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Case report

A case report of a 13-year-old girl diagnosed with superior mesenteric artery syndrome after undergoing spine correction with posterior fusion for rapidly progressed juvenile idiopathic scoliosis

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ABSTRACT

Introduction: Superior mesenteric artery (SMA) syndrome (SMAS) is a relatively rare disease that the etiology is closely related to the anatomy and the topography of the duodenum, aorta, and SMA.
Aim: To present and analyze the case of a patient who was diagnosed and treated for SMAS after scoliosis surgery.
Case study: A 13-year-old girl was admitted to our department for the surgical treatment of juvenile idiopathic scoliosis, with a Cobb angle of 120° in the main curvature. Postoperatively, we obtained the expected correction of 50%. Interestingly, after the treatment, BMI changed from 19 to 16, which assigned the patient to the underweight, starvation and emaciation group.
Results and discussion: On the 5th postoperative day, the patient's condition deteriorated. She suffered from abdominal pain, nausea and vomiting. We diagnosed SMAS. After conservative treatment the patient's condition improves and she was discharged from the hospital on the 16th postoperative day in a good general condition after the complete resolution of SMAS symptoms.
Conclusions: (1) SMAS can occur frequently in patients after surgical correction of the spine deformities. (2) At the curvatures of the order of 100°–120° or more, there is a significant change in the topography of the anatomical structures and their adaptation to a new

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Abbreviations: AIS, adolescent idiopathic scoliosis; LRV, left renal vein; PSF, posterior spinal fusion.

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position after surgery. (3) Special attention must be paid to young, lean patients, with BMI below 19, and the postoperative effect of an elongated axis of the spine. (4) Even if SMAS occurs, in most cases it can and should be treated conservatively.

1. Introduction

Superior mesenteric artery (SMA) syndrome (SMAS) is a relatively rare disease that was first described by Rokitansky in the 19th century, further analyzed by Wilkie in 1927, in 75 patients[1,2] and also called as Wilkie disease or cast syndrome.[3,4] The etiology is closely related to the anatomy and the topography of the duodenum, aorta, and SMA. SMAS is caused by the compression of the mesenteric vessels in the third part of the duodenum (Fig. 1). This is caused by the activation of extrinsic factors.[1,6] The main predisposing factors are weight loss and loss of the fat protection due to anorexia, severe trauma, and tumors, anatomical variants (the ligament of Treitz and SMA), and surgeries performed in the abdominal cavity.[7] The literature describes cases of this syndrome after surgical correction of the spine curvature, as well as after the treatment using a brace.[1,3,6] SMAS is a rare disease, with an incidence of less than 0.4%.[3] However, after surgical correction of the spine the incidence increases and is estimated to be 1.0%–4.7%.[1,8,9] It is a disease that often affects women more than men, in a ratio of 3:2,[10] and some authors[11,12] pay attention to a rather high number of deaths (33%), as described in the literature. There have been near 400 case reports in the English language literature since 1980.[1,4,13] These figures may not necessarily reflect the actual number of cases due to the difficulties in correct diagnosis.[2]

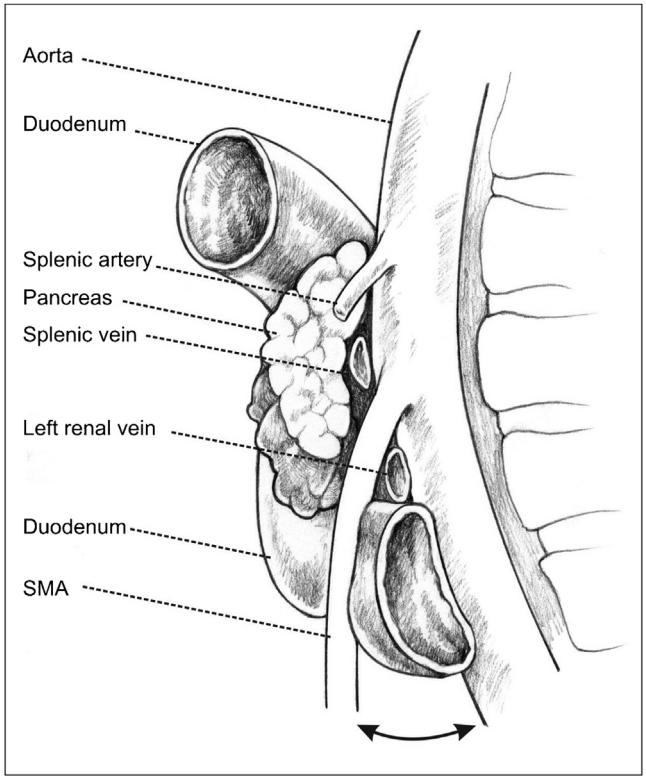

Fig. 1 – The anatomy and topography of the duodenum, abdominal aorta and superior mesenteric artery (the AP view), the SMAS pathomechanism (the LAT view), the compression of the duodenum
***Source*: Adopted from Lam et al.[5]**

2. Aim

We intend to present and analyze the case of a 13-year-old girl, with a significant deformity of the spine. After surgical correction of curvature, the girl was diagnosed and treated for SMAS.

3. Case report

A 13-year-old girl was admitted to our Department of Pediatrics, Orthopedics and Spinal Surgery for the surgical treatment of juvenile idiopathic scoliosis, which had rapidly progressed (above 15° per year).[14,15] She was previously treated exclusively with rehabilitation and a corset, without a satisfactory result. Before treating the patient with braces, X-ray, MRI, and CT examinations of the spine were carried out to rule out other pathologies.

On admission to the department, the patient's general condition was good. A clinical examination found idiopathic thoracolumbar scoliosis, with a Cobb angle of 120° in the main curvature. The Risser test was 3. Her height, body weight, and BMI before the surgery were 153 cm, 44.5 kg, and 19, respectively. The patient did not suffer from any other illnesses and was not on any medications. There was no family history of idiopathic scoliosis. Preoperative radiographs of the spine are shown in Figs. 2 and 3.

Due to the advanced spinal deformity, we discussed possible variants of the treatment with the patient and her parents, paying special attention to the potential complications that can occur with such a large curvature correction. We considered a multi-stage treatment including anterior release, cranial halo traction and posterior correction with fusion. Other proposed options covered even vertebral column resection (VCR).[16–18] After analyzing all the 'pros' and 'cons,' the parents opted for a one-stage treatment. Categorically they did not consent to the use of halo and VCR. Therefore, we planned a one-stage procedure of correction and posterior stabilization with multi-level Smith–Petersen osteotomy, informing that possible and safe correction will be from 40%