

Morphofunctional and Functionally Diagnostic Parallels of the Cecocolonic Sphincters in Children

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Abstract It is well known that the sphincter apparatuses of the digestive tract are functionally active regions that play a crucial role in regulating the passage of food and chyme. The presence of sphincters divides the entire digestive tract into separate cavities (such as the oral cavity and stomach) or into sections within the same organ (such as the intestine). Each of these parts is characterized by its own osmotic pressure, intracavitary pressure, microflora, and specific role in maintaining internal homeostasis. The sphincters of the digestive system ensure the forward movement of contents while preventing reflux.

Keywords Resection, Intestines, Children, Sphincter

1. Introduction

Colon resection is a surgical procedure involving the removal of part of the colon. This operation must be performed with extreme care and responsibility, as complications occurring during or after surgery can cause significant harm to a child's health. The importance of the large intestine extends beyond digestion, fecal formation, and excretion; it also plays roles in mineral metabolism and absorption of the liquid part of the chyme. Moreover, colonizing microorganisms synthesize certain vitamins and may contribute to additional postoperative complications [3,5,6].

Surgical correction of colon pathologies in most cases is a necessary intervention, performed to treat congenital or acquired diseases of the gastrointestinal tract (GIT) in children. Such procedures must be approached cautiously, since any intraoperative or postoperative complication can seriously affect the patient's health and life [2,8,12,16].

Despite advancements in colon resection techniques, postoperative complications remain a subject of ongoing debate among domestic and international experts. This highlights the need to refine surgical methods by considering the anatomical and physiological characteristics of the colon [1,4,8,10].

During surgical treatment of colon pathologies, such as abdominoperineal proctoplasty (STD) or transanal endorectal colon reduction (TNENTC), wide resections, intestinal shortening, or tension-related reductions often lead to a loss of normal intestinal physiology. In such cases, physiological

bends (anorectal, rectosigmoid, sigmoid–descending) and sphincters (Bern–Piragova–Moutier, Rossi–Moutier, Bally) may be disrupted or removed, leading to fecal incontinence [1,9,17].

According to L.L. Kolesnikov, a “sphincter” is a specially organized muscular structure (smooth or striated) that regulates the amount and duration of communication between compartments (segments or parts) of a hollow organ [13,15].

Purpose of the Study. To study and compare the morphofunctional and radiological characteristics.

2. Materials and Methods

To identify colon pathologies, irrigography and irrigoscopy were performed on 48 children aged 1 to 14 years. When interpreting the results, attention was given to the shape, location, and lumen diameter of the colon, the elasticity and extensibility of its wall, the relief of the mucous membrane, the function of the Bauhin's valve, and the functional condition of different parts of the colon, including the sphincters. A 50% reduction in the colonic lumen at sphincter sites was interpreted as an anatomical narrowing and served as a radiological marker. The collected data allowed for the anatomical and functional interpretation of the colon sphincters' X-ray appearance.

3. Results and Discussion

According to several authors [14], physiological narrowing throughout the colon corresponds to the location of physiological sphincters. At the junction of the ileum and cecum lies the ileocecal sphincter of Varolius; at the border between the cecum and the ascending colon - the colocec

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sphincter of Buzi; between the middle and upper thirds of the ascending colon - the Hirsch sphincter. Three sphincters are identified in the transverse colon: the right Cannon sphincter (near the hepatic flexure), the Horst sphincter (in the middle third), and the left Cannon sphincter (near the splenic flexure). The descending colon contains the Pyre and Bally sphincters, while the sigmoid colon includes the Rossi-Moutier sphincter (middle third) and the O'Bern-Pirogov-Moutier sphincter (distal third) (Figure 1, 2).

A comparison between the schematic diagram and patient irrigograms shows that while the names of certain sphincters vary among authors, their anatomical locations remain consistent. The most frequently detected sphincters included: the O'Bern-Pirogov-Moutier sphincter (87.5%), located in the rectosigmoid section; the Bally sphincter (85.4%), located distally in the descending colon; the Buzi sphincter (81.2%) at the transition from the cecum to the ascending colon; and the Hirsch sphincter (77.1%) in the proximal ascending colon (Table 1).

The sphincter of Variolius, located at the junction between the terminal ileum and the cecum, was identified in 62.5% of cases. We believe that this relatively low detection rate may be attributed to insufficient opacification of the colon with the contrast agent. The lowest detection frequencies were observed for the sphincters situated in the transverse colon: the right Cannon sphincter in 43.7% of cases and the left Cannon sphincter in 35.4% of cases. Positioned between them within the transverse colon, the Horst sphincter was visualized in 77.1% of cases. The Pyre sphincter, located in

the proximal segment of the descending colon, was detected in 70.8% of cases. The Rossi sphincter, situated at the transition between the sigmoid and descending colon, was identified in 68.75% of cases.

Table 1. Detectable colon sphincters in children during irrigography ($n=48$)

№	Colon sphincters in children	abs.	%
1.	Ileocecal sphincter of Varolius	30	62,5
2.	Colocecal sphincter of the Buzi	39	81,2
3.	Hirsch's sphincter	37	77,1
4.	Cannon's right sphincter	21	43,7
5.	Horst's sphincter	37	77,1
6.	Cannon's left sphincter	17	35,4
7.	Pyre's sphincter	34	70,8
8.	The Bally sphincter	41	85,4
9.	The Rossi sphincter	33	68,7
10.	Sphincter - Mutier	18	37,5
11.	the O'bern-Pirogov-Mutier sphincter	42	87,5

4. Conclusions

Thus, the detectability of colonic sphincters during irrigography varies. This variability is due to changes in the diameter of the lumen in sphincter zones as the intestinal contents move, which affects the frequency of their radiological visualization.

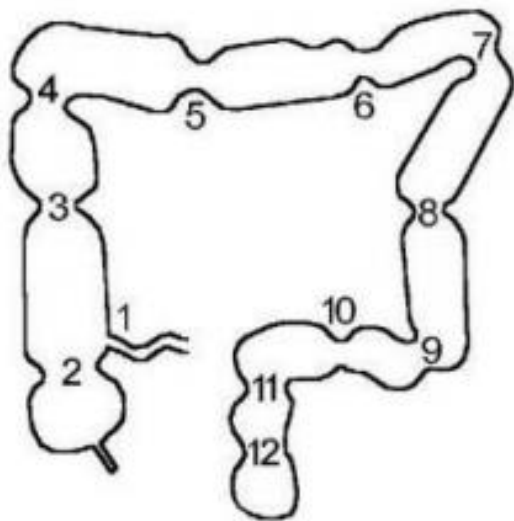


Figure 1. According to Mikhailov A.N.)

1. ileocecal sphincter of Varolius.
2. Colocecal sphincter of the Buzi.
3. Hirsch's sphincter.
4. Cannon's right sphincter.
5. Horst's sphincter.



Figure 2. Patient's irrigogram

6. Cannon's left sphincter.
7. Pyre's sphincter.
8. Bally's sphincter.
9. Rossi's sphincter.
10. The sphincter is a Mutier.
11. The O'bern-Pirogov-Mutier sphincter

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