Left-sided appendicitis: diagnosis and minimally invasive treatment

Eudaldo M López-Tomassetti Fernández,[1] Julián Favre Rizzo,[1] Iván Arteaga González,[2] Juan Ramón Hernández Hernández[1]

[1] Departamento de Cirugía General y del Aparato Digestivo, Hospital Universitario Insular de Gran Canaria, Las Palmas de Gran Canaria, Las Palmas; [2]Departamento de Cirugía General y del Aparato Digestivo, Hospital Universitario de Canarias, La Laguna, Tenerife; España.

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Summary

Intestinal malrotation and situs inversus can have important repercussions if acute abdominal pain develops. Intra-abdominal structures can have inverted position and thus may easily mislead the surgeon during physical examination. Fortunately, radiological exams have improved the preoperative diagnosis of these patients. However, in difficult cases when an underlying surgical disease is suspected, laparoscopy remains the gold standard in order to diagnose and treat if possible the suspected disorder. We present a case of acute left-side appendicitis in a child with unknown congenital intestinal malrotation. In addition, this case stressed the value of laparoscopy in daily practice to evaluate patients with atypical abdominal pain.

Key words. *Left-sided appendicitis, laparoscopy, intestinal malrotation.*

Apendicitis izquierda: Diagnóstico y tratamiento mínimamente invasivo

Resumen

La malrotación intestinal y el situs inversus pueden tener repercusiones importantes si se presenta dolor abdominal agudo. La posición de las estructuras intraabdominales puede ser invertida y eso puede confundir fácilmente al cirujano durante el examen físico. Afortunadamente, los exámenes radiológicos han mejorado el diagnóstico preoperatorio de estos pacientes. Sin embargo, en aquellos casos difíciles donde se sospecha una enfermedad quirúrgica subyacente, la laparoscopía sigue siendo el procedimiento óptimo para diagnosticar y tratar, si es posible, el trastorno sospechado. Presentamos un caso de apendicitis aguda del lado izquierdo en un niño con malrotación intestinal congénita desconocida. Además, este caso puso en evidencia el valor de la laparoscopía en la práctica diaria con el fin de evaluar a los pacientes con dolor abdominal atípico.

Palabras claves. *Apendicitis del lado izquierdo, laparoscopía, malrotación intestinal.*

Classic presentation of acute appendicitis includes pain that may start near the umbilicus and then moves to the right lower abdomen, associated with fever, leukocytosis, nausea, vomiting and anorexia. This presentation is due to the anatomical localization of the appendix and the cecum nearly always in the right lower part of the abdomen.[1] However, in some occasions the pain is not localized in the right iliac fossa because the tip of the appendix may lay in other quadrants. Less commonly, the appendix can be found in the left side in association with congenital anomalies such as situs inversus, intestinal malrotation and nonrotation. A correct diagnosis in these cases remains a surgical challenge although radiological exams can be very useful to the surgeon in making a diagnosis.

We present a case of an 8-year-old patient with left-sided appendicitis treated laparoscopically. In this case abdominal ultrasound was useful to diagnose preoperatively intestinal malrotation.

Correspondencia: *Julián Favre Rizzo*
Departamento de Cirugía
Avda Marítima del Sur, s/n, Las Palmas, (35016 Las Palmas), Las Palmas de Gran Canaria, España.
Tel: +34 695840917 / +34 928441652 / +34 928350112
E-mail: julianfavre@hotmail.com

Case report

An 8-year-old patient was referred to our hospital complaining of abdominal pain and vomiting for 24 hours. He had no prior abdominal surgery and his past history was unremarkable. Physical examination revealed a soft abdomen with left lower quadrant tenderness, muscle guarding and hypoactive bowel sounds. His body temperature was 37.8 ºC and the heart rate was normal. Laboratory tests revealed a hematocrit of 38.5% and leukocytosis (white blood cell count was 18,700 per mm^3) with left shift (segmented neutrophils 88%). C-reactive protein was 3.4 mg/dL and urinanalysis was normal. A plain film of the abdomen showed no calcifications, no free air, and a pattern consistent with mild ileus. Chest radiograph did not show any abnormality.

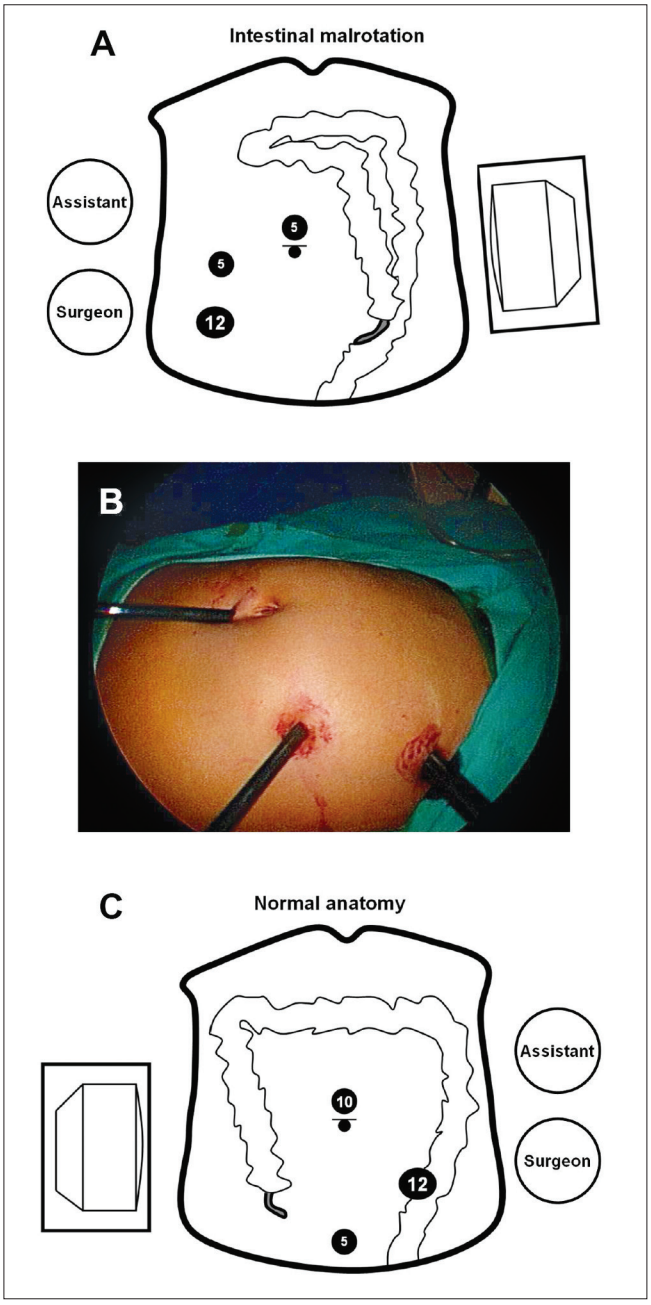
Abdominal ultrasound showed a free amount of fluid in the left lower quadrant and fat stranding but the appendix could not be visualized. The superior mesenteric vein was positioned to the left of the superior mesenteric artery. This finding strongly suggested that the child had an intestinal malrotation. The diagnosis was not clear but these findings were suspicious of acute left-sided appendicitis. So we decided to perform a diagnostic laparoscopy after the parents were correctly informed.

The patient received intravenous fluids and 500 mg of amoxicillin clavulanate, and was taken to the operating room. The exploratory laparoscopy confirmed the ultrasonographic findings of intestinal malrotation. Bowel loops were seen in the right side and the entire colon in the left side (Figure 1A). We used three trocars as we usually do for laparoscopic appendectomy. However, in this case the position of the surgeon and the monitor varied accordingly (Figure 1B).

Surgical technique

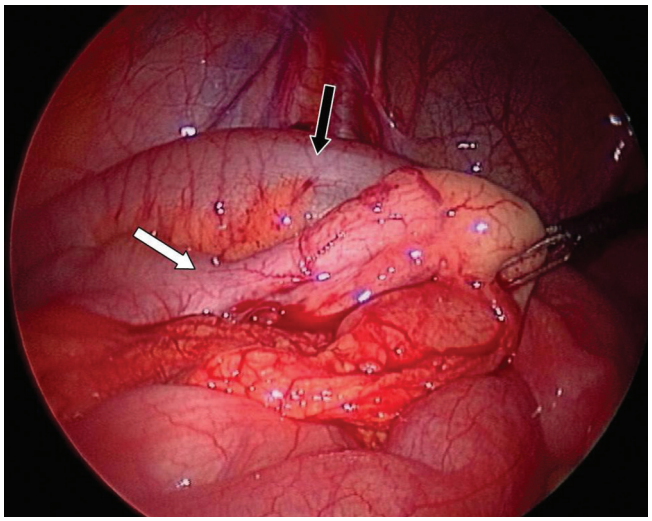
Pneumoperitoneum was achieved initially with a Veress needle and maintained at a level of 12 mmHg. A 5-mm laparoscope was inserted through the first 5-mm trocar on the umbilicus, and a second 5-mm right paraumbilical trocar was placed in order to facilitate the initial exploration with an atraumatic 5-mm grasping forceps. At this time, we found that the cecum and ascending colon was on the left side (Figure 2). Therefore, we introduced another 12-mm trocar in the right iliac fossa, instead of the usual trocar that we place in the left iliac fossa when the anatomy is normal (Figure 1C). This new port allowed us to identify the appendix with two graspers, showing evident signs of inflammation. Holding the

Figure 1. *Placement of the trocars in intestinal malrotation (1A and 1B) and in normal anatomy (1C).*



inflammed appendix with a 5-mm grasper (*Endoclinch II, Autosuture®, Tyco Healthcare*) through the 5-mm paraumbilical trocar, the appendix base was dissected with a 5-mm endodissector introduced through the 12-mm right iliac fossa. The mesoappendix was divided with a 5-mm vessel sealing system (*Valleylab's LigaSure™ Lap, Tyco Healthcare*) (Figure 3A) and the base of the appendix was transected with a 45-mm blue load stapler (3.5 mm depth) introduced through the 12-mm trocar in the right

Figure 2. *Cecum and ascending colon on the left side.*



iliac fossa with the right hand of the surgeon (Figure 3B). Previously, we have been using a 45-mm white load stapler (2.5 mm depth) to divide the mesoappendix but we observed in some occasions bleeding from the staple-line. In those cases we used endoclips to achieve a safe hemostasis. The appendix was withdrawn through the 12-mm trocar. Then, we shift our attention to the right upper quadrant searching for Ladd bands or any adhesive bands between the cecum and the right side of the abdomen. These bands were not present (Figure 4). Broadening of the mesentery was not necessary because the cecum was floppy. Finally, after laparoscopic abdominal lavage, the trocars were retired under camera vision.

The histological examination of the specimen showed an acute phlegmonous appendicitis. The patient recovered successfully and was discharged 2 days later.

Figure 3. *Division of the mesoappendix (3A) and transection of the appendix (3B).*

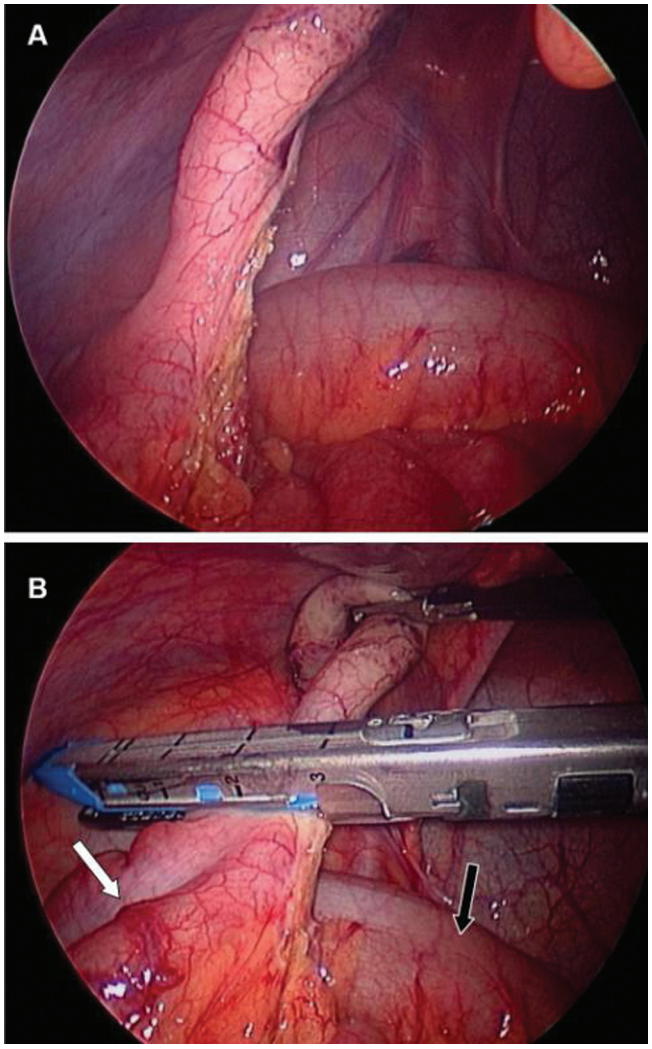
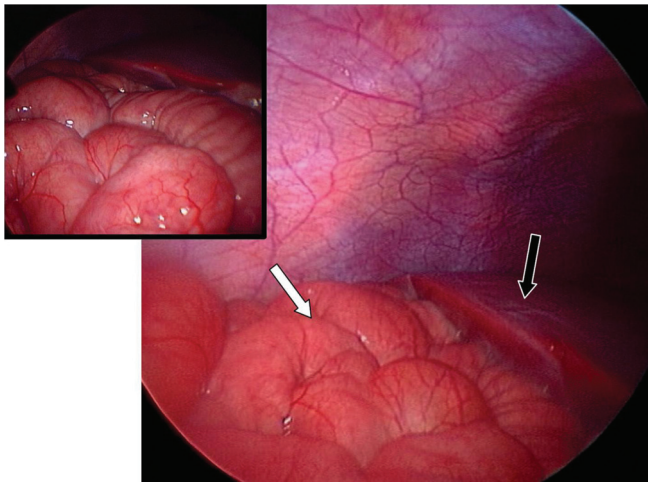


Figure 4. *Absence of Ladd bands.*



Discusión

Appendicitis is the most common acute surgical emergency of the abdomen. It occurs when the lumen between the cecum and the appendix becomes obstructed. Symptoms include the gradual onset of vague periumbilical abdominal pain shifting to the right lower quadrant. Appendicitis with the atypical presentation of left lower quadrant pain may result from true left-sided appendicitis or right-sided appendicitis with abnormal length projecting into the left lower quadrant. This means that on some occasions the pain is referred to the left because the tip of the appendix reaches the left side due to its long length.[1] However, true left-sided appendicitis happens only when the cecum is situated on the left side. Such

condition has been reported in association with two types of congenital anomalies: situs inversus and midgut malrotation. The incidence of situs inversus varies from 0.00% to 0.02% and midgut malrotation is even rarer.[2] A final report of 71,000 human appendix specimens showed that the overall incidence of intestinal malrotation and left-sided appendicitis was 0.04%.[3] Therefore, left-sided appendicitis in a patient with intestinal malrotation is a rare event in the daily practice of a surgeon.

Long time has passed since Claudius Amyand performed the first successful appendectomy in 1735. Since science and medicine have evolved, surgery has followed them. In spite of the initial reports concerning the worrisome incidence of abdominal abscess after laparoscopic appendectomy,[4] many studies reported the advantages of the minimally approach.[5] In fact, a recent meta-analysis showed that laparoscopic appendectomy reduces the complications in children with appendicitis.[6] Nowadays, laparoscopic surgery for acute abdominal pain is extensively performed and diagnostic and therapeutic advantages over conventional surgery have been suggested.[5]

We have been performing laparoscopic appendectomy for 6 years and we have never seen a similar case before. The overall incidence of malrotation in adolescents and adults is low,[2,3] but the real incidence remains obviously unknown because some patients remain asymptomatic for life.[7] Basically, this is a rare congenital anomaly of rotation and fixation of the midgut, where the primitive intestinal loop may not rotate or not rotate completely around the axis of the superior mesenteric artery during fetal development. Therefore, the cecum and the rest of the colon can be placed in many different positions, having important implications when acute abdominal pain develops. Fortunately, in this case intestinal malrotation was suspected preoperatively with the help of abdominal ultrasound, explaining why the pain was not focalized in the McBurney´s point. While most cases of intestinal malrotation are diagnosed in the first month of life, few cases present in adulthood. In these patients it is important to identify gastrointestinal malrotation preoperatively with the help of complimentary exams, thus avoiding a wrong incision that will not allow the complete exploration of the abdomen. It is important to point out that laparoscopy has potentially eliminated this problem because we can easily identify this disorder once the camera is introduced and subsequently modify the position of the trocars in order to accomplish a safe operation.[8]

In normal conditions, the superior mesenteric vein (SMV) lies to the right of superior mesenteric artery (SMA). Malrotation may be suggested by ultrasound if the SMV is to the left or anterior to the SMA.[9] It was observed that the inversion of SMV/SMA and the "whirlpool" sign were good screening tools to detect intestinal malrotation.[9,10] Other authors have reported the utility of CT-scan.[11,12] We believe that routine CT-scan is unnecessary and should be reserved for doubtful cases, considering that children have higher risk of detrimental radiation effects. In our case, ultrasound examination showed SMV/SMA inversion and gave us the opportunity to modify the surgical decision preoperatively. The operation was done as usually but the operative surgeon was positioned on the right side of patient. This position was safe and comfortable for the surgeon. It was also necessary to change the assistant and the monitor positions. Moreover, the 12-mm trocar for the stapler had to be modified. These minor modifications readily facilitate the operative exposure of the cecum and appendix on the left side.

In conclusion, appendicitis should be included in the differential diagnosis of left lower quadrant pain, especially in children and young adults.[13,14] Early clinical suspicion and abdominal ultrasound can confirm the correct diagnosis and avoid complications.[15,16] CT-scan should be reserved for doubtful cases. We have reported the utility of laparoscopy, not only in establishing the diagnosis of intestinal malrotation but also in treating diseases such as acute left-side appendicitis. In addition, this case stresses the value of laparoscopy in the evaluation of patients with atypical abdominal pain.[17] Although prophylactic laparoscopic Ladd's procedure still remains controversial, we recommend a prophylactic appendectomy if situs inversus or intestinal malrotation is found during any laparoscopic procedure to avoid future complications.[16] Finally, laparoscopy can be recommended in many if not all cases of suspected appendicitis.

Los autores declaramos no tener conflictos de interés.

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