

## Risk of appendiceal neoplasm in patients with appendix disorders

Francesco Ferrara, Roberto Peltrini

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**Francesco Ferrara**, Department of Precision Medicine in Medical, Surgical and Critical Care (Me. Pre. C. C.), "Paolo Giaccone" Hospital, University of Palermo, Palermo 90127, Italy

**Roberto Peltrini**, Department of Public Health, University of Naples Federico II, Napoli 80131, Italy

**Corresponding author:** Roberto Peltrini, MD, PhD, Researcher, Surgeon, Department of Public Health, University of Naples Federico II, Via Pansini 5, Napoli 80131, Italy.  
[roberto.peltrini@gmail.com](mailto:roberto.peltrini@gmail.com)

### Abstract

The most common appendicular disease is acute appendicitis, with a lifetime risk of 7%–8%. Complicated cases, which can occur in 2%–7% of patients, can significantly impact the severity of the condition and may require different management approaches. Nonoperative management with possible delayed appendectomy has been suggested for selected patients, however, there is a non-negligible risk of missing an underlying malignancy, which is reported to be as high as 11%. Diagnostic work-up is paramount to achieve optimal treatment with good results.

**Key Words:** Appendix; Appendiceal neoplasm; Appendiceal cancer; Colorectal surgery; Acute appendicitis

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**Core Tip:** Despite the spread of nonoperative management in selected cases of appendicitis, the risk that an inflammatory disease may be misdiagnosed with a tumor is not negligible. Preoperative work-up, interval appendectomy and follow-up strategies have a pivotal role in the prognosis and management of these patients.

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## INTRODUCTION

In this editorial, we comment on the article “Appendiceal intussusception complicated by adenocarcinoma of the cecum: A case report” by Long *et al*[1]. The authors presented a case of appendiceal intussusception associated with cecal adenocarcinoma, and reported the diagnostic and therapeutic work-up of this disease. They emphasized the rarity of this condition, showing how appendiceal intussusception may lead to complications such as intestinal obstructions, presenting symptoms such as abdominal pain, diarrhea, bloating, and vomiting, making a misdiagnosis likely. The authors focus the discussion on the etiology and pathophysiology of the appendiceal intussusception, but there are several other important factors to discuss. Sometimes this situation may mask important underlying conditions, such as colonic adenocarcinoma, which in the case presented by Long *et al* was the first diagnosis confirmed by the biopsies performed during colonoscopy. Therefore, the importance of making a precise diagnosis is paramount.

## COMPLICATED APPENDICITIS AND RISK OF CANCER

The most common appendicular disease is acute appendicitis, with a lifetime risk of 7%–8%. Improving the diagnostic pathway is crucial for minimizing the risk of incorrect diagnoses, and this is particularly true in complicated cases, which can occur in 2%–7% of patients[2]. Complications such as gangrenous or perforated appendix, with or without abscess formation, constitute what is referred to as complicated appendicitis. These complications can significantly impact the severity of the condition and may require different management approaches compared to uncomplicated cases. In these cases, different surgeons suggest adopting a nonoperative management approach, including ultrasound-guided percutaneous drainage and antibiotic therapy, followed by delayed interval appendectomy. These strategies have been explored as alternatives to immediate surgical intervention in selected cases of complicated appendicitis and they are particularly considered for patients who may not be suitable candidates for immediate surgery due to factors such as severe illness, high surgical risk, or significant comorbidities[3,4]. It is important to note that the necessity of delayed or interval appendectomy has been debated in recent years, especially with the advent of effective conservative management strategies. Some studies suggest that not all patients who undergo conservative management may require subsequent appendectomy, particularly if they remain asymptomatic. Therefore, the decision to perform interval appendectomy should be individualized based on careful consideration of the patient's clinical course and preferences. The recommendation for interval appendectomy is based on the risk of recurrence and the risk of missing an underlying malignancy[5], which has been reported to be as high as 11%[6]. Therefore, we must consider all the possible risks associated with a completely conservative approach. Special care should be reserved for patients older than 40 years, in whom there is a higher risk of appendiceal carcinoma and therefore an accurate diagnostic work-up should be undertaken[7]. In the article by Long *et al*[1] the patient was younger than 40 years, and accurate diagnosis was achieved with complete colonoscopy with biopsies and abdominal computed tomography (CT) with contrast. This approach allowed the authors to plan correct surgical management, performing right hemicolectomy with adequate lymphadenectomy (15 lymph nodes were collected). The tumoral mass caused appendiceal intussusception that was misdiagnosed during the first assessment of the CT images. This situation may present as a pedunculated or hyperplastic polyp during colonoscopy and in the case reported it presented as an atypical polyp. Therefore, it is important to perform accurate diagnosis, and CT scan or magnetic resonance imaging are the techniques of choice in these cases. During the first wave of the COVID-19 pandemic, a decrease in the number of appendectomies has been described[8,9]. This has led to an increase in complicated cases and a higher complication rate, with possible delays in diagnosis or treatment and a potential negative impact on the prognosis[10]. As reported in the World Society of Emergency Surgery guidelines, the success of the nonoperative approach requires careful patient selection and exclusion of complicated cases, like gangrenous appendicitis, abscesses, and diffuse peritonitis[11]. With this approach, the overall complication rate can be reduced to 6.5% and no major complications may be reported[12,13].

In a study on 1200 patients with acute appendicitis, 989 underwent emergency appendectomy, with an overall incidence of appendiceal neoplasm of 9.3%. Patients with appendiceal tumors were older than patients with acute appendicitis; in particular, patients aged < 30 years had a 3.8% rate of occult neoplasm, whereas patients ≥ 30 years had a 12.5% rate of neoplasia, and patients aged between 40 and 89 years and older had a 13.0% rate of neoplasia[14]. The authors argue that the higher rate of appendiceal neoplasms may be explained by the high rate of complicated cases in the study population. Another factor may be related to the COVID-19 pandemic, in which acute appendicitis was often treated conservatively, so perhaps an increase in the incidence of neoplasms is related to the lower number of appendectomies carried out during the pandemic. Moreover, there is a constant increase in the number of appendicular neoplasms over time[15]. There is no strong evidence in the literature to suggest colonoscopy or CT scan as mandatory for nonoperative management in patients aged > 30 years, but in light of these data, accurate diagnostic screening is suggested in high-risk subjects, such as familiarity for gastrointestinal malignancies or recurrent episodes of appendicitis.

## CONCLUSION

Accurate diagnostic and therapeutic work-up must be performed in patients with appendiceal disorders. Caution must be taken in the case of suspected appendiceal neoplasms, especially in patients aged > 40 years in whom the risk of malignancy is significantly higher than in younger people.

## FOOTNOTES

**Author contributions:** Ferrara F and Peltrini R contributed to this paper; Peltrini R designed the overall concept and outline of the manuscript; Ferrara F contributed to the discussion and design of the manuscript; Ferrara F and Peltrini R contributed to the writing, editing the manuscript, and review of literature.

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**Country of origin:** Italy

**ORCID number:** Francesco Ferrara 0000-0002-8208-1945; Roberto Peltrini 0000-0003-0445-2269.

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## REFERENCES

- 1 Long Y, Xiang YN, Huang F, Xu L, Li XY, Zhen YH. Appendiceal intussusception complicated by adenocarcinoma of the cecum: A case report. *World J Clin Cases* 2024; **12**: 1461-1466 [PMID: 38576819 DOI: 10.12998/wjcc.v12.i8.1461]
- 2 Addiss DG, Shaffer N, Fowler BS, Tauxe RV. The epidemiology of appendicitis and appendectomy in the United States. *Am J Epidemiol* 1990; **132**: 910-925 [PMID: 2239906 DOI: 10.1093/oxfordjournals.aje.a115734]
- 3 Andersson RE, Petzold MG. Nonsurgical treatment of appendiceal abscess or phlegmon: a systematic review and meta-analysis. *Ann Surg* 2007; **246**: 741-748 [PMID: 17968164 DOI: 10.1097/SLA.0b013e31811f3f9f]
- 4 Simillis C, Symeonides P, Shorthouse AJ, Tekkis PP. A meta-analysis comparing conservative treatment versus acute appendectomy for complicated appendicitis (abscess or phlegmon). *Surgery* 2010; **147**: 818-829 [PMID: 20149402 DOI: 10.1016/j.surg.2009.11.013]
- 5 Corfield L. Interval appendectomy after appendiceal mass or abscess in adults: what is "best practice"? *Surg Today* 2007; **37**: 1-4 [PMID: 17186336 DOI: 10.1007/s00595-006-3334-2]
- 6 Mima K, Miyanari N, Itoyama R, Nakao Y, Kato R, Shigaki H, Kurashige J, Inoue M, Iwagami S, Mizumoto T, Kubota T, Baba H. Interval laparoscopic appendectomy after antibiotic therapy for appendiceal abscess in elderly patients. *Asian J Endosc Surg* 2020; **13**: 311-318 [PMID: 31621202 DOI: 10.1111/ases.12758]
- 7 Peltrini R, Cantoni V, Green R, Lionetti R, D'Ambra M, Bartolini C, De Luca M, Bracale U, Cuocolo A, Corcione F. Risk of appendiceal neoplasm after interval appendectomy for complicated appendicitis: A systematic review and meta-analysis. *Surgeon* 2021; **19**: e549-e558 [PMID: 33640282 DOI: 10.1016/j.surge.2021.01.010]
- 8 Sartori A, Podda M, Botteri E, Passera R, Agresta F, Arezzo A; CRAC Study Collaboration Group. Appendectomy during the COVID-19 pandemic in Italy: a multicenter ambispective cohort study by the Italian Society of Endoscopic Surgery and new technologies (the CRAC study). *Updates Surg* 2021; **73**: 2205-2213 [PMID: 34219197 DOI: 10.1007/s13304-021-01126-z]
- 9 Rauseri S, Ferrara F, Zurleni T, Frattini F, Chiara O, Pietrabissa A, Sarro G; for Italian Association of Hospital Surgeons, and Collected Data Contributors. Dramatic decrease of surgical emergencies during COVID-19 outbreak. *J Trauma Acute Care Surg* 2020; **89**: 1085-1091 [PMID: 32890343 DOI: 10.1097/TA.0000000000002923]
- 10 Orthopoulos G, Santone E, Izzo F, Tirabassi M, Pérez-Carballo AM, Corriveau N, Jabbour N. Increasing incidence of complicated appendicitis during COVID-19 pandemic. *Am J Surg* 2021; **221**: 1056-1060 [PMID: 33012500 DOI: 10.1016/j.amjsurg.2020.09.026]
- 11 Di Saverio S, Podda M, De Simone B, Ceresoli M, Augustin G, Gori A, Boermeester M, Sartelli M, Coccolini F, Tarasconi A, De' Angelis N, Weber DG, Tolonen M, Birindelli A, Biffl W, Moore EE, Kelly M, Soreide K, Kashuk J, Ten Broek R, Gomes CA, Sugrue M, Davies RJ, Damaskos D, Leppäniemi A, Kirkpatrick A, Peitzman AB, Fraga GP, Maier RV, Coimbra R, Chiarugi M, Sganga AB, Pisanu A, De' Angelis GL, Tan E, Van Goor H, Pata F, Di Carlo I, Chiara O, Litvin A, Campanile FC, Sakakushev B, Tomadze G, Demetrashvili Z, Latifi R, Abu-Zidan F, Romeo O, Segovia-Lohse H, Baiocchi G, Costa D, Rizoli S, Balogh ZJ, Bendinelli C, Scalea T, Ivatury R, Velmahos G, Andersson R, Kluger Y, Ansaloni L, Catena F. Diagnosis and treatment of acute appendicitis: 2020 update of the WSES Jerusalem guidelines. *World J Emerg Surg* 2020; **15**: 27 [PMID: 32295644 DOI: 10.1186/s13017-020-00306-3]
- 12 Salminen P, Paajanen H, Rautio T, Nordström P, Aarnio M, Rantanen T, Tuominen R, Hurme S, Virtanen J, Mecklin JP, Sand J, Jartti A, Rinta-Kiikka I, Grönroos JM. Antibiotic Therapy vs Appendectomy for Treatment of Uncomplicated Acute Appendicitis: The APPAC Randomized Clinical Trial. *JAMA* 2015; **313**: 2340-2348 [PMID: 26080338 DOI: 10.1001/jama.2015.6154]
- 13 Salminen P, Tuominen R, Paajanen H, Rautio T, Nordström P, Aarnio M, Rantanen T, Hurme S, Mecklin JP, Sand J, Virtanen J, Jartti A, Grönroos JM. Five-Year Follow-up of Antibiotic Therapy for Uncomplicated Acute Appendicitis in the APPAC Randomized Clinical Trial. *JAMA* 2018; **320**: 1259-1265 [PMID: 30264120 DOI: 10.1001/jama.2018.13201]
- 14 Fransvea P, Puccioni C, Altieri G, D'Agostino L, Costa G, Tropeano G, La Greca A, Brisinda G, Sganga G. Beyond acute appendicitis: a single-institution experience of unexpected pathology findings after 989 consecutive emergency appendectomy. *Langenbecks Arch Surg* 2024; **409**: 87 [PMID: 38441707 DOI: 10.1007/s00423-024-03277-0]
- 15 Issin G, Demir F, Guvendir Bakkaloglu I, Cagatay DV, Aktug Simsek H, Yilmaz I, Zemheri E. High Incidence of Appendiceal Neoplasms in the Elderly: A Critical Concern for Non-Surgical Treatment. *Med Princ Pract* 2023; **32**: 358-368 [PMID: 37778333 DOI: 10.1159/000534347]



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