

Beware the distended appendix: technical adaptations to an appendicectomy when an appendiceal neoplasm is suspected

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Introduction

An acute appendiceal neoplasm is a rare but important differential of acute appendicitis. Most non-invasive epithelial appendiceal neoplasms are low-grade appendiceal mucinous neoplasms (Bosman et al, 2010) and those without extra-appendiceal involvement can be managed with appendicectomy alone (Glasgow et al, 2019). However, it is vital to take precautions to avoid the spread of malignant tissue into the abdomen, including having a low threshold to convert to an open approach. This article reports a case of a low-grade appendiceal mucinous neoplasm and novel adaptations used to minimise the risks of malignant contamination during laparoscopic appendicectomy. The authors suggest that these adaptations be adopted as standard practice.

Case report

A 50-year-old man (World Health Organization performance status 0) was admitted on the surgical take with a 1-day history of periumbilical pain migrating to the right iliac fossa with associated nausea and low-grade fever. Clinical assessment findings were consistent with acute appendicitis, with tenderness and a palpable fullness in the right iliac fossa. Initial investigations showed raised levels of inflammatory markers with a neutrophil count of 8.14×10^9 /litre and a C-reactive protein level of 23 mg/litre.

Given the patient's age and clinical presentation, a contrast-enhanced computed tomography examination of the abdomen and pelvis was performed as per national guidance (Royal College of Surgeons and Association of Surgeons of Great Britain and Ireland, 2014). This showed a grossly distended appendix measuring approximately 7.9 cm x 4.0 cm x 4.2 cm, containing fluid attenuation material with surrounding inflammatory changes. There was no evidence of perforation or peritoneal inflammation. The computed tomography images were suggestive of an appendiceal mucocoele with features of inflammation (Figure 1).

Management options were discussed with the patient and a shared decision was made to proceed with a laparoscopic appendicectomy, while acknowledging the possibility of conversion to open and/or a right hemicolectomy if necessary. The intraoperative findings were consistent with the imaging. There was an inflamed mucocoele with a necrotic body and tip, measuring 10.0 cm x 4.5 cm x 3.7 cm. The base of the appendix appeared healthy (Figure 2). The procedure was completed laparoscopically without injury to the appendix or spillage of contents. The patient recovered well and was discharged home after 2 days on a 7-day course of oral co-amoxiclav.

Histology revealed a dilated appendix with transmural necrosis and abundant intraluminal mucin. However, the exact histological diagnosis was unclear. Following a multidisciplinary review, a specialist histological opinion was sought from the Peritoneal Malignancy Institute, Basingstoke. The review reported a markedly dilated appendix with widespread necrosis associated with severe congestion, possibly suggestive of infarction secondary to torsion of the appendix. Histological assessment was difficult in view of these features, but the presence of hyaline fibrosis, areas of wall thinning and some columnar/cuboidal cells led to a diagnosis of low-grade, pTis, appendiceal mucinous neoplasm. pTis (pathologic tumour stage) classification signifies cellular changes or mucin confined to the muscularis propria, without extra-appendiceal spread. The patient will undergo routine follow up with imaging, tumour markers and outpatient review at 1, 3, 5 and 10 years postoperatively.

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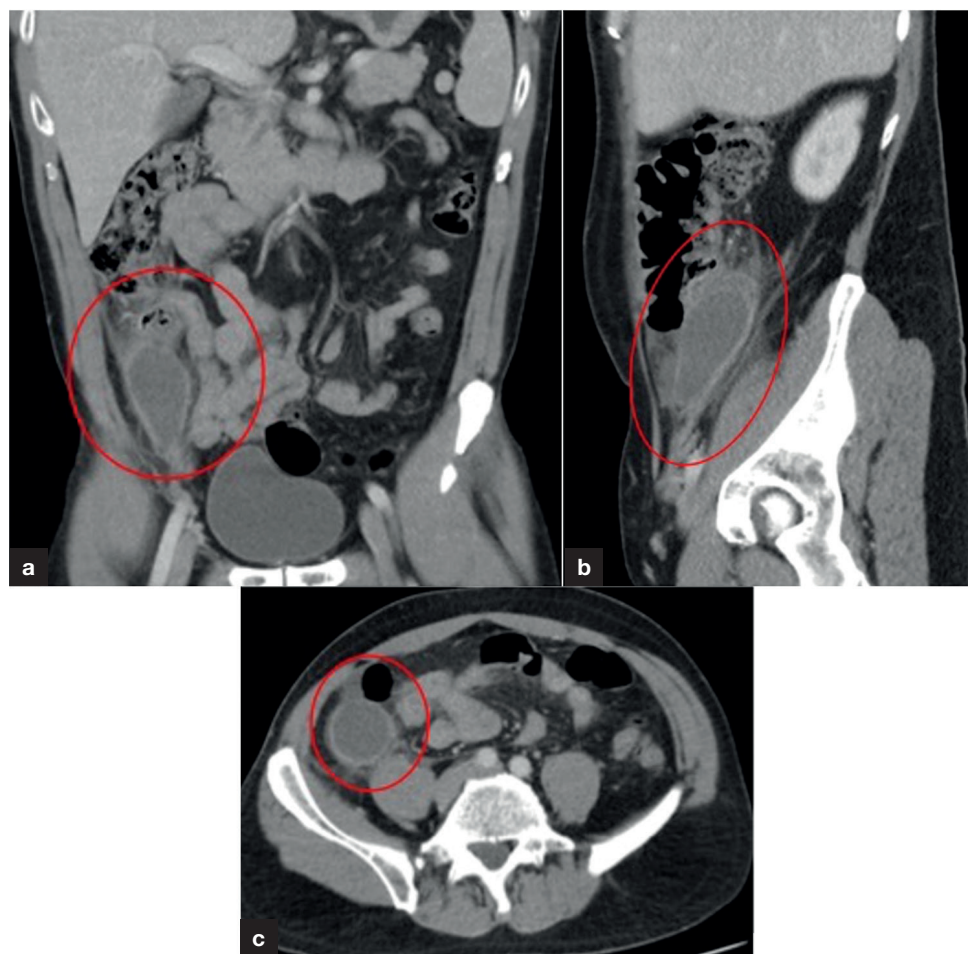


Figure 1. Computed tomography images. a. Coronal section. b. Sagittal section. c. Axial section. Circled areas showing a grossly dilated appendix with surrounding inflammatory changes.



Figure 2. Intraoperative finding of markedly dilated, necrotic appendix with no macroscopic evidence of perforation.

Discussion

The authors briefed the operating team regarding the possibility of an appendicular neoplasm, the specific equipment and procedural requirements for this case.

The initial stages were undertaken as a conventional laparoscopic appendicectomy, with port placements in the infra-umbilical, left iliac fossa and suprapubic regions. Particular consideration was given to the umbilical port site in anticipation of a possible extension being required to retrieve the specimen safely: a vertical, infra-umbilical incision was made, through which a 10 mm port was sited using the Hasson technique. The usual 5 mm left iliac fossa port was substituted with a 10 mm port to allow a laparoscopic linear stapling device through this port. A 5 mm suprapubic port was used.

Owing to the degree of distension, the appendix wall was particularly friable. Initial dissection was performed cautiously to avoid perforation while freeing the appendix from the abdominal wall and bowel loops to which it was adherent.

Standard practice in the authors' unit is to cauterise the appendiceal artery using hook diathermy and apply endoloops to the base of the appendix. However, with appendiceal mucocoeles, the risk of inadvertent injury to the appendix with diathermy is not acceptable and the possibility of a malpositioned endoloop increases the risk of spillage during removal. Additionally, using endoloops in this case would have been challenging because of the degree of appendiceal distension. Instead, an Endopath ETS-Flex 45 articulating endoscopic linear cutter was used to create a 45 mm, clean and reliable staple line at the base of the appendix.

The specimen was retrieved with a non-detachable endo pouch tissue retrieval system to avoid spillage and/or perforation. The midline port site incision was also extended by 5 cm. The authors recommend a lower threshold for extension of the incision when retrieving the specimen in these cases.

The authors suggest that these technical adaptations be used in cases where low-grade appendiceal mucinous neoplasms are suspected, clinically, radiologically or intraoperatively, with no evidence of extra-appendicular involvement or perforation. To avoid dissemination of a potentially contained malignancy, the authors advise maintaining a low threshold in implementing this operative technique (Table 1) when diagnoses are uncertain, to allow safe management.

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Table 1. Suggested modifications to appendicectomy technique in the context of suspected low-grade appendiceal mucinous neoplasm

	Standard practice in acute appendicitis	Suggested practice with possibility of low-grade appendiceal mucinous neoplasm
Team brief	Standard equipment for laparoscopic appendicectomy	Note the possibility of malignancy therefore additional focus on minimising contamination
Umbilical port	Horizontal or vertical incision, infra- or supra-umbilical: cosmesis and surgeon preference	Vertical infra-umbilical incision
Other ports	2x5 mm ports, suprapubic and left iliac fossa	5 mm suprapubic port, 10 mm left iliac fossa port
Appendicectomy	Hook diathermy, endoloops	Endopath ETS-Flex 45 articulating endoscopic linear cutter with 45mm reload cartridge
Retrieval of appendix	Bert laparoscopic retrieval bag	Endo pouch tissue retrieval system (10 x 16 cm; volume 255 ml) Generous initial incision, low threshold for extension of incision

Learning points

- Suspected low-grade appendiceal neoplasm can be safely managed with laparoscopic appendectomy.
- Surgical technique should be adapted when there is clinical, radiological or intraoperative suggestion of low-grade appendiceal mucinous neoplasm without extra-appendiceal involvement.
- A low threshold to adopt these surgical adaptations is suggested when the diagnosis is uncertain to maintain safe surgical management and avoid dissemination of contained malignancy.

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