

## CASE REPORT

## PARTIAL CAECAL NECROSIS – A RARE CAUSE OF RIGHT-SIDED INFERIOR ABDOMINAL PAIN AND TENDERNESS

Arben Karpuzi<sup>1</sup>, Dragisha Galeski<sup>1</sup>, Gazmend Elezi<sup>1</sup>, Aleksandar Goreski<sup>2</sup>, Zoran Karatashev<sup>3</sup><sup>1</sup> General and Emergency Surgery Department, September 8<sup>th</sup> General City Hospital, Skopje, R. Macedonia<sup>2</sup> Radiology Department, September 8<sup>th</sup> General City Hospital, Skopje, R. Macedonia<sup>3</sup> Pathology Department, September 8<sup>th</sup> General City Hospital, Skopje, R. MacedoniaCorresponding Author: Arben Karpuzi, September 8<sup>th</sup> General City Hospital, Bledski dogovor bb, Skopje, R. Macedonia;  
E-mail: avicenal7@yahoo.com**Abstract**

*Introduction:* Non-occlusive caecal infarction is a rare condition that has been described in association with a variety of clinical entities, generally due to a low-flow state, and has been reported to occur in association with chronic heart disease, open-heart surgery, certain drugs, and haemodialysis. The aim of this article is to describe the presentation, diagnosis and management of this unusual clinical problem.

*Case presentation:* We report on an 84-year-old female with known chronic heart disease presenting with right lower abdominal quadrant pain, tenderness and leukocytosis. Although initial clinical findings were highly suggestive of acute appendicitis, CT revealed marked circumferential wall thickening of the caecum. Intraoperatively, caecal necrosis was confirmed, while the appendix and the remainder of the intestine appeared normal. There was no evidence of major vascular occlusion or embolization. The right hemicolectomy was performed with ileo-transverse anastomosis. Histopathologic analysis demonstrated isolated transmural caecal necrosis with marked infiltration of the caecal wall by numerous bacteria and neutrophils as a consequence of nonocclusive ischaemic colitis. The patient recovered completely and was discharged from the hospital on the tenth postoperative day without any surgical complications.

*Conclusion:* Partial caecal necrosis should be included in the differential diagnosis of acute right lower quadrant pain, especially in elderly patients with chronic heart disease.

**Key words:** partial caecal necrosis, ischemic colitis, chronic heart disease.

**Introduction**

Acute colonic ischaemia is a common cause of colitis in the elderly population [1]. Ischaemic colitis usually results from atherosclerosis and low blood flow. Acute colonic ischaemia is a common cause of colitis in the elderly, in whom colonic ischaemia is a cause of morbidity. However, spontaneous isolated nonocclusive ischaemic necrosis of the caecum is a rare entity, with only a few case reports in the literature [2]. Isolated ischaemic involvement of the right colon has been reported with increasing frequency, particularly in associa-

tion with shock [3, 4], and in association with a variety of clinical entities and conditions such as chronic heart disease and hemodialysis [2, 5, 6]. Caecal infarction presents with right lower quadrant pain, and therefore may resemble acute appendicitis [2]. As this variant of ischaemic colitis is less common, it may not be considered in the differential diagnosis of right lower quadrant pain. Given the possibility of caecal perforation, an early diagnosis and surgical treatment are very important factors in such cases. Here, we report a patient with partial caecal necrosis who was admitted to our institution

with right-side inferior abdominal pain and local tenderness. The purpose of this article is to describe the presentation and management of this unusual clinical problem.

### Case presentation

An 84-year-old female patient presented to the emergency department at our institution with a main complaint of abdominal pain associated with nausea and fatigue. She had a 4 day history of abdominal discomfort with diffuse abdominal pain which in the last two days was localized in the lower right quadrant. She had no diarrhoea or vomiting. The patient had no history of gastrointestinal tract disease and she was a chronic cardiomyopath.

On physical examination, the patient was pale, and in some distress due to abdominal pain. She had a slightly elevated body temperature of 37.4°C, her blood pressure was 140/85 mm Hg, her pulse 85 beats/min, and her respi-

ratory rate 24 breaths/min. Her abdomen was distended and painful on palpation, with guarding and localized rebound tenderness in the right lower quadrant. Bowel sounds were diminished. No hepatosplenomegaly, ascites, or palpable masses were appreciated.

Laboratory analysis included a complete blood count (CBC) and biochemical parameters demonstrated leukocytosis  $12.7 \times 10^9$  cells/L and an elevated level of lactate dehydrogenase 1220 U/L. There were no specific signs in the patient's pre-operative chest and abdominal X-rays.

According to the physical examination a clinical diagnosis of acute appendicitis was suspected, but her age, comorbidity and clinical findings indicated further diagnostic imaging. An ultrasound and abdominal CT scan showed a distended caecum with circumferential caecal wall thickening and a small amount of fluid in the ileocaecal region.

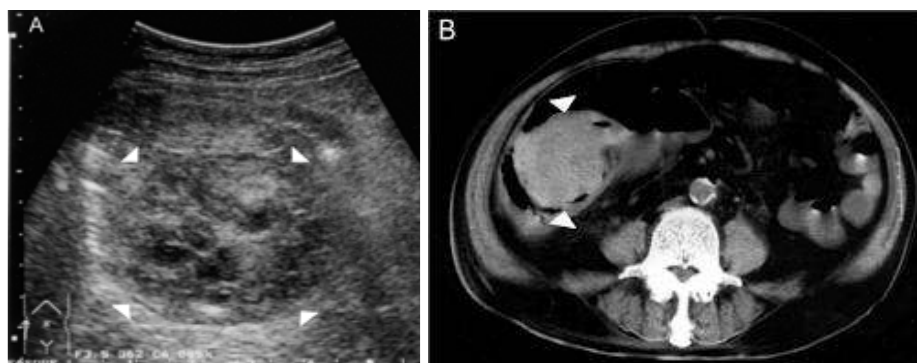


Figure 1 – Ultrasound and abdominal CT scan revealed a circumferential caecal wall thickening

On the basis of the results of these examinations, the most probable diagnosis of an inflamed caecal tumour was made, and an explorative laparotomy was performed. At laparotomy, an isolated necrosis of the anterior wall of the caecum was found, while the appendix and the remainder of the intestine appeared normal. There was no sign of major blood vessel occlusions or embolization.



Figure 2 – Isolated caecal necrosis with normal appendix

Right hemicolectomy with ileo-transversal anastomosis was performed. The specimen was sent for histopathology which revealed an isolated transmural caecal necrosis with marked infiltration of the caecal wall by bacteria and neutrophils as a consequence of nonocclusive ischaemic colitis. The postoperative course went without any surgical complication and the patient was discharged from the hospital on the tenth postoperative day.

### Discussion

Colonic ischaemia is a significant cause of morbidity and one of the most frequent causes of colitis among elderly patients [7, 8]. The causes of colonic ischaemia can be classified as occlusive and non-occlusive [9]. Occlusive factors include atherosclerosis, thromboembolisation, venous occlusion, small artery

disease and vasculitis and mechanical bowel obstruction. Non-occlusive colonic ischaemia is generally due to a low-flow state (shock), causing mesenteric vasoconstriction [3], or as the result of small vessel disease and tends to affect the colon in segmental fashion [10]. Non-occlusive caecal infarction has been reported to occur in association with chronic heart disease, haemodialysis, open-heart surgery, certain drugs, and systemic chemotherapy [5, 6 11–13]. Our patient had chronic heart failure whereas histological findings determined a non-occlusive segmental caecal infarction.

It has been postulated [5, 14] that isolated caecal ischaemia may occur because the ileocaecal region, like the splenic flexure, is a "watershed area," with poor blood supply relative to that of the adjacent intestine.

To understand why the caecum may be vulnerable to ischaemia it is necessary to review the blood supply to the caecum. The terminal ileum, appendix and ascending colon are supplied from the branches that communicate with themselves. In contrast, the caecum is supplied by end arteries which may render this bowel segment more susceptible to ischaemia. These end arteries, anterior and posterior, which are terminal branches of the ileocolic artery [5, 15], arise from either the ileal or colic branch of the ileocolic artery or may originate from the inconstant ileocolic vascular arcade whose presence may play an important role in the prevention of caecal ischaemia. The vas recta supplying the colon are longest in the caecum because this segment has the widest diameter of the large intestine [4] which is another anatomic factor that make the caecum vulnerable to ischaemia. Moreover, it has been demonstrated that the vasa recta share minimal collateral vessel flow between them [16].

Laplace's law ( $P = T/r$ ;  $P$ -intraluminal pressure,  $T$ -wall tension,  $r$ -radius) dictates that the intraluminal pressure needed to stretch the wall of a hollow tube is inversely proportional to its radius, which means that any increase in radius will automatically lead to an increase of wall tension in order to maintain the same intraluminal pressure [17, 18]. According to this law, the caecum, as the most distensible part of the colon, suffers the biggest wall tension which, together with general low flow state, can lead to compromised blood supply of this region.

As in most cases of colonic ischaemia, the exact precipitating event of isolated, partial caecal ischaemia remains unclear. A histopathologic specimen showed no evidence of atheromatous embolisation, nor did the patient undergo preoperative angiography, therefore the patient probably had vascular anatomic structures that may have predisposed her to infarction of the caecum.

Isolated caecal necrosis may present a diagnostic challenge as it is an unusual, less well-known, and rather atypical presentation of acute colonic ischaemia. Diagnosis is difficult because patients present with right-sided abdominal pain and tenderness, suggesting appendicitis, caecal diverticulitis, stercoral perforation, or caecal carcinoma [19]. Diagnostic US and abdominal CT can be helpful in such cases. The CT findings of bowel ischaemia include circumferential thumbprinting, intramural haemorrhage, focal or diffuse bowel dilatation, engorged mesentery, pneumatosis intestinalis and portal or mesenteric venous gas [20–22]. Circumferential bowel wall thickening, as we found in our patient, is the most common and sensitive finding, but it is not specific and may be seen in caecal diverticulitis, caecal infection, Crohn disease and appendicitis with secondary inflammation of the caecum [23].

If the anamnesis, physical examination, clinical findings and imaging studies suggest caecal necrosis, explorative laparotomy or an exploration through the laparoscopic approach should be performed without delay. A middle abdominal incision should be made to allow exploration of all of the intra-abdominal organs and intestine. The treatment of choice for isolated caecal necrosis is caecal resection or right hemicolectomy [2], which can be open or laparoscopic. Partial caecal necrosis can be treated by laparoscopic partial caecal resection [1]. Even if evidence of peritonitis persists, right hemicolectomy with anastomosis can be performed satisfactorily [24]. Our patient had a very small amount of serous fluid in the pericecal region with a few fibrinous bands over the terminal ileum. Right hemicolectomy with anastomosis was performed and the patient healed without complications.

### Conclusion

Ischaemic necrosis of the caecum is an infrequent variant of ischaemic colitis that should be considered in the differential diagnosis of

acute pain in the right lower quadrant of the abdomen, especially in elderly patients with congestive heart failure and low-flow state. While diffuse ischaemic disease of the intestine has high morbidity, mortality and recurrence rates, patients with isolated caecal necrosis have a good prognosis with early diagnosis and surgical treatment compared to those with diffuse ischaemic disease.

## REFERENCES

1. Perko Z, Bilan K, Vilovic K, et al. Partial cecal necrosis treated by laparoscopic partial cecal resection. *Coll Antropol.* 2006 Dec; 30(4): 937–9.
2. Dirican A, Bulent U, Bassulu N, et al. Isolated cecal necrosis mimicking acute appendicitis: a case series. *J med Case Reports.* 2009; 3: 7443.
3. Flynn TC, Rowlands BJ, Gilliland M, Ward RE, Fischer RP. Hypotension induced post-traumatic necrosis of right colon. *Am J Surg.* 1983; 146: 715–718. doi: 10.1016/0002-9610(83)90325-2.
4. Landrenau RJ, Fry WJ. The right colon as target organ of nonocclusive mesenteric ischemia. *Arch Surg.* 1990; 125: 591–594.
5. Rist CB, Watts JC, Lucas RJ. Isolated cecum necrosis of the cecum in patients with chronic heart disease. *Dis Colon Rectum.* 1984; 27: 548–551. doi: 10.1007/BF02555524.
6. Flobert C, Cellier C, Berger A, Ngo A, Cuillerier E, Landi B, Marteau P, Cugnenc PH, Barbier JP. Right colonic involvement is associated with severe forms of ischemic colitis and occurs frequently in patients with chronic renal failure requiring hemodialysis. *Am J Gastroenterol.* 2000; 95: 195–198. doi: 10.1111/j.1572-0241.2000.01644.x.
7. Boley SJ. Colonic ischemia: 25 years later. *Am J Gastroenterol.* 1990; 85: 931–934.
8. Reinus JF, Brandt LJ, Boley SJ. Ischemic disease of the bowel. *Gastroenterol Clin North Am.* 1990; 19: 319–343.
9. Bower TC. Ischemic colitis. *Surg Clin North Am.* 1993; 73: 1037–1053.
10. Wolf EJ. Ischemic disease of the gut. In: Gore RJ, Levine MS, Laufer I, eds. *Textbook of gastrointestinal radiology.* Philadelphia, Pa: Saunders. 1994; 2694–2706.
11. Hargrove WC, Roseto EF, Hicks RE, Mullen JL. Cecal necrosis after open-heart operation. *Ann Thorac Surg.* 1978; 25: 71–73.
12. Sloane CE, Anderson AA. Cecal infarction: ergot abuse as a possible etiologic factor. *Mt Sinai J Med.* 1980; 47: 31–33.
13. Kingry RL, Hobson RW, Muir RW. Cecal necrosis and perforation with systemic chemotherapy. *Am Surg.* 1973; 39: 129–133.
14. Yamazaki T, Shirai Y, Tada T, et al. Ischemic colitis arising in watershed areas of the colonic blood supply. *Surg Today.* 1997; 27: 460–462.
15. Netter FH. *Atlas of human anatomy.* Colacino S, ed. Summit, NJ: Ciba-Geigy. 1989; plates 291–293.
16. Stewart JA, Rankin FW. Blood supply of the large intestine. *Arch Surg.* 1933; 26: 843–891.
17. Slam K, Calkins S, Cason F. Cecal perforation as an unusual presentation of pancreatic carcinoma. *World J Surg Oncol.* 2007; 5: 14.
18. Saegesser F, Chapuis G, Rausis C, Tabrizian M, Sandblom P. Intestinal distention and colonic ischemia: occlusive complications and perforations of colorectal cancers. A clinical application of Laplace's Law. *Chirurgie.* 1974; 100: 502–516.
19. Wiesner W, Mortelé KJ, Glickman JN, Ros PR. 'Cecal gangrene': a rare cause of right-sided inferior abdominal quadrant pain, fever, and leukocytosis. *Emerg Radiol.* 2002; 9: 292–295.
20. Alpern MB, Glazer GM, Francis IR. Ischemic or infarcted bowel: CT findings. *Radiology* 1988; 166: 149–152.
21. Federle MP, Chun G, Jeffrey RB, Raylor R. Computed tomographic findings in bowel infarction. *AJR Am J Roentgenol.* 1984; 142: 91–95.
22. Mathis JM, Zelenik ME, Staab EV. CT detection of bowel infarction. *Comput Radiol.* 1985; 9: 177–179.
23. Simon AM, Birnbaum BA, Jacobs JE. Isolated infarction of the cecum: CT findings in two patients. *Radiology.* 2000; 214: 513–516.
24. Schuler JG, Margaret M, Hudlin MM. Cecal necrosis: Infrequent variant of ischemic colitis. *Dis Colon Rectum.* 2000; 43: 708–712. doi: 10.1007/BF02235593.

## Резиме

### ПАРЦИЈАЛНА НЕКРОЗА НА ЦЕКУМ – РЕТКА ПРИЧИНА ЗА БОЛКА И ПЕРИТОНЕАЛНА НАДРАЗБА ВО ДОЛЕН ДЕСЕН КВАДРАНТ НА АБДОМЕНОТ

Арбен Карпузи<sup>1</sup>, Драгиша Галески<sup>1</sup>,  
Газменд Елези<sup>1</sup>, Александар Ѓорески<sup>2</sup>,  
Зоран Караташев<sup>3</sup>

<sup>1</sup>Градска општа болница „8 Септември“, Оддел за општа и ургентна хирургија, Скопје, Р. Македонија

<sup>2</sup>Градска општа болница „8 Септември“, Оддел за радиологија, Скопје, Р. Македонија

<sup>3</sup>Градска општа болница „8 Септември“, Оддел за патологија, Скопје, Р. Македонија

**Вовед:** Парцијална некроза на цекум е доста ретко опишан ентитет. Неоклузивен инфаркт на цекумот е ретка состојба и е опишана во асоцијација со неколку клинички ентитети,

обично како последица на намалена ткивна перфузија и најчесто се јавува кај пациенти со хронично срцево заболување, кај пациенти со операција на отворено срце, при консумирање одредени лекаства и кај пациенти на хемодијализа. Целта на овој труд е да се опише клиничката презентација, дијагнозата и третманот на овој несекојдневен клинички проблем.

*Приказ на случај:* Прикажуваме случај на 84-годишна пациентка со кардиомиопатија, која е примена во нашата установа поради болка во долен десен квадрант на абдоменот, локална перитонеална дразба и леукоцитоза. Иако иницијалните клинички наоди беа со голем сомнеж за акутно апендикуларно страдање, КТ на абдомен покажа циркумференцијално задебелување на цекумот. Интраоперативно е потврдена цекална некроза, додека апендиксот и остаточниот

дел од цревото беа непроменети. Немаше знаци за големи васкуларни оклузии или емболизации. Направена е десна хемиколектомија и хистопатолошка анализа, која покажа дека се работи за изолирана трансмурална некроза на цекум со изразена инфилтрација на сидот со бројни бактерии и неутрофили, како последица на неоклузивен исхемичен колитис. Пациентката со уреден постоперативен тек е пуштена на домашно лекување на 10. постоперативен ден без хируршка компликација.

*Заклучок:* Парцијална некроза на цекумот треба да биде дел од диференцијална дијагноза кај пациенти со болка во долниот десен квадрант, особено кај повозрасни со хронична срцева болест.

**Клучни зборови:** парцијална некроза, цекум, исхемичен колитис, хронична срцева болест.