

**DIAGNOSIS of SYNCHRONOUS ACUTE APPENDICITIS AND ACUTE
CHOLECYSTITIS DURING LAPAROSCOPY - A CASE REVIEW SERIES**

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ABSTRACT

Acute appendicitis and acute cholecystitis are two of the most common surgical pathologies presenting to the acute surgical service. There is a theorised association due to pathogen predilection for both the gallbladder and appendix, coupled with bacterial transfer from the gallbladder following increased cholestasis, or invasion of the portal venous system by pathological appendiceal organisms. In this case review series we present two cases of synchronous presentation of acute appendicitis and cholecystitis. We describe the clinical presentation, the investigation and management of these cases and undertake a literature review of this interesting but rarely reported dual pathology.

KEYWORDS: Acute appendicitis, acute cholecystitis, laparoscopic surgery.**INTRODUCTION**

Acute appendicitis and acute cholecystitis are two of the most common surgical pathologies presenting to the acute surgical service,^[1,2] yet only a handful of case reports have noted synchronous presentation of both pathologies.^[1-14] There is a theorised association due to pathogen predilection for both the gallbladder and appendix, coupled with bacterial transfer from the gallbladder following increased cholestasis, or invasion of the portal venous system by pathological appendiceal organisms.^[14] However, incidence may be underreported due to conservative antibiotic treatment of appendicitis masking gallbladder disease.^[14]

In this series, we present two cases from our own department and review the literature regarding this unusual dual presentation.

Case report 1

A 50-year-old male with no significant past medical or surgical history attended the emergency department with a 12-hour history of sudden-onset, severe, central abdominal pain radiating to the back and accompanying nausea and vomiting. The patient was noted to be pale, tachypnoeic, afebrile, and observed to have variation in peripheral blood pressure recorded as 106/74mmHg (left arm) and 119/69 mmHg (right arm). Resuscitation measures were undertaken including intravenous access, basic bloods, oxygen, and analgesia, and an urgent Computerised Tomography Angiogram (CTA) was requested to investigate suspected vascular pathologies such as ruptured aortic aneurysm or expanding aortic

dissection. The only notable pathology reported was a 'fluid filled but not overtly dilated' appendix (figure 1). Once stabilised the patient was transferred to the acute surgical ward.



Figure 1: CT angiogram demonstrating fluid filled appendix (circled).

At this time, basic observations had improved on FiO₂ 0.21 (O₂ saturations 97%; respiratory rate 15 breaths/minute; blood pressure 121/72mmHg; pulse 75bpm), the patient remained afebrile. Abdominal examination elicited a tender yet soft epigastrium, as well as guarding in the right iliac fossa and this was considered to be suspicious for appendicitis. Blood tests demonstrated a high white cell count of 12.2x10⁹/L, neutrophil count of 10.9x10⁹/L, C-reactive protein of 9mg/L, and ALT of 62U/L, but were otherwise normal.

Ultimately, the patient was kept nil orally and listed for laparoscopic appendectomy.

In theatre, the patient was anaesthetised, prepped, and standard laparoscopic ports were inserted. The appendix was mildly inflamed (figure 2) and an unremarkable appendectomy was completed. During saline irrigation above the liver prior to closure, the gallbladder was inspected and observed to be gangrenous and perforation (figure 3). Three additional right sided laparoscopic ports were inserted, and the gallbladder was dissected off the liver following attainment of a safe critical view. Both specimens were sent for pathology, with formal reporting confirming “1. Mild appendicitis with focal areas of eosinophilic infiltration of the appendiceal wall” and “2. Severe acute cholecystitis”. The patient received IV antibiotics that were deescalated to an oral preparation upon discharge two days post-operatively.

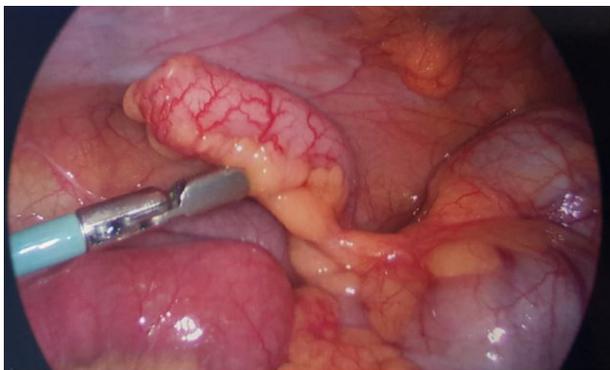


Figure 2: Intra-operative photograph of inflamed appendix.

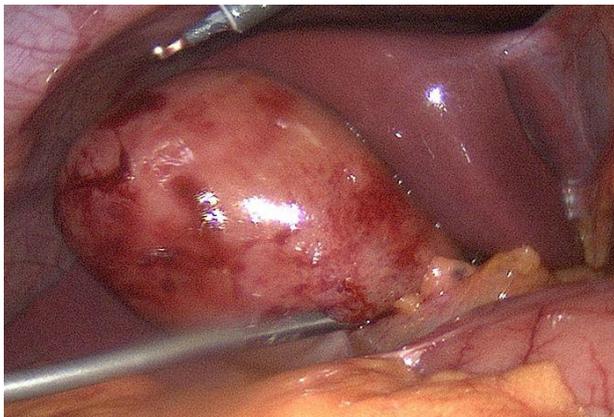


Figure 3: Intra-operative photograph of inflamed gallbladder.

Case report 2

A 21-year-old female with known reflux disease, contacted her General Practitioner (GP) due to generalised abdominal pain associated with nausea and vomiting. Due to its reported burning character, this was initially treated with an antiemetic and proton-pump inhibitor. However, five days later, the patient represented due to worsening of the pain. It had become

a constant, severe, dull ache with stabbing episodes, and was localised to the right lower quadrant. The patient had vomited bilious fluid over ten times the previous night and declined food due to nausea but had passed normal stool two days ago and menstruated a week previously. Basic observations revealed: blood pressure 167/86mmHg; respiratory rate 28; saturations 98% on room air; heart rate 102bpm; temperature 37.0°C, whilst examination confirmed a soft abdomen, with marked tenderness and guarding over the right iliac fossa on palpation and percussion. Bowel sounds were present and there was no rebound tenderness. Urine testing was positive for ketones only on dipstick, but also excluded pregnancy.

The patient was advised to attend the surgical receiving unit, which confirmed a presentation of right sided abdominal pain clinically suspicious for acute appendicitis. Initial bloods results supported this diagnosis, demonstrating raised inflammatory markers (C-reactive protein=120mg/L; white cell count=16.0 $\times 10^9/L$; neutrophil count=14.0 $\times 10^9/L$), but normal creatinine and urea, liver function, calcium, and amylase testing. Similarly, erect chest and abdominal radiographs reported, “no subdiaphragmatic free gas”, and “non-specific bowel gas pattern” respectively excluding perforation and obstruction as differential diagnoses. As such, the patient was listed for diagnostic laparoscopy \pm appendectomy \pm proceed the following day.

Standard preparation including WHO check list was completed, and laparoscopic ports (2x11mm, 3x5mm) were inserted. Initial inspection therein demonstrated “1. Serous fluid, 2. Mildly congested appendix 3. Normal ovaries 4. Thick-walled distended gallbladder.” An unremarkable appendectomy and cholecystectomy were completed, with specimens sent for analysis. The patient made an unremarkable recovery with a 7-day course of antibiotics, including discharge on day two post-operatively with regular analgesia, and an antiemetic. When returned, the final pathology report confirmed: “1. Appearances compatible with early acute appendicitis 2. Acute cholecystitis”.

DISCUSSION

The authors believe that this short case series reports the first documented instance of multiple cases of synchronous cholecystitis and appendicitis presenting to a single centre. Despite acute cholecystitis and acute appendicitis representing two of the most common presentations to the surgical receiving unit,^[6] such presentations of this dual-pathology remain rare.

Table 1 presents a summary of the literature identified following MEDLINE search using the terms ‘cholecystitis AND appendicitis’ and subsequent review of references.

Table 1: Summary of cases reporting synchronous Appendicitis and Cholecystitis.

<i>Case Report</i>	<i>Patient</i>	<i>Presentation</i>	<i>Diagnostic Modality</i>	<i>Management</i>
Al-Nabulsi(2021) ^[3]	62M	Right-sided abdominal pain	CT Abdomen-Pelvis	Laparoscopic cholecystectomy & appendectomy
Black (1977) ^[4]	76F	Right-sided abdominal pain	Clinical	Laparotomy
DeMuro (2012) ^[5]	45F	Right-sided abdominal pain	CT Abdomen-Pelvis	Laparoscopic cholecystectomy & appendectomy
Gandhi et al (2015) ^[6]	67F	Generalised abdominal pain	CT Abdomen-Pelvis	Laparoscopic cholecystectomy & appendectomy
Grimes (1996) ^[7]	36F	Unknown	Unknown	Open cholecystectomy & appendectomy
Joseph <i>et al</i> (2020) ^[8]	13M	RUQ pain & diarrhoea	Clinical	Laparoscopic cholecystectomy & appendectomy
Lee <i>et al</i> (2014) ^[9]	78M	Generalised abdominal pain	CT Abdomen-Pelvis	Percutaneous cholecystostomy and intravenous antibiotics
Lew et al (2021) ^[10]	36F	Peri-umbilical pain	Abdominal Ultrasound	Laparoscopic cholecystectomy & appendectomy
Padrón-Arredondo (2016) ^[11]	43F	RUQ pain	Abdominal Ultrasound	Open cholecystectomy & appendectomy
Sahebally et al (2011) ^[12]	23M	RUQ pain	Abdominal Ultrasound	Laparoscopic cholecystectomy & appendectomy
Salih (2016) ^[13]	66F	Right-sided abdominal pain	Abdominal Ultrasound	Laparoscopic cholecystectomy & open appendectomy
Sedik et al (2018) ^[1]	35F	RUQ pain	CT Abdomen-Pelvis	Laparoscopic cholecystectomy & appendectomy
Shweiki et al (2016) ^[14]	29F	Right-sided abdominal pain	CT Abdomen-Pelvis	Laparoscopic cholecystectomy & appendectomy
Victory <i>et al</i> (2017) ^[2]	40M	Right-sided abdominal pain	CT Abdomen-Pelvis	Laparoscopic cholecystectomy & appendectomy
Abbreviations: CT – Computed Tomography; M – Male; F – Female; RUQ – Right upper quadrant				

The above literature search noted 14 cases of synchronous appendicitis and cholecystitis, occurring with a 9:5 female to male predominance. The observed age range (13-78 years) encompasses paediatric to geriatric presentations, with a mean age of 46.3-years that, whilst similar to that for acute cholecystitis,^[15] is greater than those undergoing primary appendicectomy who are typically less than 30 years old.^[3,16] The female predominance is likewise comparable to the epidemiology of cholecystitis.^[15]

The significance attributed to so few cases should not be overstated, but such trends suggest that, if physiologically linked, cholecystitis is a primary pathology; contrary to a previous hypothesis that dual-pathology occurs secondary to bacterial translocation from a gangrenous appendix to the gallbladder.^[6,17] Indeed, neither of our reported cases document a

gangrenous appendix. However, it also remains possible that such female prevalence represents a publication bias in dual-pathology reporting as two of these case reports are notable due to their occurrence during pregnancy (7 and 10). As further cases are reported, understanding of epidemiology and pathology is anticipated to develop.

The presentation of concurrent appendicitis and cholecystitis is varied, including generalised, right sided, or right upper quadrant abdominal pains.^[17] This is to be expected as a combination of right upper quadrant pain typical of gallbladder pathology, and peri-umbilical pain migrating to the right lower quadrant that is an 80% sensitive and specific feature of acute appendicitis.^[18] Fever and raised inflammatory markers occur in both pathologies.^[19,20] but both may present unusually. Indeed, 20-30% of acute appendicitis patients have been seen to present atypically,^[21] and in our first reported

case, neither were appendicitis or cholecystitis clinically suspected until imaging and blood results were returned.

Clinical diagnosis of acute appendicitis is made frequently, and abdominal ultrasound has been evaluated as highly sensitive for detection of gallstones without risk of radiation.^[22] However, CT-abdomen and pelvis is considered the optimal imaging modality in presentations of acute abdominal pain, with 90-96% diagnostic accuracy in non-pregnant adults^[6] This is the most common diagnostic imaging modality used within the literature. Nevertheless, *Case 1* highlights that diagnoses can still be missed, and may occur more frequently when diagnosed pathology is spatially separate to the clinical question asked. Similarly, in *case 2*, formal diagnosis of both pathologies was only made at time of surgery, and as such we would recommend that during laparoscopy, both the gall bladder and appendix are routinely inspected to exclude synchronous pathology.

Management of appendicitis and cholecystitis has been achieved conservatively with percutaneous drainage and IV antibiotics^[9] but a laparoscopic surgical approach is more commonly undertaken. A five-port approach was previously proposed by DeMuro and colleagues to complete laparoscopic appendectomy and cholecystectomy in the same procedure.^[5] This was successfully implemented in both of our reported cases.

CONCLUSION

Concurrent appendicitis and cholecystitis is a rare differential diagnosis in presentations of abdominal pain. To aid diagnosis, suspicion for this dual diagnosis should be present, particularly in atypical cases of abdominal pain. The authors would advocate routine inspection of the entire abdomen during all laparoscopic surgeries, so that such diagnoses are not missed, despite the accuracy of CT imaging.

Grant

None.

CONFLICTS OF INTEREST

We the authors of this case series have no conflicts of interest to declare.

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