Chapter 99

Ladd's Band - A Case Report

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ABSTRACT

Ladd bands consist of a congenital pathology of peritoneal embryogenesis characterized by the formation of a fibrotic area between bowel loops that, combined with a malrotation of the bowel, can cause intestinal obstruction or in other cases, facilitate the development of the volvulus. Because it is congenital, it has a predominance in childhood and its diagnosis must be early, so that surgical correction can be performed on an urgent basis, given the high risk of vascular involvement and intestinal necrosis. In this work we present the case of a 13 year old male, with an acute presentation of intestinal malrotation, but with a history of chronic symptoms of this pathology, who were submitted to laparotomy and performed ileodistal dissection with significant improvement of the case. Knowing how to diagnose this congenital anomaly early is the main step towards a better quality of life for the patient.

Keywords: Ladd band, intestinal rotation, laparotomy.

1 INTRODUCTION

1.1 HISTORICAL ASPECTS

The American physician William Edwards Ladd (1880-1967) was one of the pioneers to specialize in pediatric surgery at Harvard Medical School. He limited his career to the care of infants and children, establishing an accurate system of medical records and uniform methods for each type of surgical procedure, with complete patient follow-up. Among other procedures, Ladd developed methods for the treatment of hernias, rectal bleeding, biliary atresia, malrotation of the small intestine, rectal anomalies and bladder extrophy (BILL, 1986).

Ladd's band is a fibrous structure formed from the ascending colon region of the cecum to the right upper retroperitoneum. In intestinal malrotation, it exerts extrinsic pressure on the duodenum and can cause obstruction in some cases. It can also move the duodenum and ascending colon close together and narrow the mesentery, generating a pedicle that facilitates the development of the volvulus. Intestinal malrotation is a congenital disease caused by abnormalities in the rotation and attachment of the intestinal tract. This is classified into four types according to shape. Ladd's Bands are a characteristic pathology of childhood, with

90% of cases diagnosed in the first year of life. This paper presents the case of a 13-year-old boy with an acute presentation of intestinal malrotation, but with a history of symptoms of chronicity of this pathology.

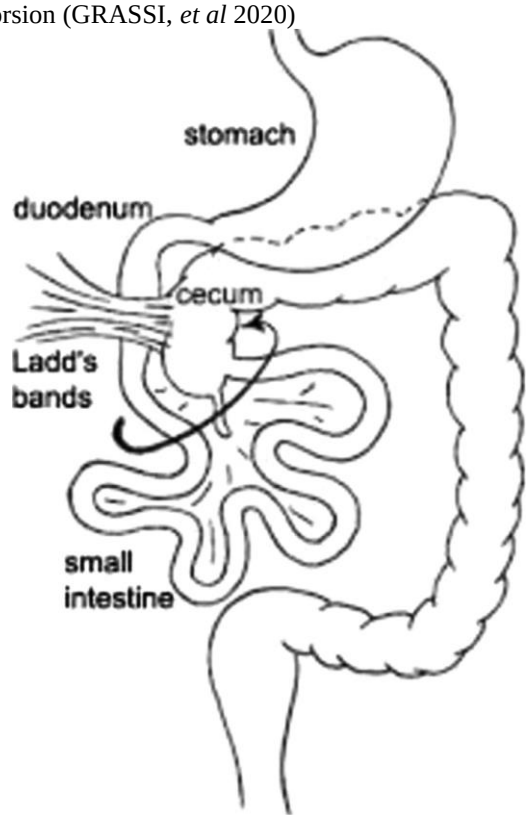
Midgut malrotation is generally considered a pediatric pathology, and diagnosis rarely occurs in adolescence or adults, requiring a high index of suspicion for these abdominal symptoms (FARMAN, 2018, GRASSI, *et al* 2020).

1.2 LITERATURE REVIEW

1.2.1 Etiology

Intestinal obstructions in children can be congenital or acquired, intrinsic or extrinsic. Obstructions caused by anomalous congenital bands are the rarest (GALVAN-MONTANO, *et al* 2017). During fetal development, the intestine differentiates into three portions, anterior, middle and posterior, evolving according to the blood supplement it receives (FERNANDEZ-MOURE, *et al* 2016). During development, the middle portion of the intestine undergoes normal rotation during the period corresponding to the fourth and sixth week of gestation. This portion develops so rapidly that the abdominal cavity may not house the entire intestine, and a hernia in the umbilical cord may occur. The intestine may return to the abdominal cavity with a 270° counterclockwise rotation around the blood supply to the middle intestine by the superior mesenteric artery. The fourth portion of the duodenum and the proximal jejunum of the intestine acquires a C-loop with the development of the ligament of Treitz, which located on top of the superior mesenteric artery (COSTE, AHMAD, 2020). Bowel malrotation is an uncommon abnormality, with an incidence of 1 in 500 births. The symptomatic change occurs at a frequency of 1 per 6,000 neonates (KOTZE, *et al* 2011).

Figure 1: The figure shows the representation of Ladd's band formed between the Cecum and the abdominal wall, compressing the duodenum and promoting bowel torsion (GRASSI, *et al* 2020)



Obstruction of the duodenum can be acute and chronic, associated or not with the volvulus of the middle intestine. When the obstruction is acute, it is usually the result of torsion of the duodenum accompanying the volvulus of the middle intestine. In chronic obstruction, the clinical signs appear when Ladd's bridles, formed between the abnormally positioned cecum and the right abdominal wall, compress the second portion of the duodenum (ASSOCIAÇÃO BRASILEIRA DE CIRURGIA PEDIÁTRICA, COLÉGIO BRASILEIRO DE CIRURGIÓNOS, COLÉGIO BRASILEIRO DE RADIOLOGIA).

1.2.2 Diagnosis

Studies with thirty-one patients who presented with clinical signs similar to intestinal obstruction were evaluated by different diagnostic methods (Li, *et al* 2017). Said patients presented on clinical examination with abdominal distention, diffuse tenderness with or without signs of peritonitis. The use of CT scan, X-ray or ultrasonography did not differ significantly between patients. The authors suggest that the characteristic swirl sign seen on abdominal CT scan may provide the best diagnostic indicator.

Radiological diagnosis using upper gastrointestinal (UGI) contrast is considered the gold standard for investigating bowel malrotation.(STEPHENS, *et al* 2017). The studies conducted in the period 2006 - 2015 with 164 newborns using contrast showed that 112 were normal and 52 had malrotation, confirmed at surgery. Of the 112 considered normal, nine had ongoing symptoms and underwent laparotomy, and four of these had malrotation (BIRAJDAR, *et al* 2017).

1.2.3 Symptoms

The symptoms observed in newborns involve bilious vomiting, acute duodenal obstruction, or abdominal tenderness, associated with hemodynamic degradation. If untreated, vascular compromise can occur with the appearance of bloody stools, progressing to peritonitis suggestive of intestinal ischemia with erythema and edema of the abdominal wall, leading to shock and death if left untreated (COSTE, AHMAD, 2020).

The presence of Ladd 's bands can lead to partial compression and obstruction of the duodenum or volvulus of the bowel that induces bowel obstruction, ischemia, and necrosis. Due to the severity of the change, patients are usually diagnosed in childhood, and adult presentation of intestinal malrotation is uncommon. In adults this condition can lead to acute symptoms, with abdominal pain, nausea, nonfibrous vomiting, constipation, abdominal distension, or chronic abdominal pain (VASSAUR, *et al* 2014).

1.2.4 Ladd's Procedures

Ladd's procedures are performed in children with intestinal malrotation caused by midgut volvulus. Such a procedure involves releasing the volvulus, resection of Ladd's band, adhesiolysis and unfolding of the curves of the duodenum, opening the mesenteric base around the superior mesenteric artery to place the small bowel on the right side of the abdominal cavity and the colon on the left side, and prophylactic appendectomy (YAMABE, *et al* 2020).

The laparoscopic Ladd procedure is less invasive, safe and as effective as the open Ladd procedure for the surgery of adults with intestinal malrotation without bowel volvulus, allowing for earlier oral intake and consequent hospital discharge (MATZKE, *et al* 2005, ADIKIBI, *et al* 2009).

1.3 OBJECTIVE

The objective of this paper was to report a case of intestinal obstruction by Ladd's bands in a patient and the treatment used.

2 MATERIAL AND METHOD

The present study consists of an exploratory research of qualitative approach for a case report from the Santa Casa de Misericórdia de Fernandópolis-SP, performed from the medical record of a patient with a characteristic picture for intestinal obstruction by Ladd's band and literature review.

3 RESULTS

Case Description:

A 13-year-old male was admitted to the emergency department of Santa Casa de Misericórdia de Fernandópolis-SP, complaining of vomiting for 3 days, accompanied by intense abdominal pain, absence of intestinal transit for gas and feces, and anorexia, compatible with intestinal occlusion. The patient also

reported appendectomy 7 years ago. On physical examination, he was emaciated and dehydrated. The abdomen was unchanged on inspection, painful on deep palpation of the mesogastrium, with no signs of peritoneal irritation and sparse hydro-aereal sounds. Rectal examination was unremarkable. The patient was submitted to laparotomy, where ileodistal dissection was performed. After 10 days postoperatively and improvement of the condition, the patient was discharged.

4 DISCUSSION AND CONCLUSION

Mal - rotation of the small intestine is a deviation from the normal counterclockwise 270° rotation of the intestine that occurs during the embryonic period. Failure of this physiologic rotation leads to several levels of anomaly, one possible one being the development, by the mesentery of the small intestine, of a narrow vertical band of attachment, with persistence of the fibrous bands of peritoneum that attach the duodenum and cecum to the abdominal wall. Ladd's bands compress the duodenum and can cause obstruction by compression or by tortuosity of the 2nd or 3rd portion of the duodenum (VASSAUR, *et al* 2014). Ladd's bands is a congenital anomaly of peritoneal embryogenesis and persist throughout life. Surgery is the treatment of choice as there is a high risk of vascular compromise and intestinal necrosis, so any patient with symptomatic malrotation should undergo emergency surgery.

Ladd's procedures, first described in 1936, are performed by classical laparotomy for cases of intestinal malrotation. Currently this procedure can be performed by laparoscopy, a safe procedure and minimally invasive approach for adult patients without midgut volvulus (PANDA, *et al* 2014), associating the mobilization of the duodenum and right colon, sectioning Ladd's bands to near the superior mesenteric (SALA, *et al* 2016). Intestinal malrotation in adults is difficult to identify and the Ladd procedure by laparoscopy is the surgical technique of choice for these cases, when they do not present acute complications (ARAGÃO, *et al* 2018). Although less invasive approaches are becoming increasingly used, there is no evidence to support the superiority of laparoscopy over the open procedure (ISANI, *et al* 2018).

In 35 successful laparoscopic Ladd's procedures reported by Reddy and colleagues (2018), six conversions to open surgery occurred from symptom recurrence. Five cases had incomplete correction, three had duodenal torsion from adhesive bowel obstruction, and one had intra-luminal duodenal obstruction.

Surgical treatment is always the main procedure, regardless of the age of presentation. Knowing how to diagnose this congenital anomaly early is the main step towards a better quality of life for the patient.

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