

Complicated appendicitis with bladder perforation treated with laparoscopic surgery: case report

Apendicitis complicada con perforación vesical manejada por vía laparoscópica: reporte de caso

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Abstract

Misdiagnosis and delay in the treatment of acute appendicitis increases the risk of complications secondary to visceral perforation. Appendicular rupture into the bladder is an uncommon complication, but possibly to happen; treatment generally consists of a laparotomy with appendectomy and repair of the bladder wall. The laparoscopic approach is a viable option in cases of complicated appendicitis, even in complex and infrequent clinical scenarios. The aim of this paper is to describe a case of complicated appendicitis with bladder perforation, treated with a laparoscopic right hemicolectomy, terminal ileostomy and closure of the urinary bladder wall.

Keywords: Appendicitis. Bladder perforation. Laparoscopy. Appendicovesical fistula.

Resumen

El retraso en el diagnóstico y en el tratamiento de la apendicitis aguda aumenta el riesgo de complicaciones secundarias al efecto de la perforación visceral. La perforación apendicular hacia la vejiga es una complicación anecdótica, pero probable, cuyo tratamiento generalmente consiste en laparotomía con apendicectomía y reparación de la pared vesical. El abordaje laparoscópico es una opción viable en cuadros de apendicitis complicada, incluso en escenarios clínicos complejos. El objetivo de este trabajo es presentar un caso clínico de apendicitis con perforación vesical tratado de manera exitosa por vía laparoscópica mediante hemicolectomía derecha y cierre de la pared vesical.

Palabras clave: Apendicitis. Perforación vesical. Laparoscopia. Fístula apendicovesical.

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Date of reception: 27-02-2022
Date of acceptance: 06-04-2022
DOI: 10.24875/CIRUE.M22000819

Cir Cir (Eng). 2025;93(1):109-113
Contents available at PubMed
www.cirugiaycirujanos.com

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Introduction

Appendectomy is the most frequently performed emergency surgical procedure. It is estimated that the lifetime risk of appendicitis is 7% up to 9%¹.

In adults, scales such as the Alvarado score and inflammatory markers alone are not capable of predicting the diagnosis in all patients with acute appendicitis. Although ultrasound (US) screening is the most widely used imaging modality, computed tomography (CT) is the gold standard, with a specificity of 98%. The staged use of US and CT increases diagnostic certainty¹. Delay in the diagnosis of acute appendicitis can lead to perforation and increased morbidity, with adverse outcomes for the patient¹.

Perforation occurs in approximately 20% of appendicitis cases. Several studies have shown that the risk of perforation is related to the course of the disease, and that delaying surgical treatment is associated with worse outcomes. In addition, surgical time, as well as postoperative hospital stay, are significantly increased with longer time intervals from symptom onset to surgery².

Appendiceal perforation can manifest with symptoms localized to the right lower quadrant or with free perforation with intraperitoneal dissemination of pus and fecal matter. Occasionally, it can manifest with unusual clinical presentations, such as retroperitoneal abscesses, enterocutaneous fistulas, liver abscesses due to hematogenous dissemination, intestinal occlusion, or even septic portal vein thrombosis (pyelephlebitis). The complications of acute appendicitis are widely variable and most are due to the effects of visceral perforation³; some are very rare, but probable, such as bladder perforation and appendicovesical fistula. Due to the variable presentation of symptoms and the inability of imaging studies to detect this rare pathology, early diagnosis is difficult. CT, the gold standard, shows thickened bladder wall and fecaliths near the bladder as the main findings, and in some cases, the fistulous tract from the intestine to the bladder can be observed⁴. Although there is no standardized treatment for this complication, it generally includes appendectomy and bladder wall repair^{3,4}.

The management of perforated appendicitis depends on the patient's condition. When the perforation is contained, with a localized abscess, it can be initially non-surgical with IV antibiotics and percutaneous drainage, followed by appendectomy, or with immediate appendectomy⁵. In hemodynamically unstable patients

with generalized peritonitis, emergency surgical exploration is required. Currently, it has been shown that the laparoscopic approach carries a lower risk of surgical site infections, a shorter length of stay, and less time to resume oral intake, with a slightly longer surgical time vs open surgery, and without increasing the risk of intra-abdominal abscess formation^{6,7}. Even in patients considered high-risk, with ASA 3-4, laparoscopy in complicated appendicitis presents the same advantages, with a higher rate of mild complications, but fewer severe ones vs open surgery⁸.

The objective of this work is to present a clinical case of appendicitis with bladder perforation successfully treated laparoscopically by right hemicolectomy and bladder wall closure.

Clinical case

A 70-year-old woman with a past medical history of type 2 diabetes mellitus and long-standing systemic arterial hypertension, as well as chronic kidney disease diagnosed 6 months prior without renal replacement therapy; surgical history included a cesarean section and bilateral salpingo-oophorectomy 22 years ago, without complications; obstetric history: gravida, 3; para, 2; C-section, 1.

At the onset of her illness, 2 weeks prior to admission, she presented with bilateral pelvic pain and fever that did not subside with the use of analgesics and antipyretics, diarrhea and vomiting, without urinary symptoms. She was taken to hospital care at a different center, US revealed vesicular lithiasis and simple CT showed bilateral lithiasis, with deterioration of renal function. She was discharged voluntarily after 1 week and transferred to our medical center, where she was admitted with data of dialysis urgency. After the placement of a catheter for hemodialysis, she presented deterioration of respiratory function, requiring advanced airway management. During hospital admission, she was diagnosed with septic shock of probable urinary focus, requiring amine support. General surgery was consulted, finding on physical examination a mass in the right iliac fossa and fecal output through the Foley catheter.

Lab test results showed leukocytosis of 45,000 with neutrophilia, prolonged coagulation times, acute kidney injury, and metabolic acidosis. CT reported free fluid predominantly in the right paracolic gutter, paracecal intra-abdominal collection in proximity to the bladder, gas in the cavity, slight thickening of the bladder wall, and an interface zone between the

cecum and the bladder (Fig. 1). She was diagnosed with probable acute appendicitis complicated by secondary bladder perforation.

Emergency surgical exploration by laparoscopic approach was decided, finding free intestinal and purulent material in the cavity (Fig. 2), with the cecum perforated towards the bladder, observing the balloon of the transurethral catheter (Fig. 3). Right hemicolectomy (Fig. 4) was performed with terminal ileostomy, primary closure of the bladder perforation in 3 layers (Figs. 5 and 6), and placement of drainage. The patient remained in postoperative surveillance in intensive care, resolved the abdominal sepsis, and was discharged on day 6 to the ward to continue her recovery under the care of the nephrology and general surgery services. On postoperative day 15, a new intra-abdominal collection was evidenced in the right paracolic gutter, which was treated with percutaneous drainage and intravenous antibiotics, resolving uneventfully. She continued with torpid evolution due to her underlying pathologies, requiring multiple hemodialysis sessions, and finally died from complications associated with kidney disease.

Discussion

Acute appendicitis is still frequently underdiagnosed. The proportion of underdiagnosed appendicitis ranges between 20% and 40%¹. The most common complication of appendicitis is perforation. For many years, efforts have been made to reduce this complication, seeking to better discern between patients who require or do not require surgical exploration. Currently, CT provides much accurate information and is used to detect doubtful cases; however, sometimes it does not provide enough data to diagnose acute appendicitis⁹. In our case, the patient underwent a CT scan prior to her admission to our hospital, which did not report data of appendiceal process, which contributed to the late diagnosis and consequent complications. According to Sosner et al.¹⁰, one of the common causes of false negatives by CT in suspected acute appendicitis is that periappendiceal inflammation may be hidden, for example, by ascites due to comorbidity, which is consistent with the situation of our patient with kidney disease.

Delay in the diagnosis and treatment of acute appendicitis increases the risk of perforation, according to various studies. Saar et al.², in 2016, demonstrated that the severity according to the Disease Severity Score (DSS), as well as

the severity of complications assessed by the Comprehensive Complication Index (CCI), increase proportionally with the time from symptom onset to surgery². On the other hand, a meta-analysis of 45 studies conducted by Van Dijk et al.¹¹ found that there is no significant increase in the risk of complicated appendicitis with a delay of appendectomy of 24-48 h from patient admission to the hospital unit, proposing that perforated appendicitis is a condition different from uncomplicated appendicitis, rather than being the next step in the natural progression of the disease.

Appendiceal perforation towards the bladder is an anecdotal complication, which can be caused by the inflammatory process between the appendix and the bladder, causing fusion and necrosis¹². The first case was described by Percy Allan in 1900¹³ and to date, about 115 cases of bladder perforation and appendicovesical fistula by appendicitis have been reported, and only a few in the recent literature^{3,4,9,12,14,15}, all associated with an acute appendicitis not evidenced early.

In 2 of the reviewed cases, symptoms of persistent urinary tract infection were what led patients to seek medical attention; in both cases, there was a history of right lower quadrant pain and untreated fever^{4,14}. In a different case, urinary symptoms preceded migratory abdominal pain, fever, nausea, and anorexia⁹. In the other 2, patients presented with a past medical history of abdominal pain, fever, and nausea in the 4 to 10 days prior to admission, without associated urinary symptoms^{3,12}. Diarrhea with or without blood and vomiting were present in almost all cases. On physical examination, the presence of a mass in the right lower quadrant with hyperesthesia was a constant. In laboratory studies, leukocytosis and pathological urine examination, with leukocyturia, pyuria or fecaluria, were present in all cases; in one of them, acute kidney injury was evidenced³. The diagnostic suspicion was made by contrast CT and the most consistent findings with bladder perforation secondary to appendiceal inflammatory process were the presence of a periappendiceal fluid collection in proximity to the bladder, inflammatory changes in periappendiceal and perivesical fat, appendiceal thickening, and bladder wall thickening^{3,4,9,12,14}.

In our case, the clinical presentation, blood and urine analyses, as well as CT findings, were similar to those described in the reviewed cases. However, our patient presented with data of septic shock and hemodynamic instability.

Historically, exploratory laparotomy has been the key to the diagnosis and definitive treatment of this disease. In the cases we reviewed, all but 1 were treated by this

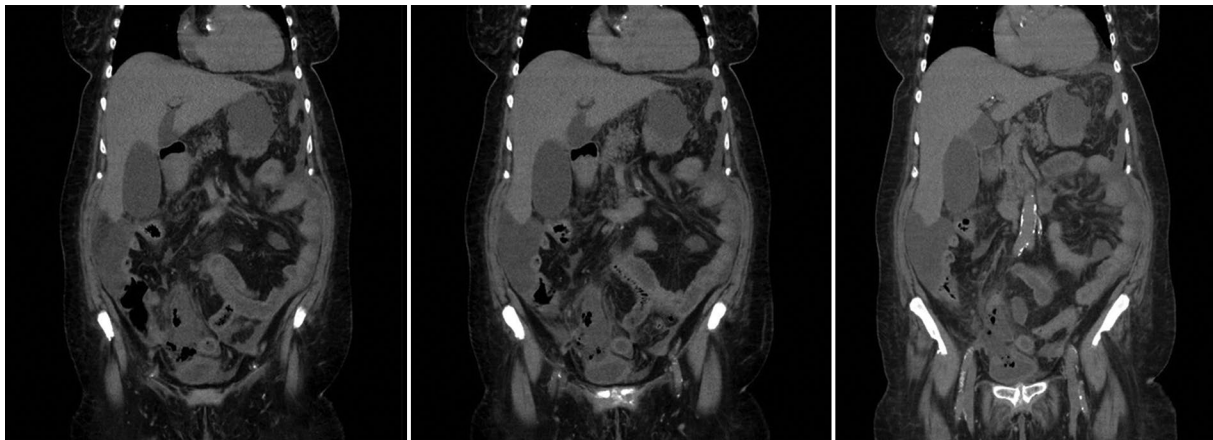


Figure 1. Findings of the contrasted abdominal computed tomography, coronal view.

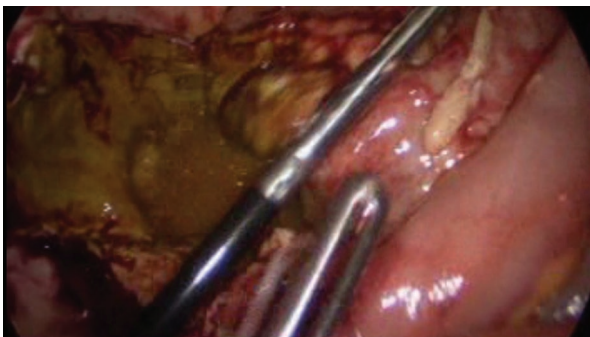


Figure 2. Laparoscopic view of the pelvic abscess due to the perforation.



Figure 4. Laparoscopic resection of the colon with stapler.

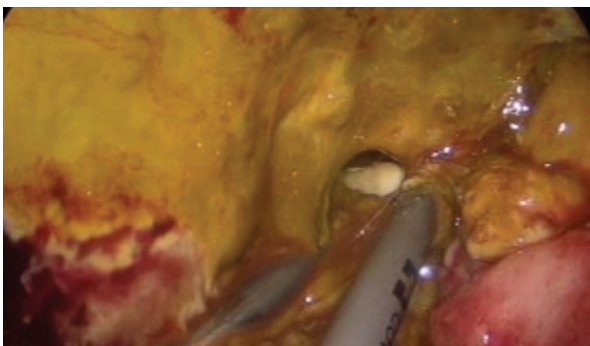


Figure 3. Laparoscopic view of the balloon of the transurethral catheter in relation to the bladder perforation.



Figure 5. Laparoscopic cystorrhaphy by planes.

route, by laparotomy, appendectomy with or without right hemicolectomy, and bladder wall closure or partial cystectomy^{3,4,9,12,15}. Only in the case described by García-Muñoz et al.¹⁴ in 2013 was the approach performed laparoscopically, performing appendectomy and resection of the appendicovesical fistula, discharging the patient 48 hours following the surgical procedure.

Like this, some other cases of appendicovesical fistula repair by laparoscopic approach have been reported, but due to chronic appendicitis or other causes, and with the intervention performed electively.

According to the reviewed literature, the case we present is the first with an acute perforation of the bladder secondary to complicated appendicitis and

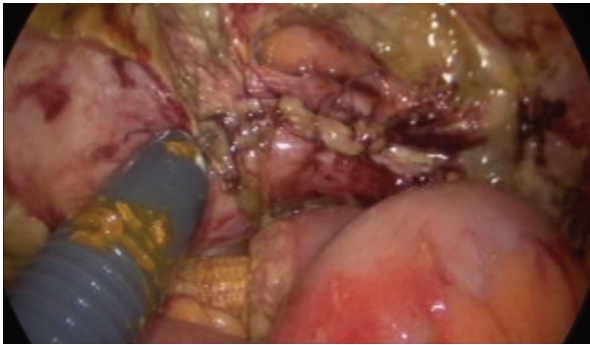


Figure 6. Laparoscopic view of the bladder wall closure.

with data of septic shock, which was treated, after preoperative resuscitation, by laparoscopic approach, completing right hemicolectomy and bladder wall closure without complications. However, the patient had a fatal outcome, due to the exacerbation of underlying organic failures despite the resolution of the primary septic process.

Conclusions

Perforated appendicitis continues to be a diagnostic and therapeutic challenge; some late complications not so studied, such as perforation of periappendiceal structures, carry a high rate of morbidity and mortality.

Minimally invasive surgery is a viable option, diagnostic and definitive therapeutic, in cases of complicated appendicitis, even in complex and infrequent clinical scenarios such as bladder perforation.

Acknowledgments

The authors thank Nicole Talamante-Padilla for her participation in editing the English abstract.

Funding

The authors received no sponsorship to conduct this article.

Conflicts of interest

The authors declare no conflict of interests whatsoever.

Ethical considerations

Protection of Persons and Animals. The authors declare that no experiments on humans or animals have been performed for this research.

Confidentiality, Informed Consent and Ethical Approval. The authors have followed the confidentiality protocols of their institution, have obtained informed consent from the patients, and have the approval of the Ethics Committee. The recommendations of the SAGER guidelines have been followed, according to the nature of the study.

Declaration on the Use of Artificial Intelligence. The authors declare that they did not use any type of generative artificial intelligence for the writing of this manuscript.

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