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Case Report

Management of Recurrent Midgut Volvulus with Modified Ladd's Procedure

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Abstract

Ladd's procedure is the surgical treatment of choice in the management of both primary and recurrent midgut volvulus in newborns or infants. Recurrence of volvulus is uncommon. We are reporting the case of a 3.5-month-old infant with recurrent volvulus who underwent a formal Ladd's procedure in its early neonatal period, due to malrotation and midgut volvulus. The patient was successfully re-operated by fixating the posterior surface of the pedicle of torsion to the retroperitoneal space.

Keywords: *Malrotation; Volvulus; Ladd's Procedure*

Background

The term malrotation refers to a variety of anomalies of rotation and fixation of the primitive gut. It occurs in approximately 1:500 live births [1-3]. Midgut volvulus is rare, with an estimated incidence of 1:6000 [3]. Ladd's procedure is the surgical treatment of choice in the management of both primary and recurrent midgut volvulus. The incidence of postoperative recurrence is even lower and in published reports ranges from 0.5% to 7% of all cases [4-8]. To the best of our knowledge there is no widely accepted method on the prevention of recurrence. In an effort to further restrict the likelihood of recurrence, our patient was submitted to the modified Ladd's procedure. This modification is an additional surgical maneuver to the formal procedure, which consists of fixating the stalk of torsion to the firm surface of the retroperitoneum.

This study was approved by the institutional ethics committee and the health authority of Children's Hospital of Athens. Informed consent was obtained from the parents.

Case Report

A full term neonate at 72 hours of age was submitted to laparotomy due to malrotation and midgut volvulus. A formal Ladd's procedure was performed at another hospital. The postoperative course was uneventful and the patient grew normally. At the age of 3.5 months, the infant was admitted to the emergency room of our hospital with bilious vomiting. Upper GI series demonstrated obstruction of the second part of the duodenum (Figure 1) and the US scan of the upper abdomen revealed torsion of the superior mesenteric vessels. The patient was submitted to an emergency laparotomy. Intraoperatively, a 360° clockwise torsion of the midgut was found. Detorsion of the intestinal loops disclosed that there were mild adhesions among intestinal loops, but the anatomical structures of the pedicle of torsion were completely dissected.

Figure 1: *Upper GI series demonstrated obstruction of the second part of the duodenum.*

Afterward, we proceeded to our additional maneuver which was as follows: The intestinal loops were retraced upwards, and towards the cephalad direction and the retroperitoneal space were fully exposed. A semicircular concave incision on the retroperitoneum, in close proximity to the root of the superior mesenteric vessels, was performed. The incision was extended to about 1 - 2 cm to the right and 3 - 4 cm to the left, alike to the course of the mesenteric root. The cutting edges of the retroperitoneum were meticulously dissected and broadened (Figure 2). By means of the same technique, just opposite to the retroperitoneal fenestration, a similar incision to the peritoneal layer of the mesentery of the first intestinal loop was performed. The peritoneal openings were touched precisely when the intestinal loops were replaced in a state of non-rotation into the abdominal cavity.

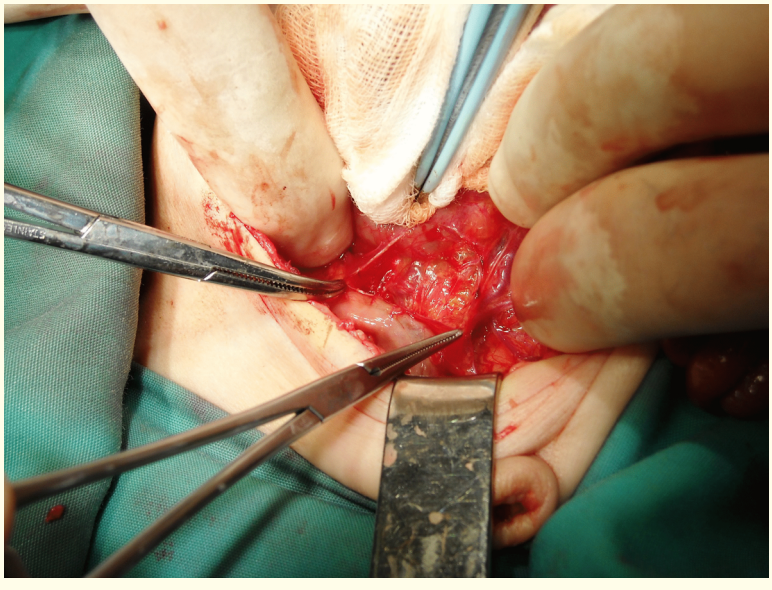

Figure 2: *Elongation and broadening of the retroperitoneal opening.*

Then the surgical wound was closed. The postoperative course was uneventful. Four years later the patient is free of symptoms, eating well, and leading a normal life.

Discussion

Ladd's procedure is the surgical treatment of choice in the management of midgut volvulus including; RUQ transverse incision or midline laparotomy - eviscerate intestinal contents - counterclockwise detorsion of the bowel if volvulus is present - meticulous release Ladd's cecal bands - broaden the small intestine mesentery - appendectomy - place small bowel on right and colon on left [9].

Despite the precise and meticulous implementation of Ladd's technique, recurrences do occur. Their incidence in different series ranges from 0.5% to 7% of all cases [1,4-8]. In an effort to prevent recurrence, several suggestions have been reported; but till this day none of them is widely accepted [1,10-15].

Studying the collective data, the question that arises is whether Ladd's procedure is a complete surgical technique and absolutely efficient to prevent recurrences. Upon considering the above question we decided to add this maneuver to the formal Ladd's procedure because of the following reasons: 1. Normal individuals are not susceptible to torsion because the fully developed mesenteric root contributes decisively to the prevention of midgut volvulus and 2. According to Ladd's guidelines, the intestinal loops which have been replaced in the abdominal cavity are prone to torsion because they are still suspended from a pedicle which has not been fixed to a firm surface anteriorly or posteriorly.

The concept of our method is to create directed adhesions to a predetermined region, alike the mesenteric root, which will cause fixation of the pedicle of torsion to a firm surface and will reduce the chance of recurrence dramatically.

We emphasize that the two opposite peritoneal openings should be in contact precisely when the intestinal loops are replaced in the abdominal cavity. Scattered approximating stitches to the cutting edges of the peritoneal openings are optional.

In comparison to other suggestions, we consider our maneuver advantageous because (a) it causes the development of strong and directed adhesions to selected areas and (b) these adhesions are fixing the posterior surface of the pedicle to a firm and immobilized area.

Although the aforementioned modification was first implemented to a patient with recurrent volvulus, during the last six years four more patients with malrotation and primary midgut volvulus have also been submitted to the modified Ladd's procedure. In all cases, the additional maneuver was feasible and was easily performed without complications. Even though the immediate and long term results were excellent, it is obvious that a larger patient volume base is needed. According to our limited, but encouraging experience, we consider that this maneuver should be added to any Ladd's procedure. Comparable studies and further experiences are needed to be established in order for documentation to take place.

Conclusion

Ladd's procedure is a satisfactory operation for correction of malrotation. However, there is still a small but significant peril for the development of recurrence who augments the risk of morbidity and mortality and should not be underestimated. The concept of our method is to create directed adhesions to a predetermined region, alike the mesenteric root, that will cause fixation of the pedicle of torsion to a firm surface. Moreover, the development of postoperative adhesions can further serve to pexy the small bowel and colon in the retroperitoneal space. To conclude, we strongly believe that our method is a useful tool to prevent recurrences that can be exploited by the paediatric surgeons in favour of the neonates.

Conflicts of Interest

The authors state that there is no conflicts of interest regarding the publication of this article.

Bibliography

1. Mazeh H., *et al*. "Three recurrent episodes of malrotation in an infant". *Journal of Pediatric Surgery* 42 (2007): E1-E3.
2. El-Gohary Y., *et al*. "Long-term complications following operative intervention for intestinal malrotation: a 10-year review". *Pediatric Surgery International* 26 (2010): 203-206.
3. Little D and Smith S. "Malrotation". In Holcomb III GW, Murphy JP (eds): Ashcraft's Pediatric Surgery. Philadelphia, Saunders Elsevier (2009): 416-424.
4. Panghaal V., *et al*. "Recurrent midgut volvulus following a Ladd procedure". *Pediatric Radiology* 38 (2008): 471-472.
5. Feitz R and Vos A. "Malrotation: the postoperative period". *Journal of Pediatric Surgery* 32 (1997): 1322-1324.
6. Schultz RL., *et al.* "Abnormalities of rotation of the bowel". *The American Journal of Surgery* 101 (1961): 128-133.
7. Hiroshi K and Tadashi I. "Recurrent midgut volvulus with intestinal malrotation". *Journal of Pediatric Surgery* 37 (2005): 813-818.
8. Smith S. "Disorders of intestinal rotation and fixation". In Grosfeld JL, O'Neill JA, Coran AG, Fonkalsrud EW (editions): Pediatric Surgery. Philadelphia, Mosby Elsevier (2006): 1342-1357.
9. Ladd WE and Gross RE. "Abdominal surgery of infancy and childhood". Philadelphia, WB Saunders, (1941).
10. Bill AH and Grauman D. "Rationale and technique for stabilization of the mesentery in cases of nonrotation of the midgut". *Journal of Pediatric Surgery* 1.2 (1966): 127-136.
11. Brennom WS and Bill AH. "Prophylactic fixation of the intestine for midgut nonrotation". *Surgery, Gynecology and Obstetrics* 138.2 (1974): 181-184.
12. Ravitch M and Cherry J. "Intestinal Intubation to Prevent Recurrence of Midgut Volvulus". *The American Journal of Surgery* 116 (1968): 101-102.
13. Stauffer UG and Herrmann P. "Comparison of late results in patients with corrected intestinal malrotation with and without fixation of the mesentery". *Journal of Pediatric Surgery* 15.1 (1980): 9-12.
14. Steiner GM. "The misplaced caecum and the root of the mesentery". *British Journal of Radiology* 51.606 (1978): 406-413.
15. Torres AM and Ziegler MM. "Malrotation of the intestine". *World Journal of Surgery* 17.3 (1993): 326-331.

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