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Title:
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Date:
2022-04-01

Citation:
Cox, D. R. A., Tosif, S., Weinberg, L. & Muralidharan, V. (2022). An unusual cause of enteric pneumatosis. ANZ Journal of Surgery, 92 (4), pp.897-899. https://doi.org/10.1111/ans.17185.

Persistent Link:
https://hdl.handle.net/11343/299003

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Images for Surgeons

An unusual cause of enteric pneumatosis

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Word Count: 630 words, Figures: 3

INFORMED CONSENT STATEMENT

Informed consent was obtained from the patient for the publication of this report and the accompanying images.

FUNDING/FINANCIAL SUPPORT

There is no relevant funding or financial support to disclose for this work.

This is the author manuscript accepted for publication and has undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process, which may lead to differences between this version and the Version of Record. Please cite this article as doi: 10.1111/ans.17185

MAIN TEXT

A 62-year-old man presented with jaundice due to a borderline-resectable duodenal tumour, obstructing the second and third parts of the duodenum (**Figure 1**). His medical history included obesity and obstructive sleep apnoea (OSA), with no prior abdominal surgery. Following failed ERCP and percutaneous transhepatic biliary drainage (PTBD), he underwent an uneventful open gastrojejunostomy with Roux-en-Y hepaticojejunostomy (double-bypass). A feeding jejunostomy tube was inserted distal to the enteroenterostomy (using a Witzel tunnel technique) for nutritional supplementation during planned future neoadjuvant chemotherapy.

Feeding via the jejunostomy commenced in the immediate postoperative period. He resumed oral fluids on day one, nursing staff noted the patient's unusual manner of 'gulping' large volumes of air while drinking. A nasogastric tube was left in-situ, capped and intermittently aspirated to monitor for post-obstructive delayed gastric emptying. On day three, a CT scan demonstrated passage of oral contrast via the gastroenterostomy. Nocturnal continuous-positive-airway-pressure (CPAP) for OSA was recommenced that evening, on medical advice, following recent non-compliance.

The next morning, the patient complained of abdominal pain and became grossly distended. Following clinical assessment, a CT abdomen was arranged which showed severe distension of the stomach and small bowel, with extensive pneumatosis in the small bowel and its mesentery (**Figure 2**).

At re-look laparotomy, there was gaseous distension throughout the gastrointestinal tract without any evidence of mechanical obstruction. The stomach and small bowel were distended but appeared healthy and well perfused. There were no signs of leakage from the feeding jejunostomy tube, which remained appropriately positioned. However, significant

surgical emphysema was palpable in the wall of the small bowel and its mesentery distal to the entry of the jejunostomy tube. The degree of pneumatosis was noted to significantly decrease as the small bowel was inspected proximally, away from the feeding jejunostomy site towards the gastroenterostomy, which itself appeared intact and healthy. The feeding jejunostomy tube was consequently removed and small bowel decompressed prior to closure of the entry site. The patient subsequently had an uncomplicated recovery.

Aerophagia describes the pathological swallowing of air leading to abdominal distension, pain, constipation and excessive belching.[1] The underlying cause is unclear but may relate to the perception of an unpleasant stimulus (e.g. in gastroesophageal reflux) or behavioural issues.[2] Severe gastric and enteric distension caused by aerophagia may imitate bowel obstruction, leading to a negative exploratory laparotomy in 30% of aerophagia cases in one series.[2] Non-invasive ventilatory techniques, such as CPAP, are known to exacerbate aerophagia and can result in gastric insufflation in up to 40% of patients, with subsequent reports of gastric perforation, abdominal compartment syndrome and even death.[3]

In this case, reintroduction of CPAP likely exacerbated the patient's underlying aerophagia. Dissociation of the mural layers in a segment of small bowel, as a result of the enterostomy used for the feeding jejunostomy tube, allowed air in the distended gastrointestinal tract to dissect the subserosal plane, presenting as pneumatosis on imaging. Intraoperatively, the air was milked from this plane and the enterostomy was closed, which resolved the issue (**Figure 3**).

The time-line of events in this case clearly indicates that the re-introduction of CPAP was a major component leading to the unusual clinical and radiological findings described. Non-invasive ventilatory techniques (such as CPAP) are commonly applied in peri-operative care and the case described therefore underlines their potential as a source of complications, particularly in foregut surgery.

However, whilst the non-invasive ventilation provided the means for significant gastrointestinal gaseous insufflation, the degree to which it occurred in this case (sufficient to cause air dissection of the bowel wall) was only likely possible as it was facilitated by the patient's underlying aerophagia. These two conditions coalesced to lead to the extensive pneumatosis described.

This case presents an unusual cause of enteric pneumatosis and highlights the underappreciated condition of aerophagia, a convincing mimic of acute intestinal obstruction.

DISCLOSURE STATEMENT

The authors declare that they have no conflicts of interest.

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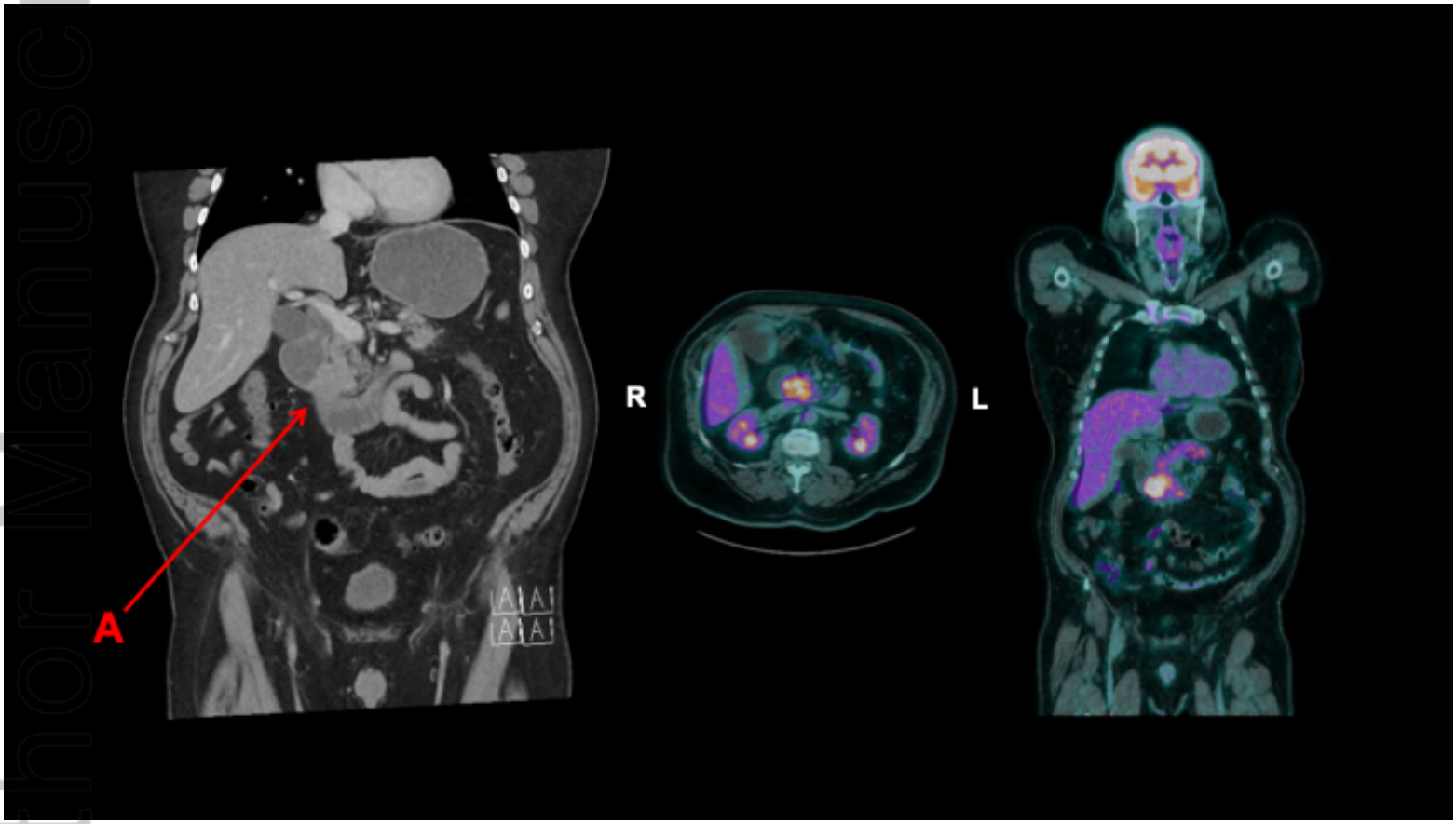
FIGURE LEGENDS

Figure 1. Pre-operative imaging: CT abdomen and pelvis with IV contrast [portal venous phase] (*left*) and images with overlaid fluorodeoxyglucose positron emission tomography (PET) (*right*). The metabolically active neoplasm shows increased uptake on PET and is indicated on contrast CT (**A**).

Figure 2. Post-operative CT images with IV contrast [portal venous phase]; extensive mesenteric gas (**A**) and enteric pneumatosis (**B**) are shown. The position of the feeding jejunostomy tube is indicated (**C**).

Figure 3. Axial (**A**), coronal (**B**) and sagittal (**C**) CT images three days following relook laparotomy and removal of the jejunal feeding tube. The imaging shows complete resolution of the enteric and mesenteric pneumatosis. Sparse extraluminal locules of gas (arrows) and inflammatory changes in the small bowel mesentery represent post-operative changes.



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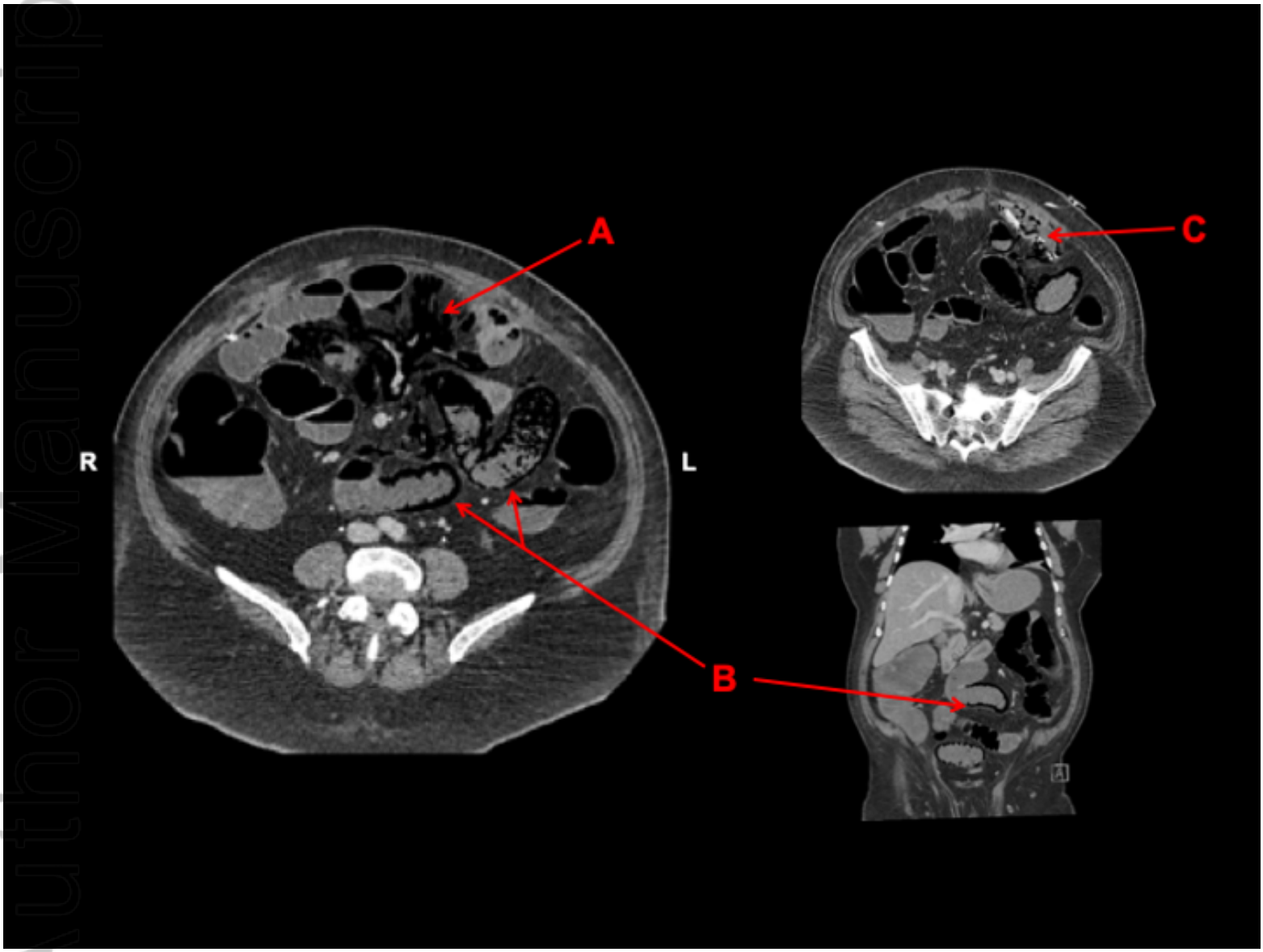

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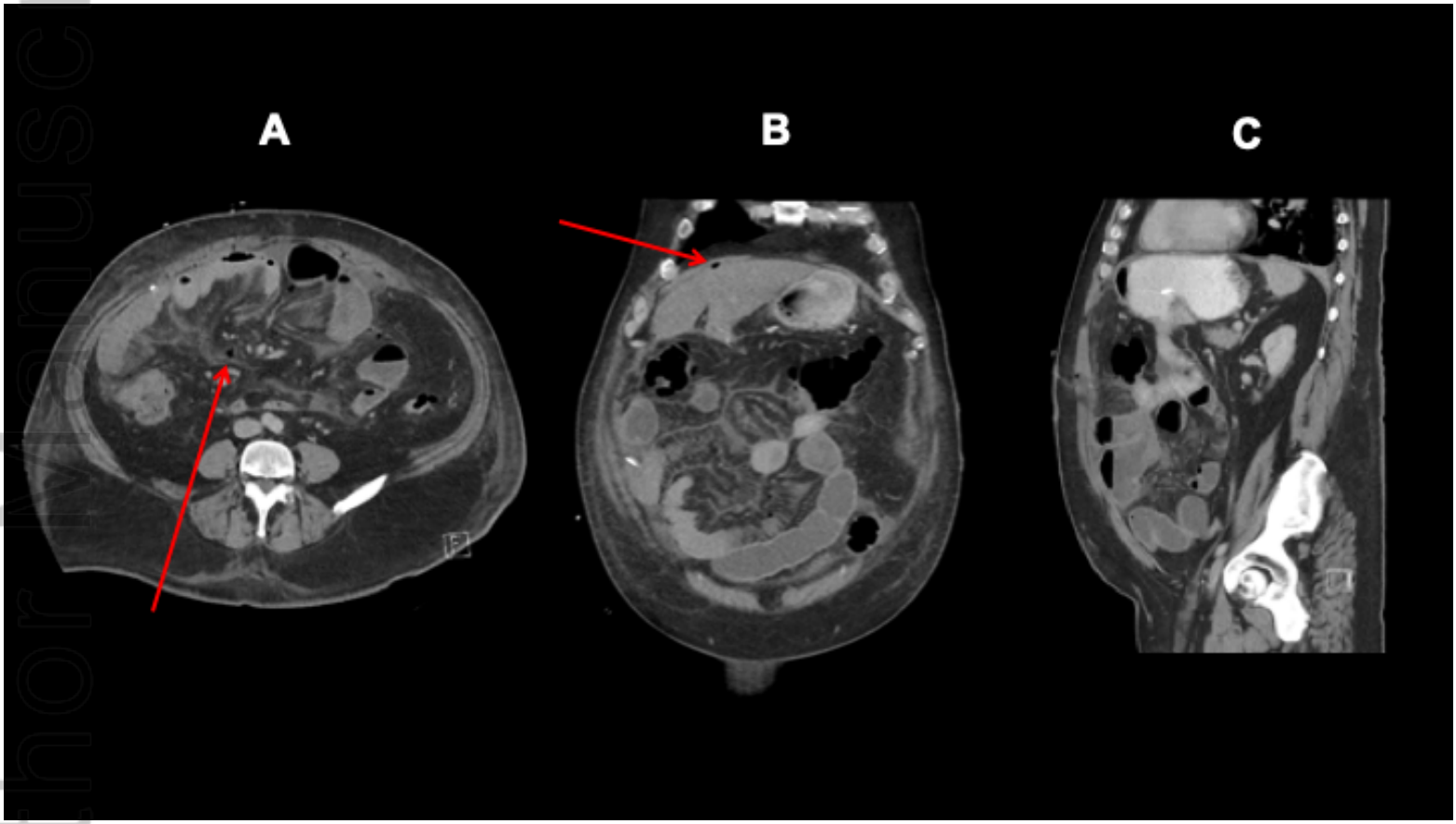

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