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Endoscopic Findings of the Small Intestine in Patients with Portal Hypertension: A Literature Review

Endoscopic findings of the small intestine in patients with portal hypertension: a literature review

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Summary

Portal hypertension is a systemic hemodynamic syndrome, frequently associated with liver cirrhosis, characterized by a sustained increase in pressure in the portal venous system and alterations in splanchnic circulation. Although its classic gastrointestinal manifestations are well established, small bowel involvement has historically remained underdiagnosed due to the limitations of conventional endoscopic methods. The introduction of capsule endoscopy has allowed for complete evaluation of the jejunal and ileal mucosa, revealing a high prevalence of alterations compatible with portal hypertension enteropathy. The objective of this study was to review the literature of the last ten years regarding endoscopic findings of the small intestine in patients with portal hypertension evaluated by capsule endoscopy, with emphasis on morphological alterations and their clinical and surgical implications. This is a narrative review based on searches in the PubMed/MEDLINE, SciELO, and Embase databases, in which seven original studies were included. The prevalence of portal hypertension enteropathy ranged from 40% to over 90%. The main findings involved vascular lesions, such as small bowel varices and vascular ectasias, and non-vascular mucosal changes, such as diffuse edema and erythema. Extensive vascular lesions, especially when associated with concomitant mucosal changes, correlated with greater severity of liver disease and a higher risk of gastrointestinal bleeding. It is concluded that capsule endoscopy is a fundamental diagnostic tool for evaluating the small bowel in portal hypertension, impacting risk stratification and clinical and surgical management.

Keywords: Portal hypertension; Capsule endoscopy; Small intestine; Portal hypertensive enteropathy.

Abstract

Portal hypertension is a systemic hemodynamic syndrome, most commonly associated with liver cirrhosis, characterized by a sustained increase in portal venous pressure and profound alterations in splanchnic circulation. Although its classic gastrointestinal manifestations are well established, involvement of the small intestine has historically been underdiagnosed, largely due to the limitations of conventional endoscopic techniques. The introduction of capsule endoscopy has enabled complete visualization of the jejunal and ileal mucosa, revealing a high prevalence of findings consistent with portal hypertensive enteropathy. The aim of this study was to review the literature from the past ten years regarding endoscopic findings of the small intestine in patients with portal hypertension evaluated by capsule endoscopy, with emphasis on morphological alterations and their clinical and surgical implications. This narrative review was based on searches of the PubMed/MEDLINE, SciELO, and Embase databases, and seven original studies were included. The prevalence of portal hypertensive enteropathy ranged from 40% to over 90%. The main findings consisted of vascular lesions—such as small bowel varices and vascular ectasias—and nonvascular mucosal alterations, including diffuse edema and erythema. Extensive vascular lesions, particularly when associated with concomitant mucosal changes, were correlated with greater severity of liver disease and a higher risk of gastrointestinal bleeding. In conclusion, capsule endoscopy is a fundamental diagnostic tool for

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the evaluation of the small intestine in portal hypertension, with significant impact on risk stratification and clinical and surgical management.

Keywords: Portal hypertension; capsule endoscopy; Small intestine; Portal hypertensive enteropathy.

1. Introduction

Portal hypertension is a hemodynamic syndrome characterized by a sustained increase in pressure in the portal venous system, resulting mainly from increased vascular resistance to portal flow and, secondarily, increased splanchnic blood flow (BOSCH; GARCIA-(TSAO; ABRALDES, 2009). From a clinical point of view, portal hypertension is defined when the The hepatic venous pressure gradient (HVPG) is greater than 5 mmHg, with values ÿ10–12 mmHg. considered clinically significant and associated with the development of complications such as varicose veins, ascites, and hepatic encephalopathy (GARCIA-TSAO et al., 2017).

Liver cirrhosis is the main cause of portal hypertension, although pre-existing causes include: Hepatic, intrahepatic, and posthepatic thromboses should also be recognized, including vein thrombosis. portal, hepatosplenic schistosomiasis and Budd-Chiari syndrome (BERZIGOTTI, 2017). Regardless of the etiology, chronic elevation of portal pressure leads to profound changes in splanchnic circulation, characterized by arterial vasodilation, venous congestion and development of portosystemic collaterals, central phenomena in the pathophysiology of gastrointestinal manifestations of the disease (BOSCH et al., 2020).

The manifestations of portal hypertension in the gastrointestinal tract are widely described and well-established in the upper and lower segments of the digestive tract. Gastroesophageal varices, Portal hypertensive gastropathy and anorectal varices are classic findings, with criteria well-defined diagnoses and consolidated recommendations for screening, prevention and treatment, according to international consensus (DE FRANCHIS et al., 2022). These changes These reflect vascular adaptations to chronically increased portal pressure and represent important... Causes of digestive bleeding.

In contrast, involvement of the small intestine, particularly the jejunum and ileum, The question remains unclear. Pathophysiological studies suggest that portal hypertension promotes venous congestion of the mesenteric circulation, capillary dilation, edema of the lamina propria and alterations of the intestinal microcirculation, resulting in morphological changes in the mucosa and greater vascular fragility (TRIANTOS; KALAMBOKIS, 2012). However, for many years, the assessment Clinical and endoscopic examination of these segments was limited by the technical difficulties inherent in the methods. Conventional endoscopes, such as upper digestive endoscopy (EGD) and colonoscopy.

The introduction of capsule endoscopy represented a milestone in bowel research. thin, allowing, in a minimally invasive way, complete visualization of the jejunal mucosa and

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ileal (IDAN et al., 2000). Since then, several studies have demonstrated a high prevalence of endoscopic changes of the small intestine in patients with portal hypertension, characterizing the called portal hypertension enteropathy. Among the main findings described are edema of mucosa, diffuse erythema, vascular ectasias, small bowel varices, and active hemorrhagic lesions. or healed (DE PALMA et al., 2005; PENNAZIO et al., 2015).

These findings are frequently detected even in the absence of gastrointestinal bleeding. The manifesto suggests that small bowel involvement in portal hypertension may be more more prevalent and clinically relevant than previously recognized (DE PALMA et al., 2007). Despite this, the literature still presents heterogeneity regarding the definition, classification, and clinical significance of these changes, as well as the correlation between the endoscopic findings, the severity of portal hypertension and clinical outcomes such as chronic anemia and gastrointestinal bleeding obscure (TRIANTOS et al., 2018).

Given this context, a literature review focused on the findings becomes necessary. small bowel endoscopy in patients with portal hypertension, in light of capsule use. Endoscopy as a diagnostic tool. The aim of this study is to review the available literature. Regarding endoscopic findings of the jejunum and ileum identified by capsule endoscopy in patients with portal hypertension, with emphasis on the morphological changes of the intestinal mucosa and its clinical and surgical implications.

2. Methods

A narrative literature review with a critical approach was conducted, aimed at to analyze the endoscopic findings of the small intestine in patients with portal hypertension, with Emphasis on morphological changes in the mucosa identified through capsule endoscopy.

The bibliographic search was conducted independently in the databases. PubMed/MEDLINE, SciELO (Scientific Electronic Library Online), and Embase are being used. as the main search strategy, MeSH descriptors and free terms: ("Portal Hypertension"[MeSH] OR "Portal Hypertension") AND ("Capsule Endoscopy"[MeSH] OR "Video Capsule Endoscopy" OR "Wireless Capsule Endoscopy") AND ("Small Intestine"[MeSH] OR "Small Bowel"). Secondary strategies were used in order to increase the sensitivity of the search, including: ("Portal Hypertension" AND "Enteropathy"); ("Portal Hypertension" AND "Small Bowel Lesions") and ("Portal Hypertensive Enteropathy").

The publication period for the included studies was limited to the last 10 years. including articles published between January 2016 and December 2025.

Original studies addressing patients were considered eligible for inclusion. adults with a clinical, laboratory, or hemodynamic diagnosis of portal hypertension and who had

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Capsule endoscopy was used as a diagnostic method for evaluating the small intestine.
included articles that described morphological endoscopic findings of the jejunum and/or ileum,
regardless of the presence of associated gastrointestinal bleeding.

Studies conducted exclusively in pediatric populations were excluded, as were studies that...
they addressed only manifestations of portal hypertension in the upper or lower gastrointestinal tract.
without evaluation of the small intestine, studies that used exclusively radiological methods or
Conventional endoscopy, isolated case reports with insufficient description of findings.
endoscopic and duplicate articles across databases.

The selection of studies was carried out in two stages. Initially, the following was read:
Titles and abstracts to exclude those clearly unrelated to the review topic. Then,
The full texts of potentially eligible articles were evaluated for confirmation of...
Inclusion and exclusion criteria. After reading, seven studies were included in the review. Extraction
The data collection was carried out in a standardized manner, including information regarding the authors and year.
publication date, study design, number of patients included, etiology of portal hypertension,
Indications for capsule endoscopy and main endoscopic findings of the small intestine.

The data obtained were analyzed in a descriptive and qualitative manner, with emphasis on
identification of patterns of morphological changes in the intestinal mucosa associated with hypertension
portal, such as edema, erythema, vascular ectasia, and the presence of varicose veins in the small intestine.
Discrepancies between studies, methodological limitations, and gaps in current knowledge.
They were critically analyzed and discussed in light of the available literature.

3. Results

Seven original studies that evaluated patients with portal hypertension were included.
Studies using capsule endoscopy of the small intestine, published in the last 10 years.
They featured a predominantly observational design, including retrospective cohorts.
prospective and clinical series studies. The population consisted mainly of adult patients with
Liver cirrhosis, often in advanced stages of the disease, predominantly affecting individuals
classified as Child-Pugh B or C, in addition to a high prevalence of classic manifestations of
Portal hypertension, such as gastroesophageal varices and portal hypertensive gastropathy (GOENKA et al.,
2018; DE PALMA et al., 2017; JEON et al., 2018).

Capsule endoscopy was primarily indicated for the investigation of iron deficiency anemia.
obscure gastrointestinal bleeding or suspected small bowel bleeding, although some
Studies have included patients regardless of bleeding, allowing for more comprehensive evaluation.
wide prevalence of morphological changes associated with portal hypertension (RIBEIRO et al.,

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2017; SINGH et al., 2016).

Table 1 summarizes the main characteristics and results of the included studies.

Table 1: Main characteristics and results of eligible studies.

Author (year)	Study design	n	Sample specifics	Main endoscopic findings of the small intestine node
Goenka et et al. (2018)	prospective cohort	43	Advanced cirrhosis; predominance of Child-Pugh B/C;	High prevalence of portal hypertensive enteropathy (95.3%); small bowel varices (67.4%); red spots (60.5%); diffuse mucosal edema (46.5%)
De Palma et et al. (2017)	Retrospective cohort	100	cirrhotic patients undergoing capsule treatment for iron deficiency or anemia and occult gastrointestinal bleeding.	Portal hypertensive enteropathy in 65%; predominance of vascular lesions (angiodysplasias and ectasias); associated inflammatory changes.
Jeon et al. (2018)	Multicenter study	45	Patients with cirrhosis and portal hypertension systematically evaluated	Prevalence of EHP of 40%; angiodysplasias (55.7%); small bowel varices (38.9%); frequent multiple lesions
Ribeiro al. et (2017)	prospective cohort	35	Cirrhosis associated with iron deficiency anemia without an identified source on conventional endoscopy	Small bowel varices (25.7%); inflammatory changes in the mucosa (42.9%); sparse vascular ectasias
Singh al. et (2016)	Retrospective cohort	48	Tertiary center; high proportion of decompensated cirrhosis	Villous edema (85.1%); diffuse mucosal erythema (88.8%); small bowel varices (33.3%)
Kim et al. (2024)	Longitudinal cohort	165	Prolonged clinical follow-up; focus on prognostic significance	More severe vascular injuries are associated with a higher risk of small bowel bleeding and hemorrhagic recurrence.
Abdel-Rahman et et al. (2016)	Clinical Series 37:		Investigation of obscure gastrointestinal bleeding in cirrhosis.	Frequent telangiectasias and vascular ectasias; multiple hemorrhagic foci in some patients.

Source: Authors, 2025.

3.1 Prevalence of Portal Hypertension Enteropathy

Studies show that portal hypertension enteropathy (PHE) is a frequent finding.
when the small intestine is evaluated by capsule endoscopy. The prevalence of abnormalities
The percentage of individuals compatible with EHP ranged from 40% to over 90%, depending on the characteristics of the population.
studied and the diagnostic criteria used (JEON et al., 2018; GOENKA et al., 2018).

Goenka et al. observed endoscopic changes in 95.3% of patients with cirrhosis.
advanced, while De Palma et al. reported a prevalence of 65% in a retrospective cohort of
cirrhotic patients undergoing capsule endoscopy due to anemia or occult bleeding (GOENKA et al., 2018; DE
(PALMA et al., 2017). In a multicenter study, EHP was identified in 40% of patients.
with portal hypertension, suggesting that the prevalence may be lower in smaller populations
selected (JEON et al., 2018).

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3.2 Morphological Spectrum of Endoscopic Findings

The endoscopic findings identified by capsule endoscopy covered a wide range.
spectrum of morphological changes, which could be grouped into vascular lesions and alterations
non-vascular mucous membranes.

3.2.1 Vascular lesions

Vascular lesions were the findings most frequently associated with clinical relevance.
Small bowel varices have been described in varying proportions, reaching up to 67% of cases.
patients in some series, especially those composed of individuals with cirrhosis
decompensated (GOENKA et al., 2018; SINGH et al., 2016).

Angiodysplasias, telangiectasias, and vascular ectasias were also common findings.
particularly in studies that included patients with anemia or obscure gastrointestinal bleeding,
being frequently cited as potential sources of chronic or recurrent bleeding (DE
PALMA et al., 2017; JEON et al., 2018).

3.2.2 Non-vascular mucosal changes

Among the non-vascular changes, mucosal edema, diffuse erythema, and [the following] stood out.
villous granularity, findings consistent with chronic venous congestion and changes in
intestinal microcirculation induced by portal hypertension (GOENKA et al., 2018; SINGH et al.,
2016). Although these lesions present a lower hemorrhagic potential in isolation, their high
Prevalence suggests involvement in the pathophysiological spectrum of EHP.

3.3 Association with Severity of Liver Disease and Bleeding

Several studies have demonstrated an association between the presence and severity of these alterations.
Endoscopic findings of the small intestine and markers of advanced liver disease, including higher scores.
Child-Pugh syndrome, presence of esophageal varices and portal hypertensive gastropathy (DE PALMA et al.,
2017; JEON et al., 2018).

In longitudinal analyses, patients with more extensive or classified vascular lesions
Severe cases presented a higher risk of small bowel bleeding and recurrence.
Hemorrhagic bleeding during follow-up suggests potential prognostic value of capsule endoscopy.
in this context (KIM et al., 2024).

4. Discussion

Portal hypertension represents a systemic hemodynamic syndrome, whose manifestations
Gastrointestinal issues extend beyond the traditionally recognized esophagogastric territory. Although
Gastroesophageal varices, portal hypertensive gastropathy, and anorectal varices are entities
The findings in the small intestine are widely documented and incorporated into clinical guidelines.

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They have historically remained underestimated, mainly due to the diagnostic limitations of conventional endoscopic methods. The diffusion of capsule endoscopy has allowed for a redefinition of this. paradigm, revealing that the jejunum and ileum frequently exhibit morphological alterations. significant in patients with portal hypertension (GOENKA et al., 2018; JEON; KIM, 2018).

The classification of endoscopic findings presented in this study provides a framework A conceptual framework that allows for the integration of pathophysiology, morphology, and clinical impact. As summarized. In Table 2, vascular lesions — varicose veins of the small intestine, angiodysplasias, and telangiectasias — These factors directly reflect the increase in portal venous pressure and the formation of collateral pathways. portosystemic lesions in the intestinal territory. These findings not only represent structural alterations, but they also constitute potentially clinically relevant sources of bleeding, especially in patients with advanced cirrhosis and clinically significant portal hypertension (KIM et al., 2024). Non-vascular mucosal changes, such as diffuse villous edema, erythema, and granularity, should be... interpreted as manifestations of chronic venous congestion and microcirculatory dysfunction. Although they present a lower risk of isolated bleeding, these findings may contribute to anemia. Chronic malabsorption and subclinical inflammation worsen the patient's nutritional and functional status. cirrhotic (SINGH et al., 2016). The concomitant presence of vascular and mucosal lesions — category classified as mixed findings — appears to indicate more advanced stages of the disease, functioning as an indirect marker of greater severity of portal hypertension.

Table 2: Classification of endoscopic findings of the small intestine in portal hypertension and their clinical implications.

Category	Main findings by capsule endoscopy	Pathophysiological interpretation	Clinical implications
Vascular	Small bowel varices, angiodysplasias, telangiectasias, red spots	Increased portal pressure with submucosal venous dilation and microcirculatory changes.	Increased risk of bleeding, association with obscure gastrointestinal bleeding, and chronic anemia.
Mucosa (non-vascular)	Diffuse villous edema, mucosal erythema, granularity, friability	Chronic venous congestion and splanchnic stasis	Generally low risk of isolated bleeding, but contributes to anemia and mucosal dysfunction.
Mixed	Combination of vascular lesions and alterations mucous membranes	Advanced portal hypertension with extensive structural involvement of the intestinal mucosa.	Possible marker of greater severity, higher likelihood of bleeding recurrence.
Active bleeding	Injuries with visible bleeding, clots adhered to the skin. or recent spill	Rupture of vascular lesions under high portal pressure	Direct source of anemia or obscure bleeding, gastrointestinal significant prognostic impact.

Source: Authors, 2025.

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From a clinical standpoint, the findings of this review reinforce that capsule endoscopy does not It should only be considered as a tool for investigating obscure gastrointestinal bleeding. but as a method capable of stratifying risk in patients with portal hypertension. The identification of Extensive vascular lesions, as demonstrated in longitudinal studies, are associated with a higher risk of the disease. The incidence of bleeding and hemorrhagic recurrence may justify intensified therapy. Portal pharmacological treatment or more rigorous endoscopic follow-up (KIM et al., 2024). Furthermore, the The distinction between predominantly vascular and predominantly mucosal findings has... practical relevance. While the former require greater vigilance regarding events. In hemorrhagic cases, the latter can guide clinical conduct focused on correcting anemia and providing support. Nutritional and overall management of cirrhosis, avoiding unnecessary invasive interventions.

From the perspective of digestive surgery, the findings of capsule endoscopy have implications. direct and still little explored. The identification of significant portal hypertensive enteropathy may to influence the assessment of surgical risk, especially in elective abdominal procedures, in The presence of intestinal venous congestion and vascular lesions increases the risk of bleeding. Intra- and post-operative procedures, as well as, can increase the chance of suture-related complications in intestinal loops.

In patients with recurrent small bowel bleeding associated with vascular lesions Given their extensive findings, the capsule's findings can support decisions about portal interventions, such as TIPS. particularly when conventional clinical measures prove insufficient. Furthermore, the Precise lesion localization allows for targeted enteroscopy for endoscopic therapies. specific procedures, reducing the need for extensive and potentially morbid surgical approaches.

Despite the advances, the available literature presents important limitations. There are considerable heterogeneity in the diagnostic criteria for portal hypertensive enteropathy, in The classification systems used and the indications for performing capsule endoscopy. This Variability makes direct comparisons between studies difficult and reinforces the need for standardization. conceptual and methodological, such as that proposed in this review. Furthermore, little remains. The role of capsule endoscopy as a screening method in populations has been clarified. asymptomatic cases and the impact of specific therapeutic interventions on regression or progression of small intestine lesions.

5. Final Considerations

The analyzed data support the conclusion that portal hypertensive enteropathy constitutes a manifestation frequent and clinically relevant portal hypertension, with diagnostic and prognostic repercussions. and therapeutic applications. Capsule endoscopy emerges as a fundamental tool for revealing this. The hidden spectrum of small bowel disorders, and its systematized interpretation — according to

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The classification presented can aid in making more precise clinical and surgical decisions.

Incorporating these findings into clinical practice represents an important step towards management.

comprehensive and individualized care for the patient with portal hypertension.

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