



## Relapsing Intestinal Intussusception in a 3-year-old Girl with an Ileal Polyp

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### Abstract

**Background:** Modernization of diagnostic methods and timely elimination of organic causes of relapsing intestinal intussusceptions in children aged 1 year or older is a current issue of pediatric surgery and gastroenterology. The interdisciplinary approach for the diagnosis of this pathology is effective in children.

**Objective:** Demonstration of modern diagnostic methods and treatment in a 3-year-old girl with a solitary juvenile ileal polyp, relapsing intestinal intussusception — for the first time with the use of video capsule small intestine endoscopy and laparoscopy-assisted polypectomy in the small intestine.

**Materials and Methods:** A 3-year-old girl was hospitalized multiple times with the clinical signs of intestinal intussusception. The child had been earlier thoroughly examined in the multidisciplinary inpatient department, including esophagogastroduodenoscopy with biopsy, colonoileoscopy with biopsy, contrast-enhanced MRI — no causes of relapsing intussusception had been detected. During the latest hospitalization in the surgical department, a small intestinal polyp was suspected after reducing the small-large bowel intussusception with the conservative method and repeated US study; the video capsule small intestinal endoscopy was conducted for the first time, which confirmed the diagnosis of a small intestinal polyp. The ileal polyp was removed using a laparoscopy-assisted approach.

**Conclusions:** The video capsule small intestinal endoscopy should be used to diagnose juvenile small intestinal polyps along with the US study. The laparoscopy-assisted method of ileal polyp removal is efficient.

**Keywords:** Relapsing Intestinal Intussusception; Children; Laparoscopy; Solitary Juvenile Ileal Polyp; Video Capsule Small Intestinal Endoscopy

### Introduction

A 3-year-old girl was hospitalized urgently with complaints of abdominal cramping, sudden-onset hesitance, triple vomiting 2 hours after the emergence of those complaints.

### History

The girl had been hospitalized 5 times within the prior 2 years with the clinical signs of intestinal intussusception. In three cases

intestinal intussusception could be reduced with conservative methods. In two cases the girl underwent surgery (laparoscopic reduction of intussusception). Signs of non-specific mesenteric lymphadenitis were detected during laparoscopy and revision of abdominal organs. The girl was constantly followed up by the gastroenterologist and underwent thorough examination in the Federal Hospital (esophagogastroduodenoscopy, colonoileoscopy with biopsy, contrast-enhanced MRI). Signs of ileocecal valve failure, gastroduodenitis, food allergy to cow milk protein were detected.

On admission to the inpatient department, the girl's condition was moderately severe. The abdomen was soft on palpation, tender in the meso- and epigastrium. Peritoneal signs were not detected. The stool was formed, without pathological admixtures. The girl underwent plain abdominal X-ray, which revealed moderately pneumatized single small intestinal loops in the mesogastrium, gas and intestinal contents along the colon, without pathological intestinal arches. A few fluid levels were detected in the lumen of small intestinal loops in the left mesogastrium. No free gas was detected under the diaphragmatic domes. No foreign body shadows were detected as well.

## Materials and Methods

The abdominal ultrasound was performed on admission: a fixed complex acoustic and layered (echographic «target» sign) structure up to 55 mm in diameter was detected in the right iliac region, along the right lateral canal and up to the right hypochondrium; this structure consisted of intussuscepted bowel fragments, at least 52+72+60 mm long (echographic «puff pastry» sign) and was considered an intussusception. Upon compression the region was sensitive, and the structure was not reduced. Dopplerography confirmed that the vascular pattern in intussusception walls was presented as single pixels. Intestinal walls were swollen, hypoechogenic (up to 6 mm); the blood flow was recorded. A rounded mass lesion sized 18x16 mm with clear smooth contours and clear blood flow was visualized in the lesion lumen at its onset. The structure was non-uniform, cellular due to multiple small anechogenic inclusions (polyp? right ovary?). Conclusion: echo signs of true ileocecal intussusception with the involvement of a mass lesion (polyp?) into the intussusception lumen.

After the administration of spasmolytics, sedatives and analgesics, the intussusception was reduced using conservative methods. The girl became active and did not complain of abdominal pain anymore. She was given the barium sulphate suspension to monitor the intestinal passage. The suspension was excreted with feces within less than a day.

The follow-up plain abdominal X-ray did not reveal any free gas in the abdominal cavity. No shadows resembling arches and fluid levels were detected. No pathological radiopaque shadows were detected in the abdominal cavity as well. Enhanced gas formation in the bowel with horizontal levels was diagnosed in the right superolateral abdominal region. Conclusion: X-ray signs of dynamic bowel disorders.

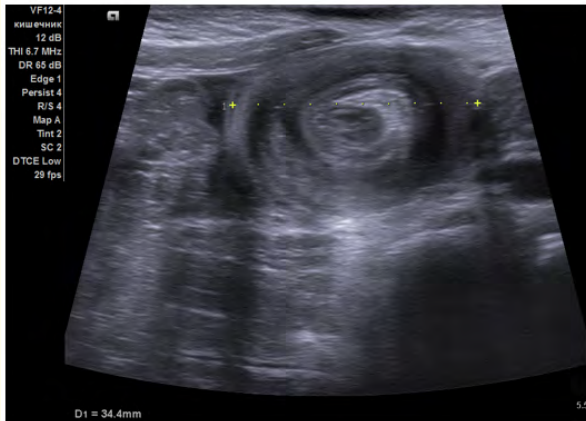
The girl did not complain of anything significant during the observation in the surgical department. The appetite was good. She played with the mother and other children. The stool was daily, regular, formed.

The follow-up abdominal ultrasound was performed: a target-like structure 26 mm in diameter and up to 54 mm long («puff pastry» type) was detected in the right hypochondrium; this structure consisted of intestinal loops with weakened peristalsis at the time of examination and preserved blood flow in the bowel walls (Color Doppler mode). A round lesion with increased echogenicity and cellular structure, clear smooth contours sized 17x13 mm was detected in the lumen; Color Doppler mapping revealed the blood flow in the polyp structure; during longitudinal scanning, a vascular pedicle retracted centrally into the intussusception was visualized.

Free fluid (up to 10 mm thick) was detected in the right iliac region.

Small bowel loops were not dilated along its other regions. Walls were not thickened (up to 2 mm) and had a differentiated structure. The peristalsis was active, large bowel loops were not dilated, pneumatized; layer differentiation was preserved.

Conclusion: Echo signs of intestinal intussusception with a mass lesion in the bowel lumen (polyp?), free fluid in the abdominal cavity (Figure 1, 2).



**Figure 1:** Ultrasound. "Target" sign. Transient intussusception.



**Figure 2:** Ultrasound. A round lesion with increased echogenicity and cellular structure was determined in the small bowel lumen.

The intussusception was not detected at the moment of examination during the follow-up examination. Small bowel: Small bowel loops were not dilated. Walls were not thickened (up to 2 mm) and had a differentiated structure. Large bowel was not dilated, pneumatized, with walls up to 2 mm thick; layer differentiation was preserved. A round mural lesion with increased echogenicity and cellular structure, clear smooth contours, sized 17x13 mm was detected in the intestinal lumen in the right hypochondrium region; Color Doppler mapping revealed the blood flow. Free fluid (up to 12 mm thick) was detected in the right iliac region. The peristalsis was active. Mesenteric lymph nodes were up to 10 mm, had an oval shape, average echogenicity, uniform structure.

## Conclusion

Echo signs of intraluminal mural intestinal mass lesion (polyp?), free fluid in the abdominal cavity.

Accounting for the absence of complaints in a child, ultrasound signs, it was decided to perform the video capsule small intestinal endoscopy for the first time.

The video capsule was endoscopically transferred to the stomach with a carrier system. The videocapsule migrated to the duodenal bulb in 4 h 20 min.

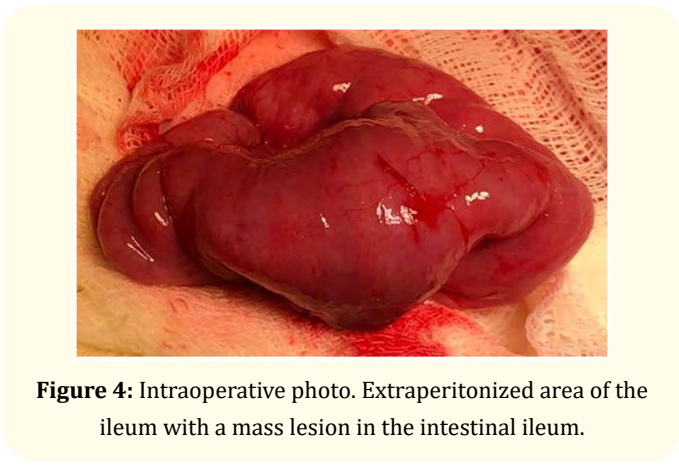
The duodenal bulb had a round lumen and locally hyperemic mucosa, which had whitish plaques closer to the retrobulbar junction. The jejunal mucosa was pink; the villous epithelium was uniform, with preserved vascular pattern. Ileum: a rounded eroded area up to 0.8 cm in diameter with central hyperemia and petechiae was visualized at the time point 7.43.14 (erosion?). Time point 7.45.44: a round submucous lesion up to 2.5 cm in diameter was visualized in the ileal lumen; it shifts along the intestinal lumen during peristalsis. Its mucous membrane is hyperemic, differs from the surrounded mucosa; the lesion base is characterized by the dilated lymphoid pattern. Visually the lesion is mostly likely of solid consistency, covers one third of the lumen in the middle third of the ileum. Lymphoid hyperplasia was detected in the terminal ileum (pink mucosa). Large bowel: large amount of intestinal contents in the lumen; visible areas of the mucous membrane in the large bowel are pink, with no pathological features. Conclusion: submucous non-epithelial lesion of the ileum; Meckel diverticulum? (Differential diagnosis: GIST? Leiomyoma? Lymphoma? Neurofibroma?). Duodenitis. Ileal erosion. Lymphoid ileal hyperplasia (Figure 3).

After the gastroenterologist counseling, pre-operative preparation, including intravenous Omeprazole, oral Trimebutine and Macrogol, the girl underwent surgery. Under endotracheal anesthesia the 5 mm trocar was inserted under the umbilicus; carboperitoneum was applied, and 5 mm optics was inserted. Additional 5 mm trocars were inserted in the left iliac region and above the pubis. Surgical revision revealed the small bowel-



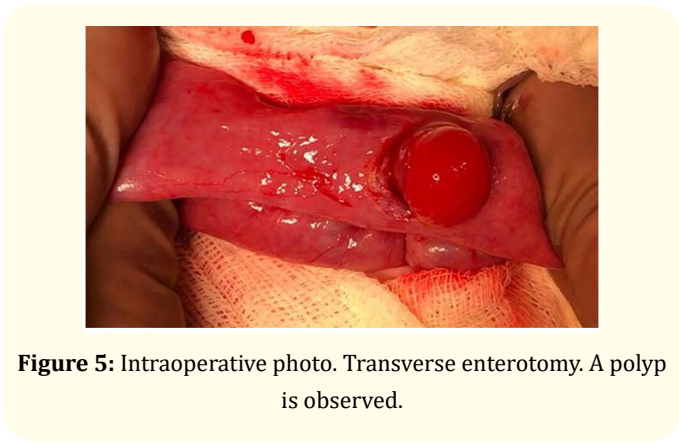
**Figure 3:** Video capsule small intestinal endoscopy.

small bowel intussusception 50 cm from the ileocecal valve. The intussusception up to 25 cm long was reduced; the ileum did not have signs of impaired circulation. A solid mobile lesion was detected in the lumen of the ileum. This area was extraperitonized to the anterior abdominal wall via the arched dilated paraumbilical trocar approach (Figure 4).

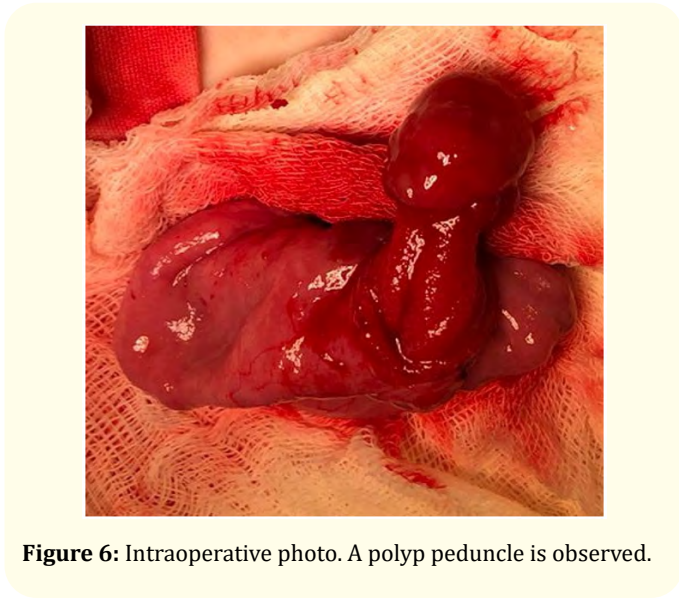


**Figure 4:** Intraoperative photo. Extraperitonized area of the ileum with a mass lesion in the intestinal ileum.

Transverse enterotomy over the tumor-like lesion — a fungoid polyp sized 2x1.5x1.5 cm on a long peduncle is detected (Figure 5, 6).



**Figure 5:** Intraoperative photo. Transverse enterotomy. A polyp is observed.

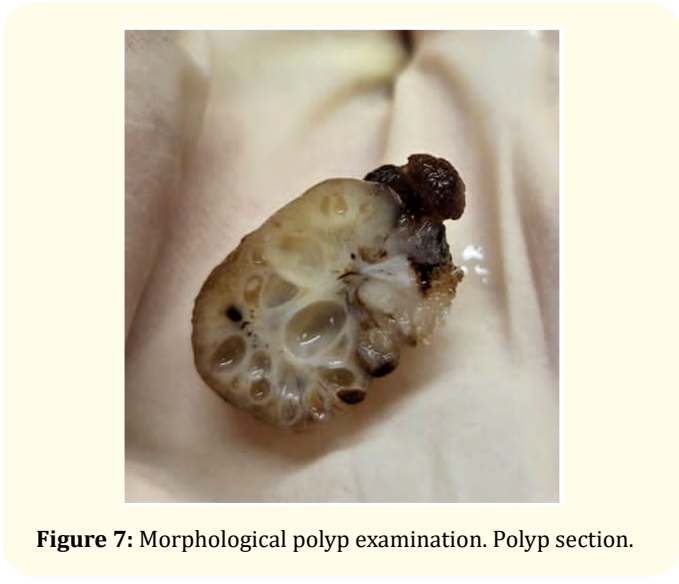


**Figure 6:** Intraoperative photo. A polyp peduncle is observed.

The polyp peduncle was dissected and sutured with a locking stitch (Vicryl 4-0). The polyp was removed. The ileal wall was sutured with a locking stitch (Vicryl 4-0). The bowel was immersed into the peritoneal cavity.

Parenteral nutrition, infusion and antibacterial therapy were administered in the postoperative period. Positive changes were detected against the background of treatment. The girl was discharged on the 9<sup>th</sup> day after surgery in satisfactory condition.

Histologic examination. A round lesion of solid-elastic consistency sized 1.8x1.5x1.0 cm; the surface was dusky, gray-brown. Small cystic cavities 0.2-0.4 cm in diameter were detected upon the dissection (Figure 7).

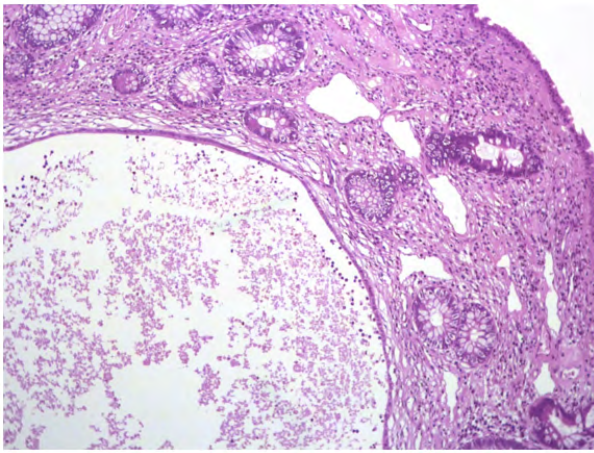


**Figure 7:** Morphological polyp examination. Polyp section.

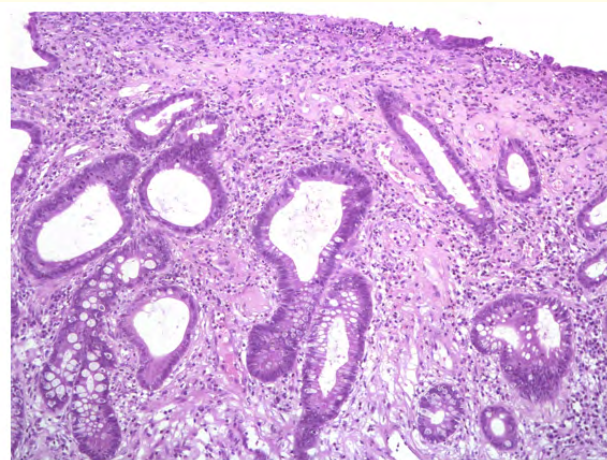
### Microscopy

The polyp was covered with the single-layer columnar epithelium with erosive defects. Its stroma contained multiple small and large cystic dilated glands lined with columnar epithelium without signs of dysplasia; the cyst lumen is filled with mucus with neutrophils. The stroma was focally infiltrated with lymphocytes, plasma cells, eosinophils; it was characterized by swelling and focal fibrosis (positive Masson staining), vascular congestion, lymphangiectasias, and focal hemorrhages.

Histological signs corresponded to juvenile small intestinal polyp (Figure 8, 9).



**Figure 8:** Histological polyp examination.



**Figure 9:** Histological polyp examination.

### Results and Discussion

In the surgical department, intestinal intussusception can be relieved in the majority of children with conservative reduction after the administration of Tramadol (central analgesic), Midazolam (sedative), and therapeutic enema. Pneumoirrigoscopy is also used to reduce the intestinal intussusception. During the laparoscopic intussusception reduction it is very important to detect and eliminate the organic cause of intussusception during the abdominal cavity revision, dissect embryonic plicae in the ileocecal angle region, biopsy enlarged lymph nodes in the ileocecal angle region, excise the Meckel diverticulum. In the latest decades clinical signs and course of intestinal intussusception in children have been changing, with increased number of relapses and repeated intussusceptions; due to this, principles of diagnosis and treatment are changing as well [1].

Organic factors are prevalent in children of older age with relapsing intussusception [2-5]. The rate of intestinal intussusception relapses in children varies from 1.5 to 20% [6]. Ileal polyps cause intussusception in 19% of cases [7]. Relapsing intussusception is an absolute indication to laparoscopy, abdominal cavity revision. Renovation of modern endoscopic devices makes it possible to perform video capsule endoscopy of the whole intestine and detect the organic cause of intestinal bleeding and relapsing intestinal intussusception [8,9]. High costs of this study prevent its widespread use. In the future similar surgical interventions will be managed remotely after the invention of intraluminal endoscopically-operated robots.

If the child with signs of intestinal intussusception and prolonged disease period, blood in the stool is admitted, laparotomy is applied, with intussusception reduced using the milking-back of the small bowel from the large bowel.

The coordinated work of pediatric surgeons, pediatricians, gastroenterologists, radiologists, anesthesiologists, pathologists enables timely diagnosis and treatment of children with intestinal intussusception. The interdisciplinary approach has demonstrated its efficacy.

### Conclusions

The video capsule small intestinal endoscopy should be used to diagnose juvenile small intestinal polyps along with the US study. The laparoscopy-assisted method of ileal polyp removal is efficient.

### Video links

<https://youtu.be/6rYBWNCfZqA>

<https://youtu.be/xKipPaBlTwQ>

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