition levels. It scaled as normal, mild abnormal, moderate abnormal, and severe abnormal with the scores of 0 to 1, 2 to 4, 5 to 8, and 9 to 12, respectively. A higher CONUT score provides hypoalimentation state, impaired immune response and systemic inflammation^{2,25}.

In our study, CONUT score evaluated the success of surgical treatments before and after the surgery. While the CONUT score of patients decreased significantly at the 6th month after the surgery, these scores reached normal levels at the 12th month. Long-term follow-up of patients who underwent surgical treatment was considered as a necessary indicator to evaluate the success of surgical treatments.

Conclusion

In conclusion, diagnosis of SMAS disease is difficult if there is not a clinical suspicion. Our study is one of the

largest serie in the literature. The conservative approach is still the primary treatment. In order to achieve both minimally invasive and successful results in the early and late postoperative period, laparoscopic duodenojejunostomy can be performed safely to the patients who do not benefit from conservative treatment. However, there is still a need for studies with larger series.

Riassunto

La sindrome dell'arteria mesenterica superiore (Superior mesenteric artery, SMA) rappresenta una rara causa di ostruzione dell'intestino tenue (small bowel obstruction, SBO). È una malattia complicata. Il nostro obiettivo è quello di analizzare la diagnosi, la presentazione clinica, la gestione della sindrome dell'arteria mesenterica superiore e degli esiti postoperatori dopo duodenodigiunostomia laparoscopica.

Sono stati studiati 19 pazienti a cui è stata diagnosticata la sindrome dell'arteria mesenterica superiore tra gennaio 2010 e novembre 2017 presso l'ospedale universitario Afyon Health Sciences e che non hanno risposto al trattamento tradizionale.

La loro età media era di 22,3 anni (17-31 anni): 6 uomini e 13 donne. Alla presentazione clinica 14 pazienti lamentavano una sindrome da sofferenza postprandiale, 3 una inspiegabile perdita di peso e 2 una GERD. 14 pazienti presentavano una dilatazione duodenale all'angio-Tac.

L'angolo aorto-mesenterico era in media di 10,6 mm. La media della distanza tra l'aorta e la SMA era di 5,1 mm. I tempi medi di degenza e di follow-up sono stati rispettivamente di 3,7 giorni e 40,2 mesi. Non è stata riscontrata morbilità o mortalità nei pazienti. I punteggi CONUT riguardanti il 6° mese preoperatorio e il 6° e 12° mese postoperatorio erano rispettivamente di: 9,1; 3,7 e 0,8.

Dall'esperienza si conclude che la duodenodigiunostomia laparoscopica può essere eseguita in modo sicuro per i pazienti che non beneficiano del trattamento conservativo.

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