



Case Report

## Differentiation between Colonic Inverted Diverticulum and Polyp in the Elderly: A Report of Two Cases with a Literature Review

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### SUMMARY

An inverted colonic diverticulum (ICD) is a rare yet benign feature of diverticular diseases, usually requiring no treatment. Nonetheless, for a junior endoscopist, the condition is sometimes difficult to differentiate from a colonic polyp. Aggressive biopsy or polypectomy of an ICD could result in colon perforation. Special features of an ICD include its sessile morphology, a normal appearance similar to the surrounding mucosa, and Aurora rings around its base. It could be deformed or flattened with manipulations such as forceps probing, water jet spraying or air insufflation. In this report, we describe two cases of inverted colonic diverticulum and review the literature on the prevalence, diagnostic approaches, and management of the condition. Since the prevalence of diverticular diseases and polyps both increase with age, it may be more common to encounter ICDs and polyps during colonoscopy in the elderly. It is important to consider these two conditions before taking further steps into invasive treatment.

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## 1. Introduction

A diverticulum is a herniation of the mucosa and submucosa through a point of weakness of the circular muscle layer, mainly where the major branches of the vasa recta penetrate.<sup>1</sup> With increasing age, diverticulosis occurs in 5% of people at 40 years of age and up to 65% in those over 80.<sup>2</sup> In Western countries, colonic diverticula arise mainly in the sigmoid colon, while among Asians, it is more predominant on the right side of the colon.<sup>3</sup>

Inverted colonic diverticulum (ICD) is a rare condition that occurs in 0.7–1.7% of patients. It is caused by the diverticulum inverting and protruding into the intestinal lumen unto itself due to changes in intraluminal or intra-abdominal pressure.<sup>4</sup> It may resemble a polyp during colonoscopy examination. Risks of bowel perforation are present if a polypectomy or biopsy is performed near the weakened circular muscle layer.

On the other hand, the prevalence of colonic polyps also increases with age.<sup>5</sup> Therefore, the chance of encountering both ICDs and polyps in elderly patients may be higher than in younger patients. It is prudent to consider these two conditions before undertaking any invasive procedure. Herein, we share our experiences managing two cases of inverted diverticulum. We have complemented these cases with a review of literature on ICD endoscopic features and management.

## 2. Case report

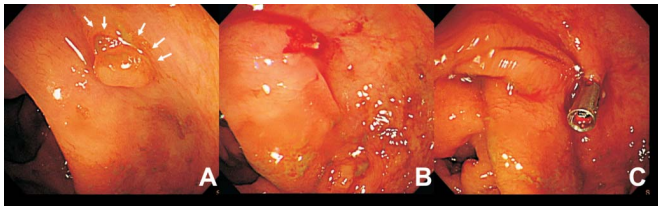
### 2.1. Case 1

A 68-year-old man without a significant medical history underwent a colonoscopy examination due to abdominal pain, constipation, and a positive stool occult blood test. Endoscopic inspection revealed diverticula in the whole colon, and the presence of two polypoid lesions. The first polypoid lesion was a 0.5 cm sessile lesion in the ascending colon near the ileocecal valve. Under white light imaging, its surface mucosa appeared normal. Thin concentric rings surrounded the base of the lesion (Figure 1A). Since the pit pattern on the polyp did not exhibit the typical appearance of a hyperplastic or adenomatous polyp, we removed it with cold snare polypectomy. The wound was wide and there was mild oozing after polypectomy, so we deployed a hemoclip to close it (Figure 1B and 1C). The second polypoid lesion was a 1 cm sessile lesion with a central depression, situated in the transverse colon near the hepatic flexure. Under white light, it had normal mucosa and thin concentric rings surrounding the base. These concentric, aurora-like rings could be enhanced under narrow band imaging (Figure 2A and 2B). We also observed that the lesion and its aurora rings were constantly changing shape. After air insufflation, the lesion was gradually flattened, but the central pitting remained. We determined that this lesion was an inverted diverticulum, and no management was required. Thus, we suspected that the first lesion, removed through polypectomy, could also be an inverted diverticulum. No complications were noted after the colonoscopy.

The pathologic diagnosis of the resected ascending colon polyp

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**Figure 1.** (A) A sessile lesion is observed, via endoscopy, with thin concentric rings surrounding its base (arrows). Its morphology is not typical of a benign polyp. (B) There was a wide wound with mild oozing bleeding after polypectomy. (C) A hemoclip was deployed to close the wound.

was normal colonic mucosa with inflammation. Therefore, we were able to conclude that both polyps we encountered were inverted diverticula.

**2.2. Case II**

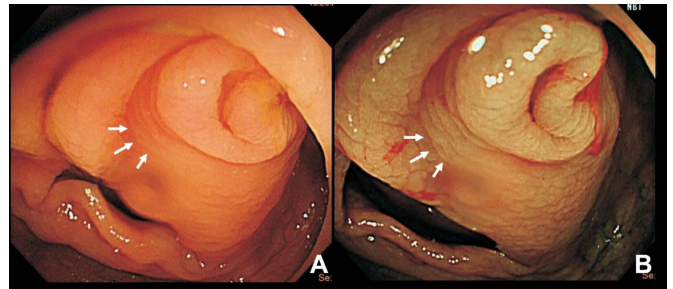
The patient was a 46-year-old woman with a medical history of acute diverticulitis. She received colonoscopy to seek possible etiologies other than diverticulitis for her persistent lower abdominal pain. Colonoscopy revealed diverticulosis throughout the whole colon, especially in the ascending colon. A 1 cm sessile polypoid lesion with a surface depression was noted on a haustral fold in the ascending colon. Under white light imaging, its mucosa was noted to be similar to the surrounding colon mucosa, with fine concentric, aurora-like rings surrounding its base (Figure 3A). Under narrow band imaging, these aurora-like rings were enhanced (Figure 3B). We gently probed the lesion with forceps, and its height decreased and eventually became an outpouching lesion (Figures 3C and 3D). We concluded that the lesion was an inverted diverticulum, and we did no further management. The colonoscopy was completed without complications.

**3. Discussion**

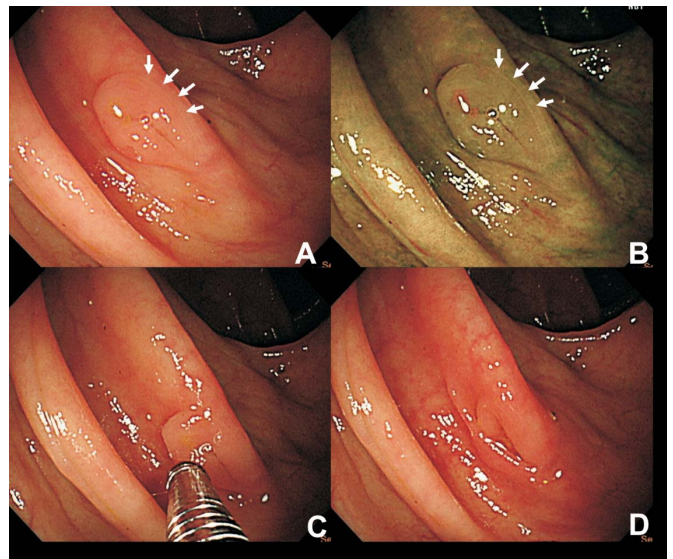
According to several reviews of various ICD reports, ICDs are slightly more common in men (54% male), and the average age of onset is 58.8 years.<sup>4</sup> The most common ICD location is in the sigmoid colon (69% of patients), and approximately 88% of patients have other diverticular diseases.<sup>4,6</sup> Patients with ICDs may experience rectal bleeding, abdominal pain, diarrhea, and diverticulitis.<sup>4</sup> However, the majority of the cases were asymptomatic, and the ICD lesions were found incidentally. We believe that the frequency of ICD may be higher than previously reported because it can be easily missed or diagnosed as polyps during colonoscopy.

Several methods mentioned in the literature can help distinguish inverted colonic diverticula from polyps. On observation, ICDs are usually sessile with a broad base, surface dimple, and have an average diameter of 9 mm.<sup>4,7</sup> Their mucosa is similar to the surrounding colonic mucosa under white light and narrow band imaging. However, ICDs can also be peduncular with hyperemic, velvety mucosa if they are larger (23 mm).<sup>4</sup> We can also look for a unique ICD feature called the “Aurora rings” (Figures 2 and 3), which are concentric mucosal rings found at the base of ICDs and are enhanced under narrow band imaging. It was hypothesized that these were caused by edematous lamina propria.<sup>8</sup> Moreover, in about 88% of the patients, ICDs are found within a row of diverticula and close to haustral folds. And there were few case reports of isolated ICDs without diverticulosis.<sup>4,6,9,10</sup>

Several endoscopic maneuvers have been described to help differentiate ICDs from polyps. When probed gently using the tip of



**Figure 2.** (A) A 1 cm sessile polypoid lesion with a central depression, is seen in the transverse colon near hepatic flexure, via endoscopy. Under white light imaging, its surface is similar to the surrounding colonic mucosa, and thin concentric, aurora-like rings surrounding its base can be observed (arrows). (B) The Aurora rings, enhanced under narrow band imaging (arrows).



**Figure 3.** (A) A 1 cm sessile polypoid lesion with a central depression, is observed in the ascending colon, via endoscopy. Under white light, thin concentric, aurora-like rings can be seen surrounding the base of the lesion (arrows). (B) The Aurora rings, enhanced under narrow band imaging (arrows). (C) When gently probed with forceps, the polypoid lesion’s height was reduced. (D) The polypoid lesion transformed into an outpouching lesion after repeated manipulation using forceps, similar to regular diverticulum.

closed biopsy forceps, ICDs have soft textures and are usually indented (pillow sign), everted, or shifted from left to right easily (mobilization sign) (Figures 3C and 3D). Furthermore, ICDs could also be deformed or everted when sprayed with a water jet (water jet deformation sign) or during air insufflation.<sup>6</sup> Polyps, conversely, are firm in texture and can never be deformed.

Most ICDs are benign, and their biopsy or removal may lead to perforation. However, the actual risk of perforation after invasive procedures on ICDs has not been specified in previous literature. Reported cases of such perforation were mild, and patients recovered after conservative treatments.<sup>4,6,11,12</sup>

The polypoid lesions seen in our two cases exhibited some endoscopic features of ICDs, but they were almost indistinguishable from polyps. In the first case, the lesion in the ascending colon was an ICD mistakenly identified as a polyp. There were risks of colon perforation after polypectomy. In our case, perforation was prevented by subsequent hemoclipping. For the other two lesions, identification of the Aurora rings and manipulation with air insufflation and probing with forceps, allowed us to successfully identify them as ICDs; thus, avoiding unnecessary treatment and risks.

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## Conflict of interests statement

The authors declare no conflict of interests for this article.

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