

## Mechanical small bowel obstruction due to an inflamed appendix wrapping around the last loop of ileum

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**SUMMARY:** Mechanical small bowel obstruction due to an inflamed appendix wrapping around the last loop of ileum.

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*Acute appendicitis rarely presents with a clinical picture of mechanical small-bowel obstruction. The Authors report a case of this unusual clinical occurrence, arising like a complication of a common disease, characterized by a chronically inflamed appendix (mucocele) wrapping around the last loop of ileum that produced volvulus and strangulation. The few similar cases reported in the literature are moreover reviewed.*

**RIASSUNTO:** Occlusione meccanica del piccolo intestino causata da un'appendice infiammata avvolta attorno all'ultima ansa ileale.

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*L'appendicite acuta raramente si presenta all'osservazione del chirurgo con un quadro di occlusione meccanica intestinale. Gli Autori presentano un caso di questa inusuale presentazione clinica, caratterizzato da un'appendice cronicamente infiammata (mucocele), avvolta intorno all'ultima ansa ileale che ne causava volvolo e strangolamento. Vengono riportati alcuni analoghi casi riscontrati in letteratura.*

**KEY WORDS:** Complicated acute appendicitis - Mucocele - Mechanical small bowel obstruction - Elderly.  
Appendice acuta completa - Mucocele - Occlusione meccanica intestinale - Anziano.

### Introduction

The early diagnosis of acute appendicitis continues to challenge physicians, especially in the elderly, where it often shows atypical characteristics, usually a more advanced stage due to pre- and post-admission delay. Compared to their younger counterparts, older patients present later to hospital. Moreover once admitted, it is more difficult to make the diagnosis in elderly people with abdominal complaints, because of the difficulty in taking an accurate history, the different perception of pain and diminished inflammatory response that can produce atypical physical findings. In addition acute appendicitis can present like more common disease in this age as diverticulosis or colonic neoplasm.

Acute appendicitis may be accompanied by varying degrees of small bowel distension. Generally this distension is the result of adynamic ileus, howe-

ver sometimes it may be the result of mechanical obstruction. Indeed appendicitis is well known to produce acute mechanical small bowel obstruction because of adhesions. On the contrary very few cases of mechanical small bowel obstruction developed as a direct result of acute appendicitis have reported in literature. Our case is interesting in this regard.

### Case report

U.A., a 78-year-old woman, was admitted in emergency setting with a 1-day history of severe, cramp-like, abdominal pain in the lower quadrants radiate to all abdomen, with vomit and diarrhea. General examination revealed a suffering patient in bad general conditions. There were no signs of dehydration.

The temperature was normal, pulse was 68/min and blood pressure 160/90 mmHg. There was abdominal distension with severe lower quadrants tenderness. Blumberg sign was negative and peristalsis was decreased. Routine investigations showed no abnormality (white blood cells 7.580/mm<sup>3</sup>). The patient was sent to medical department for observation.

A plain X-ray of the abdomen (erect posture) was performed 10 hours after admission (Fig. 1): it showed multiple fluid levels. Abdominal symptoms gradually worsened and a new plain abdominal radiograph after 13 hours was unchanged. Merely 23 hours after admission the patient arrived at observation of our equipe, that was carrying out the night-duty. CT examination was required: it showed distended small bowel loops, multiple fluid levels,

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Fig. 1 - Abdominal radiograph showing fluid levels and distended loops of small bowel.

ischaemic bowel signs, and copious peritoneal effusion (Fig. 2). A diagnosis of volvulus was made and laparotomy was performed 24 hours after admission.

At surgery bloody peritoneal fluid and a volvulus were found (Fig. 3). The strangled bowel was greatly congested and not viable. The gangrene extended up to 50 centimetres from the ileo-caecal junction and involved the bottom of caecum. At the base of the volvulus, the appendix was wrapped around the last loop of ileum. A resection of caecum and about 70 centimetres of ileum was performed. Reconstruction of bowel was made by end-to-end anastomosis.

Histology examination allowed to make diagnosis of appendicular mucocele, demonstrating the presence of an appendix chronically inflamed.

The post-operative course was complicated by infection of wound and pneumonia. The patient was discharged 31 days after admission in good general conditions.

## Discussion

Abdominal pain remains “one of the most difficult challenge for a surgeon”. No doubt the complication just been described is the consequence of an acute appendicitis not early diagnosed. Acute appendicitis is not a disease exclusively of young people: it is the second most common surgical abdominal disease in the 50 years and older age group and there is a bimodal age typical incidence rate, with an early peak in young adulthood and another in advanced age (Fig. 4). Despite this, the literature showed a considerable difference of diagnostic error rate between

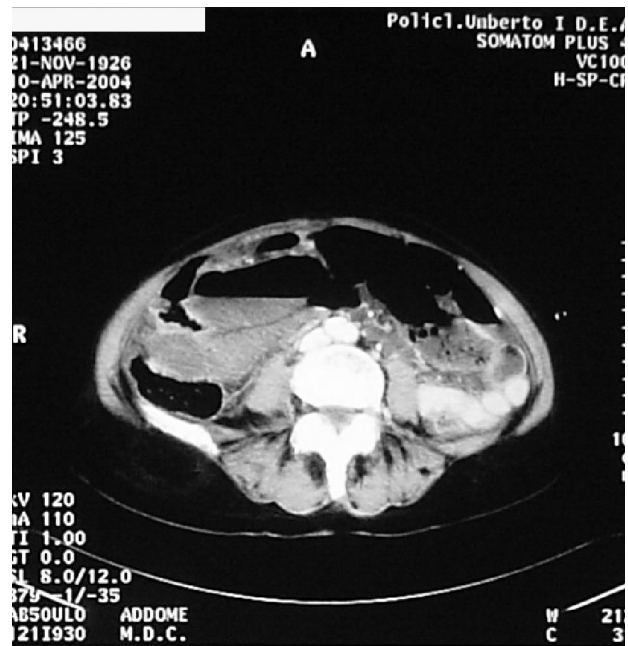
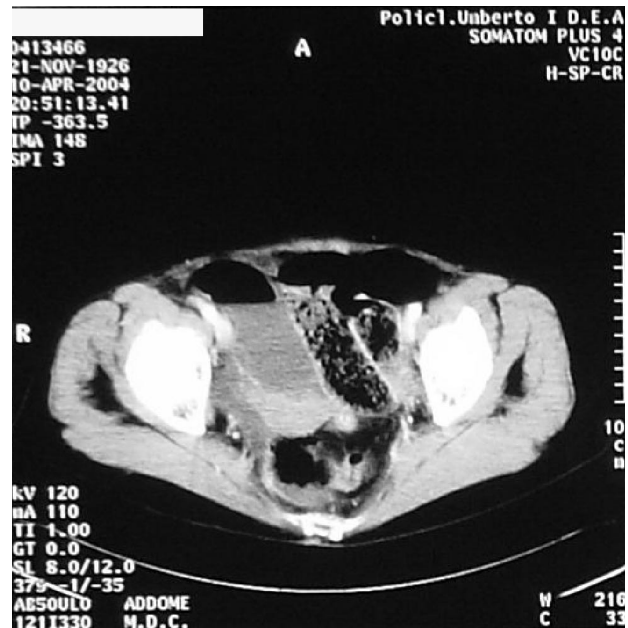


Fig. 2 - CT scan: small bowel obstruction with bowel necrosis and intramural gas.

younger and older patients (Tab. 1). Treatment delay is the major deleterious factor influencing the outcome. Diagnostic delay in elderly patients is imputable on the one side to the not ready coming to the Emergency Department due to different perception of pain and, on the other side, to difficulty in taking an accurate history and to atypical clinical finding.

Frequently elderly patients consider abdominal pain to be normal with aging or due to diseases, such



Fig. 3 - Inflamed appendix wrapping around the last loop of ileum producing volvulus of bowel.

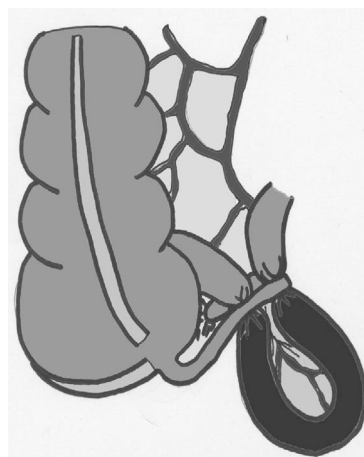


Fig. 5 - Our case: mechanical small bowel obstruction due to an inflamed appendix wrapping around the last loop of ileum.

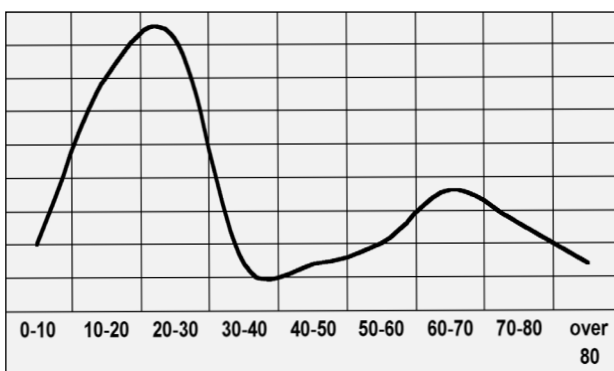


Fig. 4 - Bimodal age incidence rate of acute appendicitis.

as diverticulosis or chronic constipation. Kraemer in a multicentric study among 2.280 patients reported that the diagnosis of acute appendicitis in elderly is more often delayed (9); however, disease presentation is not atypical if one considers the advanced stage that is

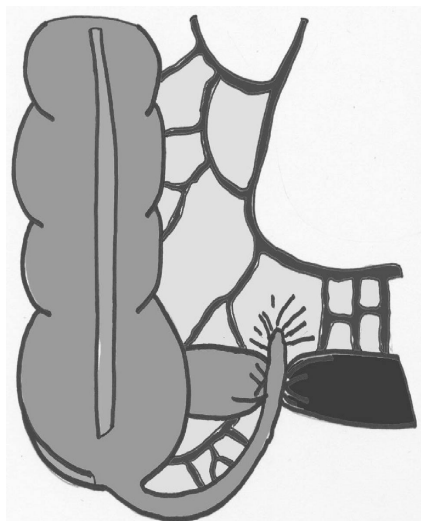
more common in older patients.

The diagnosis of acute appendicitis is rarely taken into account by doctors, but more than one of ten elderly patients presenting with abdominal pain to an Emergency Department will have acute appendicitis. Indeed appendicitis is the most common condition requiring abdominal surgery and the elderly population today accounts for about 20% of total appendectomies (8). Patients in late adulthood with abdominal pain are high-risk patients and they have to be clinically evaluated by experienced surgeons as soon as possible.

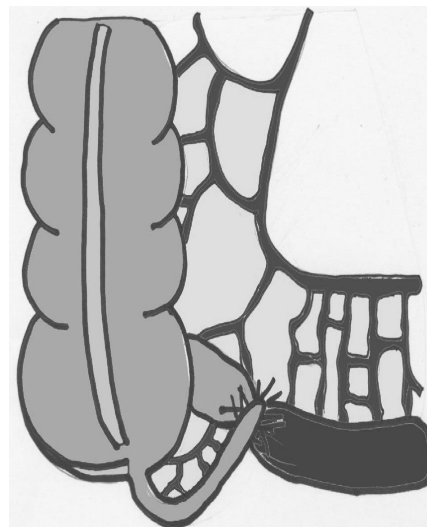
In our case, plausibly the appendix had wrapped around the bowel a relevant time before the onset of the intestinal obstruction, because of hyperactive movements of this organ during the first period of inflammation. Afterward subsequent fibrosis in the inflamed appendix must have narrowed the intestinal lumen. This dynamics was easier from particular

TABLE 1 - ACUTE APPENDICITIS IN ELDERLY.

Author	Year	Pts (n)	Age (yrs)	Perforation rate (%)	Diagnostic error (%)	Complication rate (%)	Mortality (%)
Goldemberg	1949	129	>60	66	11	25	4,6
Pannenberg	1976	668	>60	28	-	-	8
Arnbjörnsson	1983	755	>60	32	40	-	-
Luckmann	1984	1395	60-79	68	6	-	1,4
Luckmann	1984	193	>80	75	7	-	4,7
Burns	1985	105	>50	65	9	60	3
Paajanen	1988	100	60-79	37	33	23	3
Paajanen	1988	100	>80	49	31	40	7
Andersson	1992	690	>50	35	17	-	-
Reding	1993	350	>60	17	-	-	9
Wen	1995	1126	>65	71	31	-	2,8
Kraemer	2000	415	>50	35	10	20	2,9



**Fig. 6 - The tip of the inflamed appendix adheres to posterior peritoneum across the ileum.**



**Fig. 7 - The tip of the inflamed appendix adheres to the bowel wall directly.**

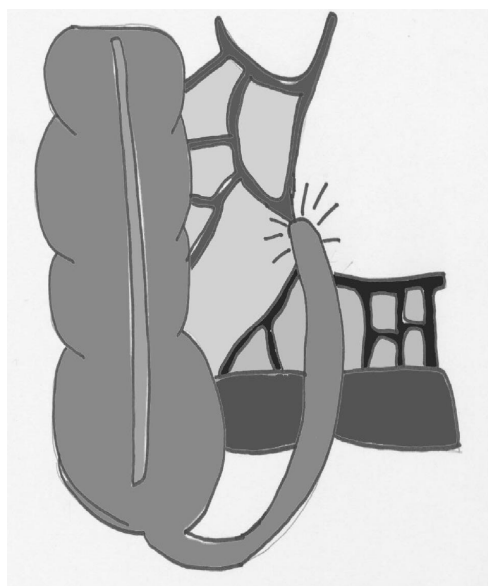
appendix's length (about 10 cm) (Fig. 5).

The type of obstruction described occasionally (3,6% of cases) was produced by Meckel's diverticulum (7). Indeed bowel obstruction are one of the most common complication of the Meckel's diverticulum. Very few cases of mechanical bowel obstruction developed as a result of acute appendicitis have appeared in the literature. We found only six similar cases where an appendix acutely or chronically inflamed was wrapped around the last loop of ileum causing strangulation (Tab. 2).

In addition other instances has been reported where the appendix was the strangulation agent:

1. the tip of the inflamed appendix adheres to posterior peritoneum across the ileum, producing the compression of its lumen (6) (Fig. 6);
2. the tip of the inflamed appendix adheres to the bowel wall directly, producing small bowel obstruction due to compression and/or kinking of a loop. (5) (Fig. 7);
3. the tip of the inflamed appendix adheres to posterior peritoneum forming a loop through which a portion of the bowel may herniate (10);
4. the inflamed appendix lies over the terminal ileum and adheres to the mesentery near ileocolic artery, causing thrombosis and gangrene of the terminal ileum (5) (Fig. 8).

More commonly small bowel obstruction due to appendicitis can be caused by appendicular abscess or adhesions by traction, compression, kinking of a loop or by volvulus. Generally these adhesions can produce intestinal obstruction after many months and sometimes after many years following an acute attack of appendicitis.



**Fig. 8 - The tip of the inflamed appendix adheres to the mesentery near ileocolic artery.**

An accurate and early diagnosis of intestinal strangulation is essential in patients with small bowel obstruction to minimize the risks of morbidity and mortality. Indeed treatment delay exceeding 24 hours is significantly associated with an increased death rate. Fevang studied retrospectively 877 patients who underwent operations for small bowel obstruction, reporting that mortality rate rised from 3% in the event of viable loop-strangulation to 16% in the event of not viable loop. Likewise complications rate rised from 16% to 36% respectively (11).

TABLE 2 - MECHANICAL SMALL BOWEL OBSTRUCTION BY ACUTE APPENDICITIS IN THE LITERATURE.

<i>Case</i>	<i>Author</i>	<i>Year</i>	<i>Sex and age (yrs)</i>	<i>Duration of symptoms (days)</i>	<i>Finding at operation</i>	<i>Surgery</i>
1	Srivastan	1964	F 40	12	Strangled bowel congested, but viable constricted by appendix having completely encircled the base of loop.	Right emicolectomy
2	Paliwal	1969	-	-	Appendix encircling the loop of ileum and bulbous tip adherent to the descending colon.	Retrograde appendectomy
3	Gupta	1969	M 15	2	Long inflamed appendix winding round the strangulated terminale ileum.	Resection of ileocecal region
4	Bose	1973	M 50	1	Distal half of inflamed appendix wrapping around a loop of ileum, making a complete circle and producing strangulating obstruction.	Retrograde appendectomy+ bowel resection
5	Bose	1973	M 35	1	Inflamed appendix encircling a loop of ileum making a complete circle, causing mechanical obstruction and strangulation of the gut.	Retrograde appendectomy
6	Ivoulosou	1996	M 22	2	Bloody peritoneal fluid. Appendix rolling up terminal ileum, producing strangulating obstruction.	Retrograde appendectomy+ bowel resection
7	Assenza	2004	F 78	2	Bloody peritoneal fluid Inflamed appendix wrapping around the last loop of ileum, producing volvulus of bowel.	Ileocecal resection

The preoperative differential diagnosis between simple and strangulated small bowel obstruction is still difficult despite careful history taking, physical examination and radiological and biochemical examinations.

Generally, conventional radiography is first imaging procedure in patients with bowel obstruction. However, its accuracy in showing the presence of obstruction is still only 46-80% and lower in diagnosing the site and cause of obstruction and the presence of strangulation.

The role of CT in the evaluation of patients with small bowel obstruction has been extensively described in the literature. Balthazar et al. reported a sensitivity, specificity and accuracy of CT in the diagnosis

of small bowel strangulation of 83%, 93% and 91% respectively (12). CT is surely recommended for the evaluation of patients with suspected bowel obstruction, particularly when clinical, biochemical and initial conventional radiographic findings remain doubt or vague.

## Conclusions

The onset of appendicitis in elderly are often insidious and the diagnosis is often delayed, resulting in high morbidity and mortality rates. These patients should be examined by an expert surgeon as soon as possible.

Closed loop and strangulating obstruction of the small bowel are a serious lesions that require emergency surgery. Delayed operation potentially results in high mortality. The differentiation between simple and strangulated small bowel obstruction is still difficult.

CT plays an important role in evaluation of patients with small bowel obstruction in which clinical and initial conventional radiographic findings remains indeterminate or strangulation is suspected, defining the correct diagnosis and a possible etiology and showing signs of strangulation requiring surgical intervention.

## References

1. Srivastan M. Intestinal obstruction caused by a long appendix ensnaring a loop of ileum. *J Med Ind Ass* 1964; 43: 400-401.
2. Bose SM, Talwar BL. Appendicitis causing acute intestinal obstruction with strangulation. *Aust NZ J Surg* 1973; 43: 56-57.
3. Ivoulou DP, Agoukagou M. Un cas d'occlusion du grele sur strangulation par appendice vermiculaire. *Med Trop* 1996; 56: 413-414.
4. Paliwal YD, Singh RP. *Indian J Surg* 1969; 31: 288.
5. Gupta S, Vaidya MP. Mechanical small bowel obstruction caused by acute appendicitis. *Am Surg* 1969; 35(9): 670-674.
6. Buckwalter JA, Modlin MB. Acute appendicitis with intestinal obstruction. *JAMA* 1954; 155(18): 1577-1578.
7. Kusumoto H, Yoshida M, Takahashi I, Anai H, Maehara Y, Sugimachi K. Complications and diagnosis of Meckel's diverticulum in 776 patients. *Am J Surg* 1992; 164 (4): 382-3.
8. Ronen R, Margel D, Soffer D, Kluger Y. Appendicitis in the elderly: what has changed? *Isr Med Ass J* 2000; 2: 220-223.
9. Kraemer M, Franke C, Ohmann C, Yang Q. Acute appendicitis in late adulthood: incidence, presentation, and outcome. Results of a prospective multicenter acute abdominal pain study and a review of the literature. *Lagenbeck's Arch Surg* 2000; 385: 470-481.
10. Cohn S, Felmus RD. Volvulus with partial intestinal obstruction caused by an abnormally placed appendix. *New York J Med* 1950; 50: 2965.
11. Fevang BT, Fevang J, Stangeland L, Søreide O, Svanes K, Viste A. Complications and death after surgical treatment of small bowel obstruction: a 35-year institutional experience. *Ann Surg* 2000; 231(4): 529-537.
12. Balthazar EJ, Liebeskind ME, Macari M. Intestinal ischemia in patients whom small bowel obstruction is suspected: evaluation of accuracy, limitations, and clinical implications of CT in diagnosis. *Radiology* 1997; 205: 519-522.