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Metastatic gastric adenocarcinoma and synchronous carcinoid tumour mimicking appendicitis: A case report

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ABSTRACT

INTRODUCTION: Silent metastatic gastric adenocarcinoma presenting as appendicitis is very rare. Rare pathologies may be encountered during common operations such as appendicectomy and an awareness of possible alternative pathological entities would be helpful in a surgeon's wealth of knowledge.
PRESENTATION OF CASE: A 63-year-old man presented with a three-day history of acute abdominal pain suggestive of appendicitis. Intra-operatively, a macroscopically inflamed and perforated appendix was found. There were however some atypical features, which included multiple inflamed ulcerated lesions throughout the small bowel mesentery and along the terminal ileum. Appendicectomy was performed and biopsies of these lesions were taken. Subsequent histopathology revealed that there were metastatic deposits of poorly differentiated adenocarcinoma in the appendix and mesenteric biopsies, as well as a neuroendocrine (carcinoid) tumour of the appendix. Upper endoscopy confirmed a gastric primary leading to peritoneal dissemination. The patient was scheduled to undergo a course of palliative chemotherapy.
DISCUSSION: Metastatic gastric adenocarcinomas with peritoneal dissemination have a very poor prognosis and often the first choice of treatment is chemotherapy as a complete cure through surgery is often not feasible. As for classical carcinoid tumours smaller than 2 cm towards the tip of the appendix with low proliferative index and without angiolymphatic or mesoappendiceal extension, then appendicectomy alone is indicated. Synchronous neoplastic pathologies presenting as appendicitis is largely unknown.
CONCLUSION: To our knowledge, this is the first report in the literature of synchronous carcinoid tumour and metastatic gastric cancer co-existing within an inflamed appendix.

1. Introduction

It is widely accepted that acute appendicitis is the most common presentation of the acute abdomen worldwide, and the current standard of care is surgical removal once it is diagnosed, either clinically or radiologically [1–3]. Although alternative diagnoses are commonly found during surgery for suspected appendicitis, surgeons may pre-operatively anticipate such diagnoses and be able to deal with them based on individual experiences and accepted level of care [3]. Rare pathologies may be encountered and an awareness of possible alternative pathological entities would be helpful in a surgeon's wealth of knowledge. Reported here, in line with the SCARE criteria [4], is a case of a metastatic gastric adenocarcinoma (MGA) diffusely involving the peritoneum and the appendix, as well as a neuroendocrine tumour found within the appendicectomy specimen.

2. Case presentation

A 63-year-old male presented to the emergency department with a three-day history of acute abdominal pain. His medical co-morbidities included ischaemic heart disease with a previous myocardial infarction, hypertension, dyslipidaemia, and cholecystectomy. He was opening his bowels and passing flatus. He was nauseous but there had been no vomiting. On presentation, he was apyrexial and had a slight tachycardia but was not hypotensive. The abdomen was not distended; however he had tenderness in the lower quadrants with some localised guarding in the right iliac fossa.

His white cell count was elevated at 14,200 and he was mildly acidotic on his arterial blood gases. Cardiac investigations performed in the emergency department excluded myocardial ischaemia. An abdominal computed tomography (CT) scan reported that the appendix was not dilated however there were adjacent fat

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Fig. 1. Intraoperative photograph showing multiple ulcerative lesions in the small bowel mesentery characterising peritoneal dissemination.

stranding, suggesting secondary features of inflammation (Fig. 1). The stomach thickening on CT was attributed to non-distension initially. The other abnormality reported at the time was a possible localised loop of dilated small bowel with no definitive transition points, and the possible differentials were closed loop small bowel obstruction or a sentinel loop secondary to another inflammatory process.

In view of this clinical picture, a decision was made to perform a diagnostic laparoscopy. Upon peritoneal survey, there were purulent fluid in the paracolic gutters, adhesions and severe inflammation associated with an inflamed appendix which has now perforated. A decision was made to convert to a midline laparotomy for better operative access. Once the purulent fluid was washed out and sent for microscopy and culture, multiple ulcerative lesions throughout the small bowel mesentery and the terminal ileum were noted (Fig. 1). The rest of the large bowel was inspected and small bowel run performed but there was no evidence of obstruction or perforation. The stomach was slightly thickened but no tumour was evident on the serosal surface. Standard appendicectomy was performed and the ulcerative lesions of the small bowel mesentery were biopsied. After thorough peritoneal lavage, two silicone surgical drains were placed within the abdomen. After recovery the patient was monitored in the intensive care unit where he recovered without complication, and to eventual discharge.

Given the thickened stomach, the CT images were rediscussed with the radiological team which suggested that such diffuse gastric wall thickening (Figs. 2 and 3), could resemble the appearance of *linitis plastica*. An upper gastrointestinal endoscopy revealed a flat lesion in the upper body of the stomach. Colonoscopy was also performed but was non-contributory.

Pathology reports confirmed that the appendix was inflamed, consistent with clinical findings of perforated appendicitis. But there were also multiple serosal and subserosal deposits of metastatic poorly differentiated adenocarcinoma, as well as a 2 mm carcinoid tumour (Neuroendocrine Tumour Grade 1) confined to the submucosa of the appendiceal tip. The mesenteric biopsies and fluid from the abdomen revealed deposits of poorly differentiated adenocarcinoma. Gastric biopsy confirmed the likely primary source being gastric adenocarcinoma with signet-ring cell morphology. From these findings, it was concluded that the pathology was in keeping with transcoelemic spread of a gastric cancer leading to peritoneal dissemination.

This patient was referred to the oncology unit, and scheduled to undergo a course of chemotherapy.

3. Discussion

Metastatic cancer to the vermiform appendix presenting as acute appendicitis is rare, with few available case reports in the literature [5–8]. A higher clinical suspicion may be raised in oncology patients [7,8]. Secondary metastatic appendiceal cancers comprise less than 0.02% according to a review of 8699 appendicectomy specimens by Yoon et al. [9]. The most common sources of metastases to the appendix are the breasts, but other various sources of origin include the urogenital tract, the gastrointestinal tract and the lungs [9,10]. In the author's previous retrospective review of 1347 appendicectomy specimens, there were only 20 (1.4%) primary tumours presenting as appendicitis, with no findings of secondary tumours [3].

Gastric adenocarcinoma, particularly signet-ring cell type, tends to metastasise intra-abdominally via several mechanisms. It can directly invade into local structures such as pancreas, colon and spleen. However, direct seeding across cavities (transcoelomic spread) may lead to the formation of Krukenberg's ovarian tumours for instance, but more commonly this causes peritoneal dissemination which has a very poor prognosis of 2% at 5 years [11]. Currently, chemotherapy has been the first line of treatment for metastatic gastric cancer with peritoneal dissemination because a complete cure through surgery is difficult [11]. Haematogenously, gastric cancer often spread to the liver. Lymphatic pattern of distribution can present as Virchow's node (left supraclavicular lymphadenopathy), Irish node (left axillary node) and Sister Mary Joseph node (peri-umbilical nodule) [12]. Extra-abdominally, gastric cancer favours the lungs [5,13].

Fig. 2. Initial CT scan of the abdomen on presentation. Green arrow demonstrates appendix with fat stranding.

Gastric cancer metastasising to the appendix is particularly rare; the risk of involving the appendix and progression to presentation as acute appendicitis is largely unknown, with only a few case reports available in the literature [5,7,14]. Although it can be variable, a typical radiological feature of diffuse gastric cancer is the 'leather-bottle' appearance or *linitis plastica* [15]. In this patient, such appearance was mistaken for a non-distended stomach which can be quite similar in subtle cases. Even though it has little bearing on the management and final outcome for this patient, awareness of such similarities would be valuable in many circumstances. This also highlights that intraperitoneal survey during appendectomy is a good clinical practice that may discover other synchronous pathologies.

However, the unique feature of this patient with metastatic gastric adenocarcinoma of the appendix is a co-existing synchronous neuroendocrine carcinoma which was 2 mm in size and of low grade. To this date, no other studies in the literature, to the authors' knowledge, have reported identical concurrent pathologies. There have been isolated reports in the literature of synchronous carcinomas in the appendix, with one report describing two independent carcinoid and mucinous neoplasms that have arisen within the appendix [16]. However, it is exceptionally rare to find synchronous carcinomas in the appendix, either metastatic or primary. It is well known that carcinoid tumours of the appendix can cause appendicitis, but most are found incidentally [17,18]. It is thought that only when the tumour grows to a size large enough to obstruct the appendiceal lumen, that it will lead to clinically significant symptoms and signs [16,18]. The current treatment of choice for appendiceal neuroendocrine tumours greater than 2 cm in diameter is a right hemicolectomy. For classical carcinoid tumours smaller than 2 cm towards the tip of the appendix with low proliferative index and without angiolymphatic or mesoappendiceal extension then appendicectomy alone is recommended [18]. Given the small size of the carcinoid tumour in this case, it is unlikely that it would

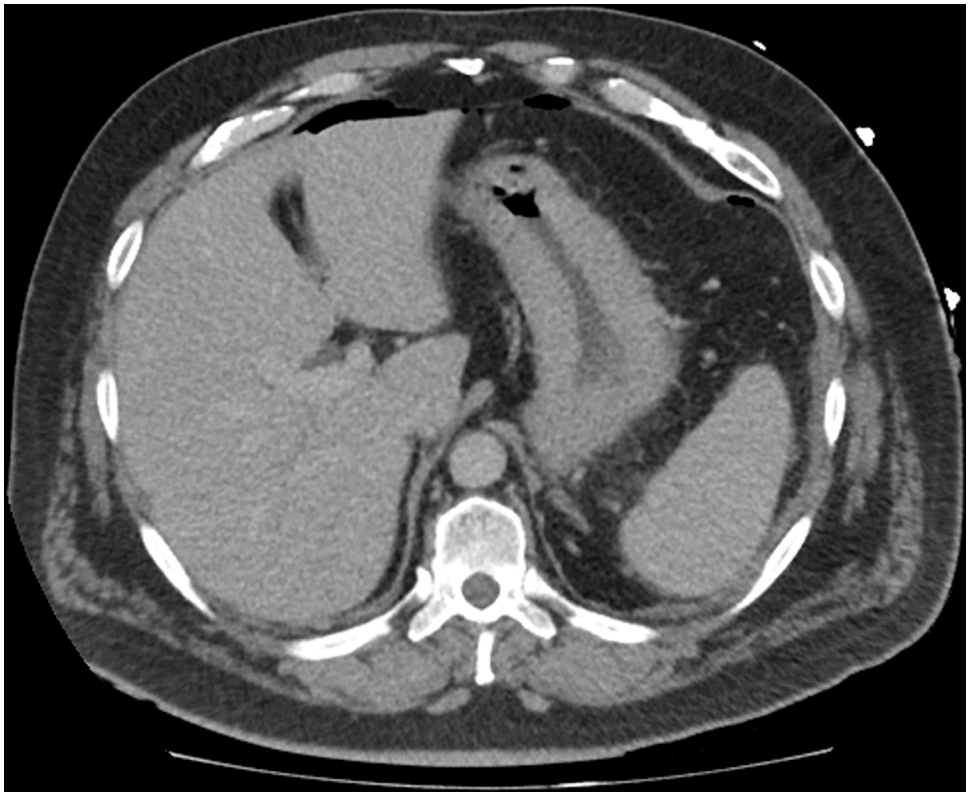

Fig. 3. Diffuse gastric wall thickening on CT.

have led to the patient's presentation. In those with secondary tumours of the appendix, appendicectomy has not been reported to improve survival [5,9].

4. Conlcusion

Metastatic gastric adenocarcinomas have a very poor prognosis and very few have involved the appendix and presented as acute appendicitis. To date there has been no other reports of metastatic gastric cancer and a synchronous carcinoid tumour coexisting within an inflamed appendix. Subtle cases of gastric cancer in the form of *linitis plastica* can sometimes be mistaken for a non-distended stomach on CT and this case highlights the importance of thorough peritoneal survey during appendicectomy as it can often discover synchronous pathologies. An awareness of rare presentations will not only broaden a surgeon's wealth of knowledge but also encourages greater vigilance.

Conflicts of interest

None.

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None.

Ethical approval

Ethical approval is exempted for case reports at Caboolture Hospital and QLD Health Hospitals.

Consent

Written and signed informed consent is obtained for this patient.

Author contribution

Quoc Tran contributed to data collection, data analysis and writing. Ryo Mizumoto contributed to data acquisition, revising critically for important intellectual content and final approval prior to submission. Dr Sujith Ratnayake contributed to case conception, revising for important intellectual content and final approval of report. Dr Boris Strekozov contributed to the editing of intellectual content, supervising surgeon.

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