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Case Report

Surgery Section

Low-grade Appendiceal Mucinous Neoplasm in a Middle-aged Female: A Case Report

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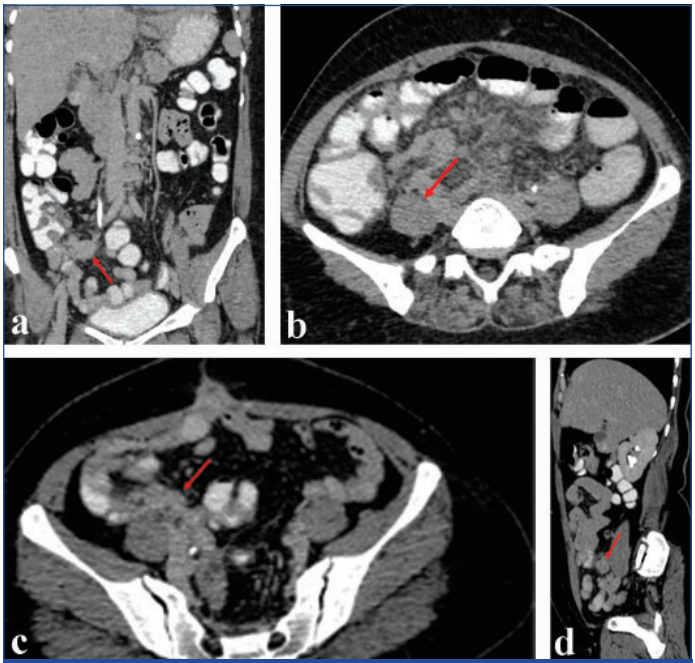
ABSTRACT

Mucinous Appendiceal Neoplasms (MANs) are rare tumours where more than 50% of the tumour volume is composed of extracellular mucin. Low-grade Appendiceal Mucinous Neoplasm (LAMN) is a rare condition with symptoms that vary depending on clinical manifestations. It can manifest as an unruptured mucin-filled appendix, transmural invasion of the primary tumour, or present with peritoneal metastases post-rupture. The prognosis of LAMN depends on the presence or absence of neoplastic epithelium outside the appendix. Here, the authors describe a case of 35-year-old female who visited the OPD of Emergency Medicine with only complain of pain in abdomen for three days. She exhibited right iliac fossa tenderness with no guarding during the abdominal examination. She underwent an open appendectomy and was diagnosed with LAMN upon histopathological examination. She was advised to follow-up after six months post-discharge to monitor for any metastatic spread. Due to its malignant potential, mucinous lesions of the appendix are uncommon yet significant entities. They are more prevalent in women and can range from mucinous adenocarcinomas to straightforward retention cysts. This case illustrates the need for extreme caution when dealing with appendiceal tumours and the importance of selecting the appropriate course of action, be it surgical or medical.

Keywords: Appendix, Cancer, Gastrointestinal system, Mucin, Tumour

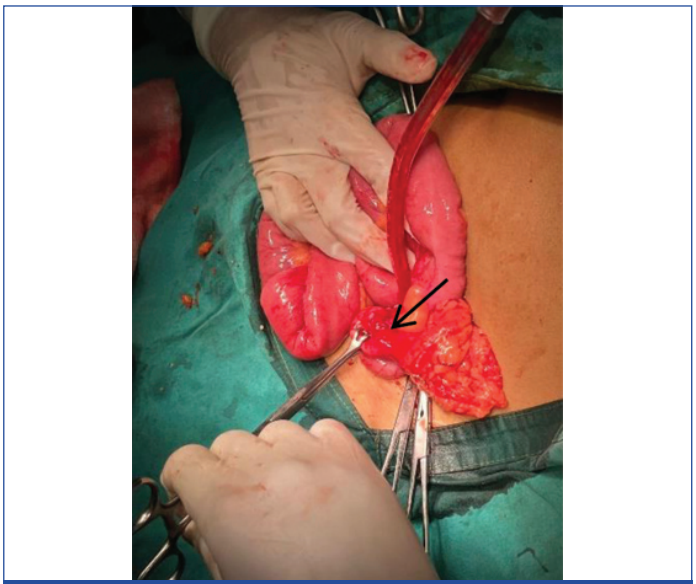
CASE REPORT

A 35-year-old female presented to the hospital with chief complaints of lower abdominal pain persisting for three days. The pain had an insidious onset, was gradually progressive, non radiating, and was relieved with medication. The patient is a known hypertensive and is currently on a regimen of Tablet Telmisartan 40 mg 1-0-0. Upon examination, she exhibited right iliac fossa tenderness but no guarding. Notably, she had a history of hospitalisation for appendicular perforation and abscess formation following acute appendicitis a year earlier. A previous Contrast-enchanced Computed Tomography (CECT) abdomen and pelvis scan [Table/Fig-1a-d] one year back at hospital revealed an ill-defined soft tissue density of size 27×22×34 mm (CC×AP×TR) in the right iliac fossa adjacent to the caecum, inferiorly to the ileocecal junction. It shows heterogeneous post-contrast enhancement with peripheral fat stranding and few sub-centimetric surrounding lymph nodes. Perforated appendix with a wall-to-wall diameter of 15 mm, however, appendicular stump is distinctly not visualised separately from the lesion. Surgical management involved exploratory laparotomy, adhesiolysis, and drainage of the appendicular lump.

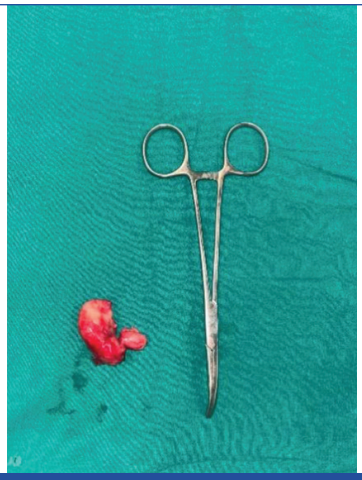


[Table/Fig-1]: a) CECT abdomen and pelvis cornonal section (arrows in the figure is pointing at the abscess). b) CECT abdomen and pelvis axial section (arrows in the figure is pointing at the abscess). c) CECT abdomen and pelvis axial section (arrows in the figure is pointing at the abscess). d) CECT abdomen and pelvis sagittal section (arrows in the figure is pointing at the abscess).

The patient underwent investigations which included complete blood count, all routine blood tests and Carcinoembryonic Antigen (CEA) and all were within normal limits during this admission. The patient was re-evaluated and planned for an open appendectomy. The patient was in a supine position under spinal anaesthesia, a McBurney's incision was taken and the abdomen was explored. The appendix was adhered to the caecum. Adhesions were released and the appendix was excised [Table/Fig-2]. Gross examination of the excised appendix revealed dilation, congestion on the external surface, and a patent lumen [Table/Fig-3].

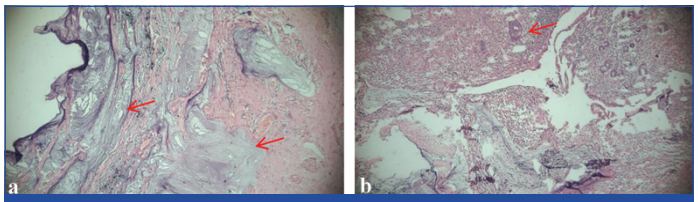


[Table/Fig-2]: Intraoperative image of open appendicectomy. Inflamed appendix caught with Babcock's forceps during open appendicectomy using Mcburney's incision.



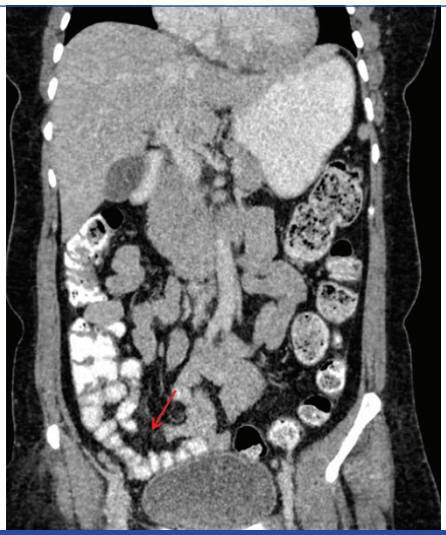
[Table/Fig-3]: Specimen image postprocedure. Grossly appendix is dilated and measures 3.5 cm in length, external surface appears to be congested with a greyish-white area measuring 1x0.8 cm the lumen was patent on cut surface.

Microscopically mucosa of the appendix was lined partially by stratified epithelium. Submucosa and muscularis showed mild chronic inflammation by lymphocytes. The arrows in the pictures are pointing towards mucin-containing cells and cells exhibiting low-grade nuclear atypia. Collection of mucin in the muscular, subserosal and serosal layers [Table/Fig-4a,b].



[Table/Fig-4]: a) Histopathological image of the specimen. b) Histopathological image of the specimen showing few foci with mucosal cells exhibiting low-grade nuclear atypia.

Following the surgery, the patient remained stable with no postoperative complaints. A follow-up appointment in six months, along with a CECT scan, was advised [Table/Fig-5]. The postoperative scan showed no evidence of seroma, with small bowel loops adherent to the anterior abdominal wall in the infraumbilical region, likely due to adhesions. No bowel dilatation or evidence of metastasis was noted. The patient reported no subsequent episodes of abdominal pain, vomiting, or febrile episodes during the follow-up period.



[Table/Fig-5]: CECT abdomen and pelvis cornonal section. (Arrow in the figure is pointing at the appendicular stump with no evidence of local or distant metastasis).

DISCUSSION

Less than 0.3% of appendectomy specimens contain LAMN, a rare gastrointestinal tumour characterised by mucin synthesis within the appendix [1]. This condition is often misdiagnosed, and missed diagnoses are common [2]. Patients with disease confined to the appendix wall following appendectomy seem to have a very low risk of disease recurrence [3].

This cancer is frequently incidentally discovered during surgical investigation and is often diagnosed after it has spread. The histopathologic subtypes of appendiceal neoplasms include Goblet Cell Adenocarcinomas (GCAs), signet ring cell adenocarcinomas, non-mucinous adenocarcinomas, and mucinous cystadenocarcinoma. The majority of cases are mucinous adenocarcinomas [1]. According to the World Health Organisation's 2019 classification, LAMN, High-grade Appendiceal Mucinous Neoplasm (HAMN), serrated polyps, hyperplastic polyps, and mucinous adenocarcinomas are all types of neoplastic appendiceal lesions [4].

The histological appearance and method of spread of LAMN are distinctive. They exhibit a pushing margin with low-grade atypia rather than the infiltrative growth typical of malignant tumours [5]. Low-grade mucin-generating appendix tumours, such as adenomas and mucinous tumours, can spread as mucin-containing deposits to the peritoneal cavity and viscera by mucin seeding in the peritoneum or distant metastases, and can manifest as Pseudomyxoma Peritonei (PMP) [6,7].

There are two types of LAMNs; type I, where mucin is only found in the appendix's lumen, and type II, where mucin is present in or outside the appendiceal wall. In later stages, mucin is abundantly dispersed throughout the abdominal cavity, and the condition progresses to PMP. PMP can include mucinous ascites, peritoneal nodules, and ovarian involvement. Symptoms of appendicitis, such as right iliac fossa discomfort, vomiting, fever, and nausea, as well as elevated leukocyte and C-reactive protein levels, are commonly seen in patients with LAMN [7]. Preoperative diagnosis in these individuals is challenging due to the vague clinical appearance of mucinous lesions [8]. Intussusception and obstruction can also occur in LAMN patients. Complications of LAMN include volvulus, Small Bowel Obstruction (SBO), intussusception, ureteral obstruction, appendiceal wall rupture or proliferation, and dissemination of septic or neoplastic content, leading to localised or diffuse peritonitis, or PMP. None of these symptoms were exhibited by present patient [1,7]. PMP occurs in 20% of patients with appendiceal mucinous neoplasm [9].

The pathogenesis of LAMN involves atypical hyperplasia of the epithelium of the appendix, which is responsible for the occlusion of the lumen due to the accumulation of mucus. The mucus enters the muscularis mucosa, forming mucinous masses in the retroperitoneum as well as around the appendix [6].

Ultrasound (US) and Computed Tomography (CT) are commonly used imaging modalities for diagnosis [1]. On Ultrasonography (USG), mucinous neoplasms appear as an appendicular elongated, encapsulated, or oval cystic lesion with an internal onion-skin appearance, which is pathognomonic for lamellated mucin. An appendix with a diameter of more than 15 millimeters and a cystic soft tissue mass closely adjacent to the caecum with a long tubular or round shape with wall thickening or irregularity should raise suspicion of a mucinous neoplasm on a CT scan, which is a definitive imaging technique for the diagnosis of these tumours [6,10].

Gross LAMN symptoms include fibrosis and hyalinisation of the appendiceal wall, as well as an appendix that is noticeably enlarged due to mucinous buildup. Rarely malignant, LAMNs less than 2 cm are categorised as non-malignant simple or retention mucoceles. An increased risk of malignant cells, appendiceal perforation, and PMP are evident in masses larger than 6 cm [1]. Between 56.1% and 67.1% of LAMN patients may have elevated tumour markers. These tumour markers can also be used to monitor peritoneal cancer after surgery or other medical treatment. Additionally, patients with LAMN have a 35% chance of developing a concomitant Gastroinstestinal (GI) cancer [1].

The size of an AMN and its involvement with surrounding structures determine the course of treatment. Open or laparoscopic appendectomy can successfully treat a small LAMN that is confined to the appendix; a larger LAMN will require a laparotomy or open appendectomy. Resection at the ileocaecal junction or a part of the cecum may be necessary if the tumour affects the adjacent area of the appendix, making it challenging to excise the appendix. Careful dissection and removal of the appendicular tumour are essential to avoid perforation. If mucinous materials from a perforation leak into the peritoneum and seed the LAMN there, the patient is at risk for PMP. Studies have shown that a laparoscopic approach carries a higher risk of rupture when removing these tumours compared to an open approach [4]. Preventing seeding, rupture, and PMP are key objectives in LAMN management.

Even in individuals with extra-appendiceal mucin and neoplastic epithelium, right hemicolectomy is not superior to appendectomy alone in the management of benign appendiceal mucoceles in patients with LAMN. Right hemicolectomy with or without omentectomy may be performed if the cancer has invaded the submucosa or if lymph node metastasis is present [1,10]. Right hemicolectomy should be considered in patients if risk factors such as increased mitotic activity, poorly differentiated tumour, lymph node metastasis, and tumour size larger than 2 cm, or involvement of the base of the appendix are present.

Appendectomy and right hemicolectomy, alongside lymph node dissection, need to be performed in HAMN and mucinous adenocarcinoma. For appendiceal mucinous tumours with positive margins post-appendectomy, there is an ongoing debate, and no precise treatment guidelines are available. Management for early-stage LAMNs with positive margins includes various options such as simple cecostomy, right hemicolectomy, and monitoring [2]. Debulking or aggressive numerous peritonectomies, along with hot intraperitoneal chemotherapy, are used to treat tumours that have widely diffused throughout the peritoneal cavity, including mucinous plastic epithelium outside of the appendix. Patients with ruptured LAMNs and acellular mucin on the periappendiceal serosa have a significant risk of developing peritoneal recurrence; therefore, these patients need to be constantly monitored to ensure that no localised or Diffuse Pseudomyxoma Peritonei (PMP) forms [10]. If aggressive management is not utilised, LAMNs with diffused peritoneal seeding of neoplastic epithelium and mucus commonly result in the patient's mortality [10]. Due to the regular relationship between ovarian neoplasms and PMP, it is important to remember that the ovaries must be thoroughly inspected in all females with appendiceal mucinous neoplasms [7].

In present case, there were no pathological indications of cancer spreading to the lymph nodes or infiltrating the intestinal submucosa, and there were no signs of cancerous cells along with mucin pools in the adjacent tissue. Therefore, this patient did not need any surgical or adjuvant treatments.

CONCLUSION(S)

Due to their malignant potential, mucinous lesions of the appendix are uncommon yet significant entities. They are more prevalent in women and can range from mucinous adenocarcinomas to simple retention cysts. In most situations, pre-operative diagnosis is challenging. While a thorough examination can offer a hint, a precise diagnosis requires careful histological interpretation. Overall, further research is required to develop a more precise approach to LAMN diagnosis, treatment, and monitoring. Due to the female appendix's proximity to the adnexa, an appendiceal cyst could be mistaken for an adnexal tumour. The classification of the disease, the tumour markers used, and the imaging modality used to make the diagnosis vary to date. Post-treatment surveillance durations and techniques are still not standardised. This instance demonstrates the necessity of exercising a high degree of caution regarding the emergence of appendiceal cancers and selecting the best surgical or medicinal treatment option. LAMNs should be taken into consideration in cases of any appendiceal mass because they are rare and can manifest in a variety of ways. On microscopic examination, it was observed that the mucosa of the appendix was partially lined by stratified epithelium. The submucosa and muscularis show mild chronic inflammation by lymphocytes. There is a collection of mucin in the muscular, subserosal, and serosal layers. The arrows in the pictures are pointing towards mucin-containing cells and cells exhibiting low-grade nuclear atypia.

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