

# Persistence of appendix after total colectomy: An unexpected surgical finding. Case report

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Case Report

General Surgery



## Background:

**INTRODUCTION:** Total colectomy is a major surgical procedure that involves the resection of the entire colon, including the cecum and, consequently, the appendix. However, in this case, an intact and vascularized appendix was identified during an exploratory laparotomy three years after the colectomy. This finding is exceptional, as no previous cases have been reported in the literature. The present case report explores possible explanations that could justify this situation.

**CONCLUSION:** The surgical finding presented is unusual, and although various anatomical and technical explanations were explored, none provided a definitive answer. Other possibilities, such as errors in documentation or deliberate surgical decisions, were also evaluated but failed to fully justify what occurred. A relevant aspect was the viability of the tissue despite an inadequate blood supply, which challenges normal physiological expectations. This report highlights the importance of conducting thorough surgical explorations and maintaining accurate documentation in complex procedures, especially in emergency situations, to prevent inadvertent omissions and improve clinical outcomes.

**Keywords:** Appendix, Total colectomy, Unusual anatomical finding, Ectopic, Duplication, Remnant.

**T**otal colectomy is a major surgical procedure that involves the complete removal of the colon, including the ascending, transverse, descending, sigmoid, and cecum segments. In most cases, approximately 10 cm of the terminal ileum is also resected, allowing an ileorectal anastomosis to be performed either during the same procedure or in a subsequent surgery, with the goal of restoring intestinal transit. (1)

The resection of the cecum inevitably involves the removal of the appendix, as this structure originates anatomically at the base of the cecum, where the three colonic teniae converge. Normally, the appendix measures between 6 and 9 cm in length, and although its function has been debated, its absence does not cause significant health repercussions. (2) Despite its well-defined anatomical origin, the appendix can present positional variations, such as retrocecal, pelvic, subcecal, pre-ileal, or retro-ileal. In even rarer cases, congenital variants, such as agenesis and duplication of the appendix, have been documented. However, the accidental isolated preservation of the appendix without the cecum is extremely rare and represents an exceptional anatomical finding. (2)

The presence of a "conserved" appendix is described during an exploratory laparotomy, performed three

years after a total colectomy. This situation raises questions about possible anatomical variations or inadvertent technical errors during the first intervention, making this case report a relevant and exceptional contribution to clinical and surgical practice. Furthermore, the context of this isolated appendix, with interrupted drainage to the remaining intestine or the peritoneal cavity, without developing inflammatory signs, underscores the importance of evaluating the scenarios that allowed its persistence. (3) (4)

## Case report

We present the clinical case of a 67-year-old male patient who underwent an exploratory laparotomy on March 13, 2019, at an external hospital due to an acute abdomen secondary to toxic megacolon and intestinal perforation. During the surgery, a total colectomy was performed, removing the entire colon, including the ascending, transverse, descending, sigmoid, and cecum segments. The resected specimens were sent to pathology for histopathological analysis, where it was confirmed that the extracted structures corresponded to the expected colonic segments, without alterations suggesting anomalies or errors in the resection. As part of the

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**Figure 1.** Axial CT scan: Both orange arrows point to the structure that appears to be the appendix.

procedure, a terminal ileostomy was left, with the option of performing intestinal restitution in a second intervention. The patient's recovery was favorable, with a functional ileostomy and no postoperative complications, so he was discharged.

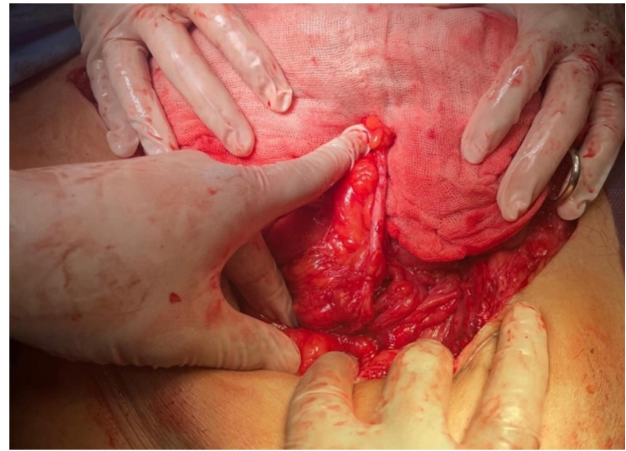
Subsequently, the patient came to our service with the desire to undergo intestinal restitution. As part of the surgical planning, a control CT scan was performed, which confirmed the absence of the colon, consistent with the surgical history. Additionally, the tomography identified a structure that appeared to correspond to the appendix, although it could not be confirmed with absolute certainty that it was that structure. (See figure 1).

On June 15, 2022, the intervention was performed, with a mechanical end-to-end ileorectal anastomosis carried out without major difficulties. However, an unexpected anatomical finding was encountered: an isolated cecal appendix with preserved vascularization was identified, without signs of ischemia or perforation. Given this discovery, it was resected and sent for pathological examination for histological confirmation. (See figure 2).

The pathology report, issued on June 16, 2022, confirmed the finding of a cecal appendix. The structure measured 7.5 x 2.5 x 1.5 cm, with a tubular shape, smooth surface, and light brown color. Additionally, it showed areas of congestion and soft fibro-adipose tissue. Upon sectioning, abundant green-yellowish liquid with a foul odor was observed. The histopathological diagnosis concluded that it was an appendix without signs of active inflammation, necrosis, or perforation.

## Discussion

This finding presents both an anatomical and surgical enigma. Normally, a total colectomy involves the resection of the entire colon, including the cecum and appendix, as both are integral parts of the



**Figure 2.** Photograph of the appendix with normal characteristics. No visible signs of vascular compromise, inflammation, necrosis, or perforation.

ascending colon. Therefore, the inadvertent preservation of the appendix is an anatomically improbable finding.

Next, we will evaluate all the anatomical and surgical possibilities that could have led to this scenario.

### 1.- Possible Anatomical Explanations

#### - *Unusual or Ectopic Appendix Position:*

According to Ghorbani et al., the most common anatomical locations of the appendix are: pelvic (55.8%), subcecal (19%), retroileal (25%), retrocecal (7%), and ectopic (4.2%). (5)

Ibrahim et al. described a case of an ectopic appendix located in the subhepatic region, which has been associated with an anomaly in the rotation of the primary intestine that occurs during embryogenesis. (6) Hu et al. reported a case of an appendix located in the lower left quadrant, coinciding with the same pathophysiology. (7)

It is possible that the appendix was in a deep retrocecal, subcecal, pelvic, or even pre-ileal/post-ileal position, which would have made its visualization and resection difficult during the initial colectomy. Anatomical variations are common, but some positions are harder to locate, especially in the context of severe inflammation, which leads us to the next point.

#### - *Severe Adhesions and Inflamed Tissues:*

The pathophysiology of toxic megacolon is not fully understood, but one hypothesis suggests that the process begins with inflammation of the intestinal mucosa and smooth muscle, leading to paralysis and eventual dilation of the colon. The hallmark of toxic

megacolon is acute transmural inflammation of the colon with necrosis and granulation tissue. (8)

In cases like that of our patient, who presented with toxic megacolon and associated peritonitis, the appendix could have adhered to surrounding tissues, going unnoticed during surgery. This is more likely in emergency procedures, where anatomical precision may be compromised.

#### **- Appendix Duplication:**

This is a rare anomaly, with a reported incidence of 1 in 25,000 cases. Approximately 100 cases have been documented since the first in 1892. Tinkam et al. reported the case of a 10-year-old patient who underwent an uncomplicated laparoscopic appendectomy, but two months later presented with a new episode of acute abdomen. A computed tomography scan showed a retrocecal appendix. (9)

Allan et al. described a case in a 4-day-old newborn where an incidental appendix duplication was discovered during an exploratory laparotomy. (10) Although extremely rare, appendix duplication could be a plausible explanation for the finding, as a second appendix may have gone unnoticed during the initial colectomy, possibly due to its atypical position or the complex conditions of the surgery.

## **2.- Possible Surgical Explanations**

#### **- Technical error during surgery:**

The omission of key structures, such as difficulty in correctly identifying the colonic teniae and the base of the cecum, where the appendix originates, is a crucial anatomical milestone for its identification. Emergency surgery is also associated with a higher likelihood of incomplete resections due to the urgency to stabilize the patient and prevent the progression of sepsis or peritonitis. The lack of a thorough review of the surgical field before closure can lead to the inadvertent preservation of structures like an appendiceal remnant. (11)

One of the most important challenges in colorectal surgery, including total colectomy, is precise anatomical identification to prevent technical errors during the intervention. As previously discussed, the urgency of the procedure, severe adhesions, inflammation, and distorted anatomy are factors that complicate an adequate surgical approach. In our case, it is suggested that some technical error or lack of complete exploration may have occurred during the first intervention

## **3.- Other Possible Explanations**

#### **- Error in the operative report or surgical documentation:**

It is possible that during the initial colectomy, the resection of the cecum and appendix was not correctly recorded, omitting important details.

#### **- Intentional preservation of the appendix:**

Although unlikely, some surgeons may choose to preserve the appendix if it is not inflamed or involved in the pathological process.

#### **- Diagnostic error or imaging failure:**

Initial imaging may not have detected a duplicated or ectopic appendix due to the severe inflammatory conditions of the abdomen.

In addition to what has been discussed, a relevant aspect is the absence of inflammation, necrosis, or perforation in the appendix, despite the apparent lack of blood supply. Since the ileocolic artery is resected during colectomy, the expected outcome would have been tissue necrosis due to a lack of blood supply. On the other hand, without an outlet, the appendiceal lumen would have been obstructed by the amount of mucus produced by the appendix, which is 2-3 ml per day, typically triggering a progressive inflammatory process. In cases of appendicitis, the obstruction of the appendiceal lumen leads to increased internal pressure, mucus accumulation, and bacterial multiplication, which triggers an inflammatory process with the risk of perforation and peritonitis. (12)

However, in this case, the patient remained asymptomatic between the colectomy performed in 2019 and the second intervention in 2022. This absence of clinical complications highlights the rarity of the finding and raises questions about anatomical and functional viability in this context.

It is important to note that no reports have been found in the medical literature describing a case similar to ours, emphasizing its clinical and surgical significance.

## **Conclusion**

Several possible anatomical and surgical explanations for this finding have been explored. Among them, anatomical variations such as an ectopic or retrocecal appendix, the presence of severe adhesions that may have hidden the appendix during the initial colectomy, and the rare possibility of appendiceal duplication stand out. On the surgical side, a technical error related to the incomplete identification of the cecum or the lack of thorough exploration of the surgical field is also a reasonable hypothesis. Additionally, other possibilities have been considered, such as failures in surgical documentation or even the intentional preservation of

the appendix if its resection was not deemed necessary. However, the absence of clinical signs and complications in the period between both surgeries raises an even more intriguing question about the anatomical and functional viability of the appendix in a context of compromised blood supply after the colectomy.

This case underscores the importance of thorough and meticulous exploration during complex surgical procedures, especially in emergency surgery, and highlights the need for complete and accurate documentation. Furthermore, it provides evidence of the importance of considering rare anatomical variants in the planning and execution of abdominal surgeries. This finding invites reflection and clinical learning to improve surgical vigilance and prevent complications resulting from inadvertent technical or anatomical errors.

### Conflicts of interests

There was no conflict of interest during the study, and it was not funded by any organization.

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