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Acute Appendicitis with Successful Laparoscopic Appendectomy: Importance of Imaging Guided Management - A Case Report

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Abstract

Acute appendicitis is among the most frequent cases of emergency abdominal surgery and requires rapid diagnosis to prevent complications like perforation and abscess formation. However, the lack of regional data comparing the results of laparoscopic and non-operative management still persists, which highlights the need to conduct larger, multicentric prospective studies. The aim of this report is to demonstrate the diagnostic value of a multimodal approach integrating clinical examination and imaging investigations, along with the possible surgical outcomes of timely laparoscopic intervention in acute, uncomplicated appendicitis. A 24-year-old man with no significant past medical or surgical history presented with a 12-hour history of abdominal pain, initially in the periumbilical area and later localised to the right lower quadrant, associated with nausea, vomiting, and anorexia. Clinical presentation diagnosed tachycardia, low-grade pyrexia, with right lower quadrant tenderness and positive Rovsing and psoas signs, which were consistent with localised peritoneal irritation. Laboratory tests revealed leukocytosis (14,900), neutrophilia (82%), and elevated C-reactive protein (46 mg/L). A non-compressible, blind-ending tubular structure, occurring in the right iliac fossa, was detected by ultrasonography, and contrast-enhanced computed tomography confirmed an inflamed appendix, with wall thickening and periappendiceal fat stranding, but without perforation or an abscess. The patient underwent laparoscopic appendectomy under general anesthesia with minimal intra-surgical blood loss and uneventful post-operative recovery. He was discharged on the third day and achieved complete recovery at one month. The case highlighted the value of early imaging, precise diagnosis and minimally invasive surgery in achieving optimal outcomes in acute uncomplicated appendicitis.

Keywords: Acute Appendicitis, Laparoscopic, Appendectomy, Ultrasonography, Computed Tomography, Typical Appendicitis, Leukocytosis, Multimodal Diagnosis, C-Reactive Protein

Introduction

The lifetime prevalence of acute appendicitis is considered to be approximately 7% and it is the most frequent conditions for emergency abdominal surgery in certain regions (Di Saverio et al., 2020). Generally, the condition is identified by an initial pain in the right lower quadrant of the abdomen, which is usually accompanied by loss of appetite, nausea, and vomiting (Echevarria et al., 2023). Traditionally, the diagnosis used to be more of a clinical nature (Feddock, 2007; Kirch & Schafii, 1996); however, with the introduction of advancement of imaging technologies, the diagnostic criteria is also changing. These not only increased the accuracy of the process, but also resulted in a decrease in the rate of negative appendectomy(Debnath et al., 2017).

Laparoscopic appendectomy (LA) is a minimal surgical technique that uses three standardized abdominal incisions where a laparoscope and instruments are introduced to locate and remove an inflamed appendix(Saran Lotfollahzadeh et al., 2024). LA has revealed a considerable range of advantages over open appendectomy, including minor post-operative pain, shorter hospital stay, quicker recovery of normal functions, fewer wound infections, and better cosmetic results (Bhosle & Degloorker, 2018; Nikolov et al., 2024). Furthermore, he laparoscopic approach enables the surgeon to see and treat more intra-abdominal pathologies and to perform irrigation of the peritoneal cavity due to superior visualization (Garg et al., 2009). The available literature asserts that LA is the preferred method for treatment of uncomplicated appendicitis when performed under the supervision of a skilled surgical team(Hori et al., 2017).

Generally, ultrasonography (USG) is recommended as the imaging modality of first line in suspected appendicitis,

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particularly among children and pregnant women, because it is non-ionizing, yet its sensitivity is inconsistent (Ooms et al., 1991). Computed tomography (CT) imaging has become a very sensitive and specific study in the diagnostic process of appendicitis and to rule out complications associated with the condition, including perforation or formation of abscess (Ali et al., 2018). CT imaging provides great diagnostic accuracy for suspected appendicitis, with reported sensitivity of 88-100% and specificity of 91-99%. It provides good imaging of the appendix and associated structures, allowing clinicians to confirm or rule out a diagnosis and assess disease severity. However, its use requires exposure to ionizing radiation, which is its fundamental constraint (Leite et al., 2005). Meta-analyses also show that CT is better than ultrasound in terms of sensitivity (approx. 94%) and ultrasound (approx. 86%) in adults (van Randen et al., 2011). Besides, CT scanning with low-dose protocols has demonstrated an equivalent accuracy with the conventional-dose protocols and provide an option with lower radiation levels, preserving diagnostic quality (Kim et al., 2020; Niiniviita et al., 2018; Sippola et al., 2020). Therefore, CT is central to the diagnosis of appendicitis in the contemporary world, especially where the ultrasound results are controversial and/or suspected cases of complications.

The main objective of this case report was to present the successful operation of a young adult male with acute, uncomplicated appendicitis through laparoscopic appendectomy. This case highlighted how timely diagnosis, with the help of imaging techniques, associated with minimally invasive surgical interventions, leads to excellent clinical outcomes, even in a relatively low-risk group of patients.

Case Presentation

A 24-year-old male with no significant past medical or surgical history presented to the Emergency Department with a 12-hour history of severe abdominal pain. The pain began initially in the periumbilical region and later migrated to the RLQ, accompanied by nausea, two episodes of vomiting (non-bilious), and loss of appetite. There was no history of diarrhea, dysuria, hematuria, chest pain, or recent travel. The patient was not a smoker, occasionally consumed fast food and reported taking only non-prescription paracetamol for symptom relief.

Physical Examination

On examination, the patient was uncomfortable and diaphoretic. Vital signs revealed low-grade pyrexia (38.1°C) and tachycardia (104 bpm), consistent with an acute inflammatory response (Table 1). Abdominal examination showed localised tenderness, guarding, and rebound tenderness in the RLQ. The positive Rovsing's and psoas signs were very suggestive of localised peritoneal irritation, while bowel sounds were normal with no palpable mass or abdominal distension.

Table 1. Patient Clinical Profile

Parameters	**Findings**	**Reference Range**
Temperature	38.1 °C (fever)	36.5 – 37.5 °C
Blood Pressure	122/76 mmHg	90 – 120/60 – 80 mmHg
Heart Rate	104 bpm	60 - 100 beats/min
Respiratory Rate	18 breaths/min	12 – 20 beats/min
SpO2 (room air)	98% room air	≥ 95%
Abdominal Examination	Tenderness in the RLQ, guarding, and positive rebound tenderness	_
Rovsing's Sign	Positive	Negative (normal)
Psoas Test	Positive	Negative (normal)

Clinical Examination

Laboratory findings of the patient demonstrated leukocytosis (WBC: 14,900/ µL), neutrophilic predominance of 82% and elevated CRP (46mg/L), confirming acute signs of inflammation. The serum electrolytes were found to be in the normal range, as shown in Table 2, and this indicated the absence of a metabolic imbalance.

Table 2. Baseline Laboratory Findings

Test	Result	Reference Range
WBC	14,900 µL	4,000 –11,000 µL
Neutrophils	82%	40–60%)
CRP	46 mg/L	<5 mg/L
Serum Electrolytes	Normal	—

Diagnosis

Although these clinical and laboratory results were very indicative of acute appendicitis, an imaging study was required to verify the diagnosis as well as to rule out a possible complication, such as a perforation or abscess development. Abdominal USG, Figure 1, showed a compressible tubular structure of the right iliac fossa with a diameter of 8mm, which was typical of an inflamed appendix.

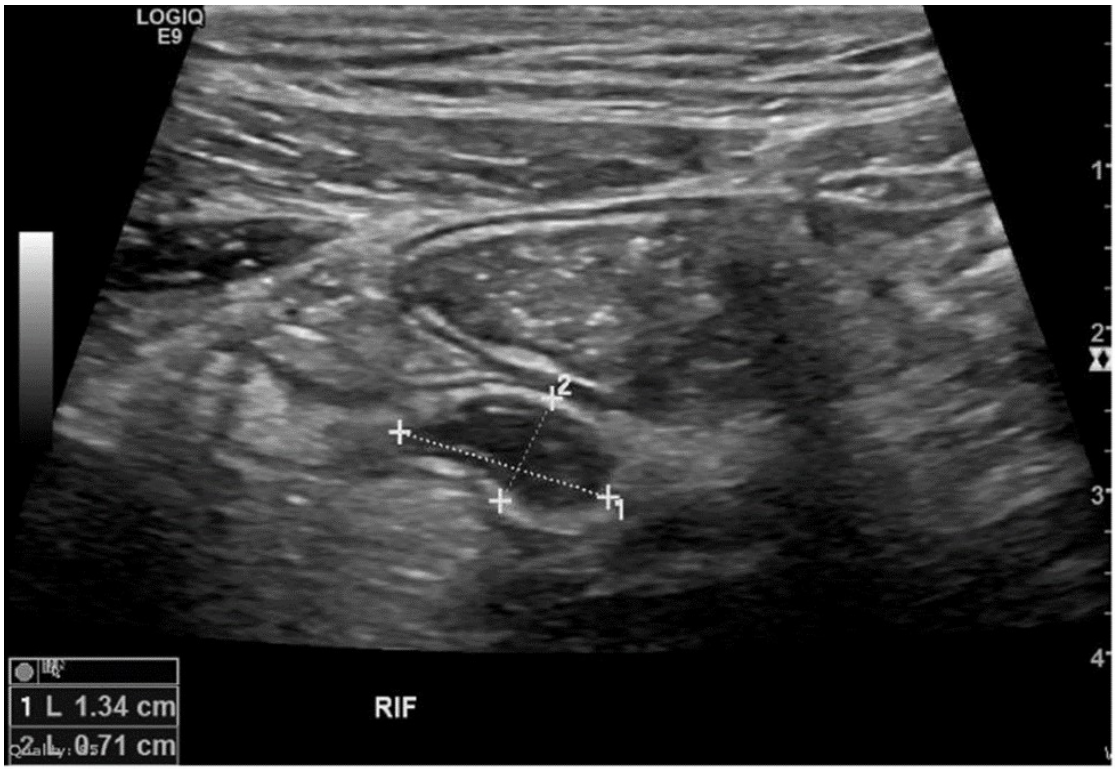

Figure 1. Ultrasound of the right iliac fossa demonstrating a non-compressible blind-ending appendix measuring ~8 mm in diameter.

To further increase the diagnosis accuracy, a CT scan was done, which proved the presence of an enlarged appendix with a thickened wall and the presence of periappendiceal fat stranding, perforation or development of an abscess.

The combination of clinical assessment, laboratory indicators, and radiographic observations made it possible to unambiguously diagnose acute uncomplicated appendicitis and give a clear explanation of the need to continue with laparoscopic appendectomy. This method is in line with the existing guidelines, which call for imaging when clinical and laboratory findings themselves are insufficient to be certain to exclude complications or atypical presentations.

Preoperative Management

After the conclusive diagnosis of acute, uncomplicated appendicitis, the patient was scheduled to undergo LA. The preoperative included withholding of food from the patient (nil per os) to minimize the chances of aspiration during anesthesia. As shown in Table 3,

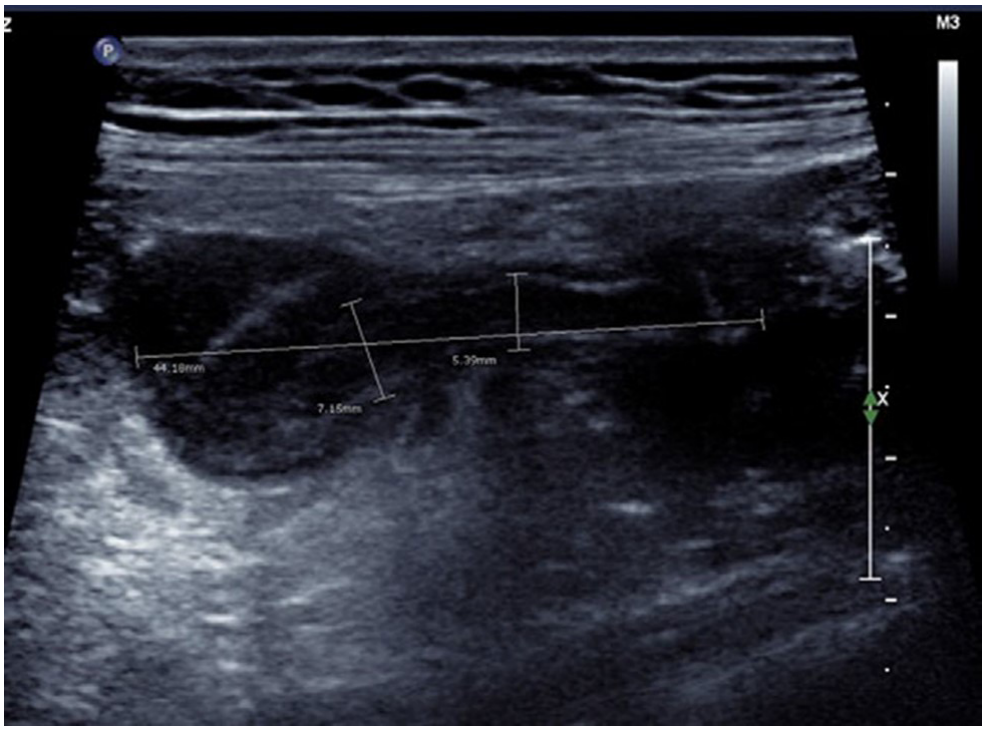

Figure 2. Axial CT abdomen showing an inflamed appendix with wall thickening

hydration was started intravenously with 1.5 L of normal saline to balance the fluids, and IV analgesia (tramadol 50 mg) was used to manage the pain. To prevent the risk of perioperative infection, prophylactic antibiotics, such as ceftriaxone 1 g IV and metronidazole 500mg IV, were given. Laboratory parameters and vital signs were observed closely, and informed consent was taken before the surgery.

Table 3. Preoperative medications and procedures administered

Medication/Procedure	Dose	Route	Purpose
IV Fluids (Normal Saline)	1.5 L	IV	Hydration
Ceftriaxone	1 g	IV	Infection Prophylaxis
Metronidazole	500 mg	IV	Anaerobic Coverage
Tramadol	50 mg	IV	Analgesia
Nil per oral	—	—	Pre-surgery protocol

Surgical Procedure and Post-Operative Care

A standard 3-port Laparoscopic appendectomy was performed under general anesthesia, lasting approximately 45 minutes. Intra-operative findings revealed an inflamed but non-perforated appendix, minimal blood loss and no pus or abscess collection. An endoloop was used to secure the base of the appendix and to divide it. The specimen was removed through the retrieval bag, and the abdominal cavity was irrigated and closed in layers.

Postoperatively, as described in Table 4, the patient received intravenous ceftriaxone and metronidazole for 2 days along with oral paracetamol and omeprazole. Oral fluids were introduced 8 hours' post-surgery, followed by a soft diet after 24 hours. Incisions were clean, no drainage, no febrile episodes and no wound infection. The patient mobilised on the first preoperative day, with no fever, wound infection or any other complications. He was discharged on the 3rd day with a five-day course of oral amoxicillin clavulanate 625 mg TID and paracetamol 500 mg TID for three days. The patient was instructed not to do heavy lifting for two weeks, maintain wound care, and to report any fever, vomiting, bloody or increasing pain. A follow-up was scheduled after 1 week.

Table 4. Post-operative Drug Administration Schedule

Medication	Dose	Route	Frequency
Ceftriaxone	1 g	IV	Every 12 hours (2 days)
Metronidazole	500 mg	IV	Every 8 hours (2 days)
Paracetamol	1 g	Oral	Every 8 hours
Omeprazole	40 mg	Oral	Once daily

Outcomes and Follow-Up

At one-week follow-up, the patient was showing good recovery with perfectly healed cuts, no pain left, a normal appetite and resumption of light physical activity. By the one-month follow-up, the patient was entirely asymptomatic, fully restored in physical activity, and had also resumed his studies at the university. In general, post-surgery recovery was without any complications and with no signs of perforation or extended hospital stay.

Discussion

Acute appendicitis is one of the frequent surgical emergencies that require early diagnosis and proper treatment (Di Saverio et al., 2020). The case illustrates the clinical significance of using laboratory tests, physical examination, and imaging in combination to get a rapid and accurate diagnosis. The recovery from early laparoscopic appendectomy was not complicated, thus proving the effectiveness of this minimally invasive procedure in uncomplicated appendicitis. The practitioners can get useful information from these findings about the multimodal diagnostic strategies and prompt surgical intervention in similar cases.

In addition, this multimodal approach is supported by Humes and Simpson (2006), who emphasis that no individual clinical or laboratory test provides sufficient diagnostic accuracy, particularly in early or atypical presentations (Humes & Simpson, 2006). Similarly, Kim et al. (2016) demonstrated that significant elevations in leukocytosis and CRP are the laboratory markers of inflammation that were observed to be a reliable indicator of complicated disease in case of their significant elevation (Kim et al., 2016). The history of the patient (migration of pain to the RLQ), focal signs (positive Rovsing and psoas), leukocytosis and elevated CRP also increased pretest probability, which implies imaging verification.

Moreover, in modern diagnostic procedures, imaging has a leading role. Meta-analyses and radiological reviews by Furukawa et al. (2005) and van Randen et al. (2011) showed that CT provides consistently high diagnostic accuracy, with its sensitivity, especially effective in identifying the presence of complications, like perforation or abscess (Furukawa et al., 2005; van Randen et al., 2011). In contrast, the results by Cho & Oh (2023) and Yu et al. (2005) show that USG offers the advantages of accessibility and absence of radiation exposure, but demonstrates operator-dependent variability in performance, with a pooled sensitivity of about 0.81 and specificity of 0.87 (Cho & Oh, 2023; Yu et al., 2005). These trends are reflected in our local experience: an initial USG showed the possibility of appendicitis (8^{-} non-compressible appendix), and a contrast CT that was used to confirm the observation and no perforation was found, which is approved by several guidelines.

Additionally, the LA has emerged as the best in terms of comparative results of surgical management. The patient reports of this study showed early recovery and had an undisrupted course after undergoing laparoscopic appendectomy that took 45 minutes, aligns with the findings of Basukala et. al., (2023), Yousaf et al., (2024), and Zhang & Wu (2022) in support of LA which shows that laparoscopic approach has less wound infection rate, shorter hospital stays and faster return to activity in comparison with open appendectomy, but longer operation time may be observed in some regions. (Basukala et al., 2023; Yousaf et al., 2024; Zhang & Wu, 2022).

Furthermore, antibiotic-based non-operative management of appendicitis is becoming an option in a few patients with uncomplicated appendicitis. The case in the current situation had unambiguous imaging and an obvious surgical suitability. CODA collaborative (2020) and de Almeida Leite et al. (2002) proved that antibiotic treatment was not inferior to surgery in terms of some outcomes, although a significant part of the population needed appendectomy within 90 days; hence, appendectomy was the evidence-based option and reached the ultimate conclusion. (Collaborative, 2020; de Almeida Leite et al., 2022).

This case was methodologically consistent with the existing diagnostic and perioperative guidelines, including a well-developed clinical assessment, ultrasonography

as the first line of imaging, and computed tomography as the last resort in case of ambiguous results. Correct resuscitation and prophylactic antibiotics were used as the preoperative management, and a temporally optimal laparoscopic intervention was implemented. Ethically, informed consent was respected, and all activities were meticulously done in line with institutional guidelines that focus on patient safety and evidence-based practice.

Besides, the case supports the evidence of other regions and the surgeries trending in that region, indicating that the imaging-guided diagnosis and laparoscopic appendectomy lead to a low level of morbidity and early post-operative recovery. Despite the fact that the inherent limitations of one case do not allow generalising the results, the study findings confirm that the current guidelines can be applied to similar low-risk adult groups (Zhang & Wu, 2022).

Overall, this case reinforces that the timely clinical assessment, supported by appropriate imaging and early laparoscopic interventions, yields optimum outcomes for acute uncomplicated appendicitis. Such an integrated diagnostic and surgical strategy aligns with contemporary evidence and reflects both national and international best practices in the management of these common surgical emergencies.

Conclusion

The case report highlights the diagnostic and therapeutic considerations for a young adult who exhibit localised pain in the right lower quadrant pain (RLQ). Although the clinical picture was subtle, the use of timely imaging and laparoscopic appendectomy helped the patient recover smoothly and with positive outcomes. The report highlights the value of a combined clinical and imaging evaluation to enhance the accuracy of diagnosis and is shown to be of critical significance in complications prevention. In addition, a lack of information regarding early identification of atypical or localised appendicitis in young adults underlines the necessity of additional research to support clinical practice.

List of Abbreviations:

Abbreviations	Full Form
RLQ	right lower quadrant
USG	ultrasonography
CT	computed tomography
LA	laparoscopic appendectomy
CRP	C-reactive protein
WBC	white blood cells
IV	Intravenous

Statements and Declarations

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Conflict of Interest: The author declares no conflict of interest.

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Ethical Approval: This case study was conducted in conformity with the principles described in the Declaration of Helsinki. Formal ethical approval was not necessary because it is a case report involving a single patient.

Data Availability Statement: All data supporting the findings of this study are available within the article.

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