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Laparoscopic treatment of intussusception



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ABSTRACT

INTRODUCTION: The success of laparoscopic approach in children has encouraged the application of this technique in young (<2 years) children with non-complicated intussusception.

MATERIAL AND METHOD: A retrospective analysis of our database provided a total of 4 patients who underwent laparoscopic reduction of intestinal intussusception between 8/2008 and 4/2013. A comprehensive review of each case was done including the video description of the laparoscopic technique of one of them.

RESULTS: Four patients (2 boys) were treated by laparoscopy for intestinal intussusception. Mean age was 9 months (5–20 months). Delay time between initial symptoms and diagnosis and between diagnosis and surgery were 3.5 days and 6 h respectively. Mean operative time was 35 min. There were no conversions. There were no complications. Patients were discharged after 2.5 days (2–4 days). We herein report (video) the laparoscopic approach in a 5 month male child who suffered from a ileocecal intussusception. A 10 mm trocar was placed in the left lower quadrant and two 5 mm trocars were placed in the upper left quadrant and suprapubic just to the right midline. The cause of the intussusception was identified and the bowel was reduced. A concomitant appendectomy was performed.

CONCLUSION: Laparoscopic reduction of intussusception appears to be a safe procedure, in young children with uncomplicated intussusception.

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1. Introduction

Intussusception remains a common cause of bowel obstruction in young children and it is accompanied by a significant morbidity and mortality. Urgent management must be performed. Radiologic reduction may be effective. However, surgery remains an important part of the treatment, especially in the presence of presumed intestinal ischemia. Laparoscopic surgery has progressively been implemented in the general practice in children, including for the management of intussusception.¹ Many authors have showed controversial aspects of the aforementioned technique.¹ However, laparoscopy, compared to laparotomy, has shown to give less pain, shorter operative time, a better cosmetic result, shorter hospital stay, shorter time to full feeds, lower requirement for intravenous narcotics and a lower long-term risk of adhesive bowel obstruction.^{1–3} In addition, the lead point or ischemic intestinal areas could be identified during the laparoscopic procedure.^{4,5} Despite of all its benefits, the laparoscopic approach to treat acute intussusception has been questioned.⁶ We herein present our results in 4 patients. The surgical technique is demonstrated by the clinical case of 5 months old child with acute occlusion

caused by an intestinal intussusception and treated by laparoscopic approach.

2. Patients and method

A retrospective analysis of our database provided a total of 4 patients who underwent laparoscopic reduction of intestinal intussusception between 8/2008 and 4/2013 in our department. A comprehensive review of each case was done including the laparoscopic technique of one of them. All patients (parents) gave written consent for the retrospective study.

3. Results

Four patients (2 boys) were treated by laparoscopy for intestinal intussusception. Mean age was 10 months (5–20 months). All patients developed symptoms of nausea and vomiting with abdominal pain. Three of the children had diarrhea, one of them caused by adenovirus. In all patients, diagnosis was obtained by echography. Delay time between initial symptoms and diagnosis and between diagnosis and surgery were 3.5 days (range: 2–4 days) and 6 h (range: 2–8 h) respectively. Decision was made to perform laparoscopic surgery in all patients. A three trocar technique was used for all four patients. All 4 patients had an ileocecal intussusception. None of the patients required an intestinal resection. Concomitant

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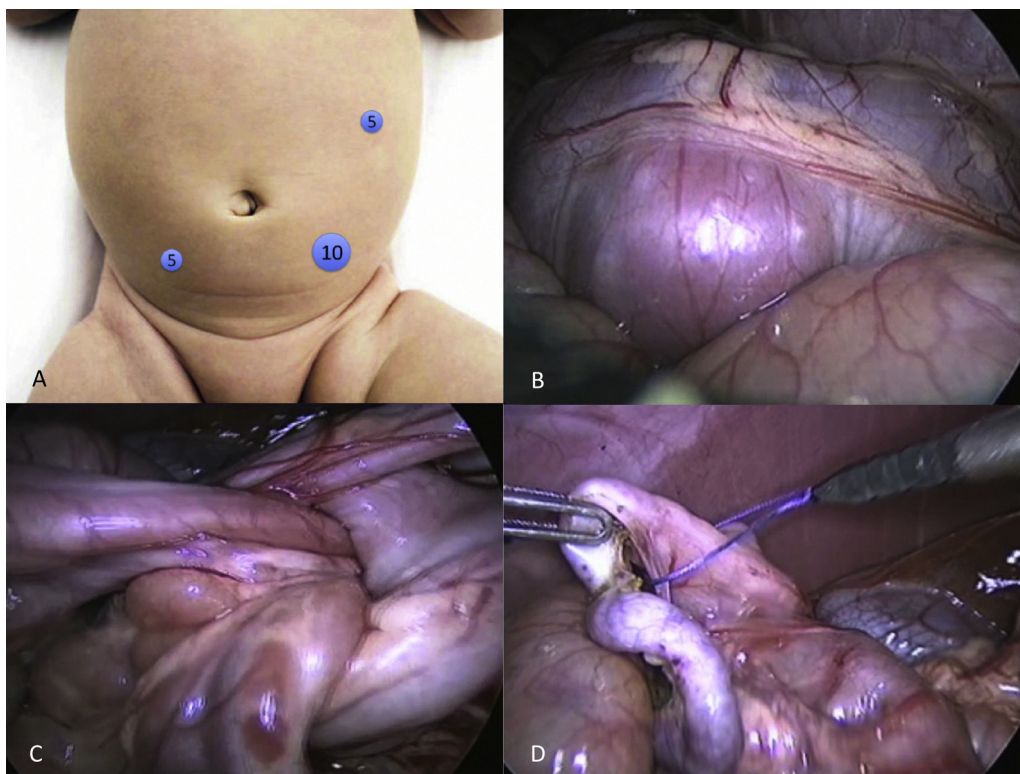


Fig. 1. Fig 1-A: Image showing trocar placement (10 mm trocar was placed in the lower inferior quadrant, a 5 mm trocar in the left upper quadrant and finally a 5 mm trocar in the suprapubic area). Fig 1-B: ileocolic intussusception Fig 1-C: Reduction of the intussusception completed by a combination of delicate direct pressure on the transverse colon and gentle pulling on the distal small bowel. Fig 1-D: An appendectomy was performed.

appendectomy was done in all 4 patients. Mean operative time was 35 min. There were no conversions. There was no mortality. Patients were discharged after 2.5 days (range: 2–4 days) (Fig. 1).

3.1. Surgical technique

A 5 month old boy who presented with acute abdominal distention, abdominal pain, nausea and vomiting was admitted to the emergency department. An ultrasound was performed and showed a typical image of ileocolic intussusception. Decision was made to proceed with a laparoscopic exploration. The patient underwent general anesthesia and trocars were placed under direct vision as follows: 10 mm trocar was placed in the lower inferior quadrant, a 5 mm trocar in the left upper quadrant and finally a 5 mm trocar in the suprapubic area (Image A). A thorough exploration of the peritoneal cavity was performed and ileocolic intussusception was confirmed (Image B). Reduction of the ileum was completed by a combination of delicate direct pressure on the transverse colon and gentle pulling on the distal small bowel (Image C). The colonic appendix was mobilized and appendectomy was performed (Image D). At the conclusion of the appendectomy, the specimen was retrieved and the abdominal cavity was cleansed. All trocars were closed under strict visual control. Operative time was 30 min.

4. Discussion

Intussusception is one of the main abdominal emergencies in children.⁴ Its diagnosis is usually based on clinical features and confirmed by ultrasound and/or computer tomography scan.⁷

Hydrostatic reduction of intussusception, introduced by Ravitch and McCune in 1848 remains the gold standard.⁸ Although radiological treatment may be effective, its failure rate increases beyond 24 h after the onset of the clinical symptoms.⁹ All our four patients

had their diagnosis performed after 3 days. When the clinical situation of the child is poor, including signs of peritonitis, perforation, or hypovolemic shock, radiological treatment is contraindicated. Hence, surgical treatment may be required in 10–20% of cases.^{10–12} However, laparoscopic reduction of intussusception is still controversial.

In the early days of laparoscopy for intussusception management, the presence of a lead point or necrotic bowel was considered an indication for conversion to open surgery. With the improvement of surgeon's skills and instruments, laparoscopic reduction may be attempted without a significant increase in mortality or morbidity.¹³ In adults, laparoscopic reduction of intussusception might be more difficult because of a chronic incarceration of the tissues, necessitating conversion and manual reduction or bowel resection. In the children, the clinical setting is usually within hours allowing even a medical treatment.⁹

In a multi-center retrospective study conducted between 1992 and 2005, including 69 patients [average age at diagnosis was 2.9 years (range: 0.3–14.8)], the French study group for pediatric laparoscopy (GECI) showed that after failed hydrostatic enema reduction the best candidates for laparoscopic management were those patients with short lag time between onset of symptoms to diagnosis (<1.5 days), and in whom there were no signs of peritonitis.¹⁴ The same study group showed that the risk for conversion to an open procedure was higher when a pathologic lead point was present, such as a tumor, a Meckel's diverticulum or even a Henoch-Schonlein purpura.

In our practice we, like other authors, do not contraindicate laparoscopy when dealing with an acute intussusception even in the presence of a lead point.^{5,13} Although laparoscopy can be more challenging because of the reduced tactile feedback, this drawback is insignificant with the longer experience of the surgeon. Some authors disagree with this concept.^{14–16} Conversion rates

range from 9% to 70% depending on the analyzed series.^{6,13} The higher conversion rate is found in the older series. Laparoscopy may offer some benefits in case of recurrent intussusception (i.e. >2) such as the ability of ruling out the presence of a lead point.^{17–19} For some authors, peritonitis is still considered a major contraindication to the laparoscopic approach because of the theoretical risk of enhanced bacteremia and endotoxemia by the pneumoperitoneum.^{20–22} The use of mini-laparoscopy in children (usually 2 mm instruments tools), described in processes such as acute appendicitis may be useful in the context of intussusception as well.²³

In a recent revisional study, 28 patients requiring operative intervention for reduction of intussusception in 12 years period. In that study, 5 patients underwent laparoscopic reduction of intussusception, and 23 patients underwent open reduction. Operative times were not statistically different. The rate of overall complications was not statistically different, with 1 of 5 (20%) and 7 of 23 (30%) having complications in the laparoscopic reduction of intussusception and open groups, respectively.

The authors found that laparoscopic reduction of intussusception a safe and feasible alternative to the open approach. Length of stay may be shorter in the laparoscopic reduction of intussusception group.²⁴ Similar results have been shown by other authors.^{25–27}

We performed an appendectomy in all patients with intussusception. Performing appendectomy at the time of appendectomy remains however controversial. We consider that performing appendectomy may avoid future confusion as to whether appendectomy actually has been performed or not. More importantly, intussusception and recurrent intussusception have been described in relation to the presence of persisting adenovirus in the appendix (acting as a reservoir). The appendix may thus act as a persisting lead point for intussusception. Removing the appendix may help decrease the potential risk of recurrent intussusception.^{28,29}

To summarize, intestinal intussusception is a frequent cause of bowel obstruction in children. Initial treatment involves pneumatic reduction. If this fails, operative reduction is indicated. There is controversy regarding use of the laparoscopic versus the conventional open approach might still remain depending on the team's experience.^{30,31}

5. Conclusion

This clinical report shows the feasibility and utility of laparoscopy for the management of pediatric intussusception. This approach appears to be safe and reasonable. Laparoscopy allows visualizing the lead points. Some caveat still remain in case of peritonitis.

Conflicts of interest

Dr. Ramon Vilallonga and Dr. Femke Vandecrossen have no conflicts of interest. Dr. Jacques Himpens is a consultant for Ethicon Endosurgery and Gore. The manuscript has been read and approved by all authors.

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References

- Hill SJ, Koontz CS, Langness SM, Wulkan ML. Laparoscopic versus open reduction of intussusception in children: experience over a decade. *J Laparoendosc Adv Surg Tech A* 2013;**23**:166–9.
- Miller G, Bowman J, Shrier I, Gordon PH. Natural history of patients with adhesive small bowel obstruction. *Br J Surg* 2000;**87**:1240–7.
- Karic SM. Adhesions and adhesiolysis: the role of laparoscopy. *JLS* 2002;**6**:99–109.
- Sathyaprasad C, Burjonrappa. Laparoscopic reduction of intussusception: an evolving therapeutic option. *J Soc Laparoendosc Surg* 2007;**11**:235–7.
- Chui CH, Ong LY, Chua JH, Yap TL. Chinese fan spread distraction technique of laparoscopic reduction of intussusception. *JLS* 2007;**11**:238–41.
- Van der laan M, Bax NM, Van der Zee DC, Ure BM. The role of laparoscopy in the management of childhood intussusception. *Surg Endosc* 2001;**15**:373–6.
- Lloyd DA, Kenny SE. The surgical abdomen. In: Walker WA, Goulet O, Kleinman RE, et al., editors. *Pediatric Gastrointestinal Disease: Pathophysiology, Diagnosis, Management*. 4th ed. Ontario: BC Decker; 2004. p. 604.
- Ravitch MM, McCune RM. Reduction of intussusception by barium enema: clinical and experimental study. *Ann Surg* 1948;**128**:904–17.
- McDermott VG, Taylor T, Mackenzie S, Hendry GM. Pneumatic reduction of intussusception: clinical experience and factors affecting outcome. *Clin Radiol* 1994;**49**:30–4.
- Bisset GS, Kirks DR. Intussusception in infants and children: diagnosis and therapy. *Radiology* 1998;**168**:141–5.
- Guo JZ, Ma XY, Zhou QH. Results of air pressure enema reduction of intussusceptions: 6396 cases in 13 years. *J Pediatr Surg* 1986;**21**:1201–3.
- Choi SO, Park WH, Woo SK. Ultrasoundguided water enema an alternative method to non-operative treatment for childhood intussusceptions. *J Pediatr Surg* 1994;**29**:498–500.
- Fraser JD, Aguayo P, Ho B, Sharp SW, Ostlie DJ, Holcomb 3rd GW, et al. Laparoscopic management of intussusception in pediatric patients. *J Laparoendosc Adv Surg Tech A* 2009;**19**:563–5.
- Bonnard A, Demarche M, Dimitriu C, Podevin G, Varlet F, François M, et al. Indication of laparoscopy in the management of intussusception: a multicenter retrospective study conducted by French study group for pediatric laparoscopy. *J Pediatr Surg* 2008;**43**:1249–53.
- Dronov AF, Poddubnyi IV, Smirnov AN, Al-Mashat NA. Laparoscopy in the treatment of intestinal invagination in children. *Khirurgiia (Mosk)* 2003;**11**:28–32.
- Kia KF, Mony VK, Drongowski RA, Golladay ES, Geiger JD, Hirschl RB, et al. Laparoscopic vs open surgical approach for intussusceptions requiring operative intervention. *J Pediatr Surg* 2005;**40**:281–4.
- Chang YT, Lee JY, Chion CS, Lin JY, et al. Early laparoscopy for ileocolic intussusceptions with multiple recurrences in children. *Surg Endosc* 2009;**23**:2001–4.
- Boehm R, Till H. Recurrent intussusceptions in an infant that were terminated by laparoscopic ileocolonic pexie. *Surg Endosc* 2003;**17**:831–2.
- Anand RJ, Shah SR, Kane TD. Laparoscopic management of delayed recurrent intussusception in an old child. *JLS* 2007;**11**:106–8.
- Sauerlenad S, Agresta F, Bergamaschi R, Borzellino G, Budzynski A, Champault G, et al. Laparoscopic for abdominal emergencies: evidence based guidelines of the European association for endoscopic surgery. *Surg Endosc* 2006;**20**:14–29.
- Agresta F, Michelet I, Colucci G, Bedin N. Emergency laparoscopy. A community hospital experience. *Surg Endosc* 2000;**14**:484–7.
- Agresta F, De Simone P, Bedin N. The laparoscopic approach in abdominal emergencies. A single-center 10-year experience. *JLS* 2004;**8**:25–30.
- Wei PL, Huang MT, Chen TC, Weu W, Lee WJ. Is mini-laparoscopic appendectomy feasible for children. *Surg Laparosc Endosc Percutan Tech* 2004;**14**:61–5.
- Sklar CM, Chan E, Nasr A. Laparoscopic versus open reduction of intussusception in children: a retrospective review and meta-analysis. *J Laparoendosc Adv Surg Tech A* 2014;**24**:518–22.
- Burjonrappa SC. Laparoscopic reduction of intussusception: an evolving therapeutic option. *J Soc Laparoendosc Surg* 2007;**11**:235–7.
- Cheung ST, Lee KH, Yeung TH, Tse CY, Tam YH, Chan KW. Minimally invasive approach in the management of childhood intussusceptions. *ANZ J Surg* 2007;**77**:778–81.
- Baily KA, Wales PW, Gerstle JT. Laparoscopic versus open reduction of intussusception in children: a single institution comparative experience. *J Pediatr Surg* 2007;**42**:845–8.
- Porter HJ, Padfield CJ, Peres LC, L Hirschowitz PJ, Berry. Adenovirus and intranuclear inclusions in appendices in intussusception. *J Clin Pathol* 1993;**46**:154–8.
- Berrebi D, Ferkdadjji L, De Lagausie P, Aigain Y, Peuchmaur M. Adenovirus and intranuclear inclusions in the appendix in children with acute intussusception. *Ann Pathol* 1997;**17**:89–93.
- van der Laan M, Bax NM, van der Zee DC, Ure BM. The role of laparoscopy in the management of childhood intussusception. *Surg Endosc* 2001;**15**:373–6.
- Lai IR, Huang MT, Lee WJ. Minilaparoscopic reduction of intussusception for children. *J Formos Med Assoc* 2000;**99**:510–2.