CASE REPORT

Pseudomyxoma peritonei diagnosed 19 years after appendicectomy

Paula F Wrafter,¹ Tara Connelly,² Jody Sultan Ali Khan, William P Joyce¹

¹Department of Surgery, The Galway Clinic, Galway, Ireland

²University Hospital Galway, Galway, Ireland

³Department of Vascular Surgery, Beaumont Hospital, Dublin, Ireland

Correspondence to

Dr Tara Connelly,
tara_conn@hotmail.com

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SUMMARY

Pseudomyxoma peritonei (PMP) is an uncommon clinical finding describing the intraperitoneal accumulation of abundant mucinous, jelly-like material. This entity may represent a spectrum of diseases ranging from mucinous ascites, commonly associated with ruptured epithelial tumours of the appendix, to frank mucinous carcinomatosis. In cases of appendiceal origin, the patient may present with signs and symptoms of acute appendicitis, and thus careful diagnosis must be made in order to correctly and appropriately guide management. This may include a combination of surgical debulking with or without intraperitoneal or systemic chemotherapy. We present a 52-year-old woman with a 4-month history of abdominal pain and distension with a previous appendicectomy 19 years earlier. Radiological and pathological investigations diagnosed a probable PMP secondary to ruptured appendicitis many years ago. We describe her unique case, with emphasis on length of time to diagnosis and clinical management by surgical cytoreduction alone.

paracolic gutter (figure 1). A subsequent pelvic MRI demonstrated a large fluid-filled mass and normal ovaries (figures 2 and 3). Serum cancer antigen (CA) 125 levels were normal at 27.3 ng/mL (0–35). However, carcinoembryonic antigen (CEA) levels were elevated at 6.4 ng/mL (0–5).

Ultrasound-guided biopsy obtained a mucinous aspirate, but no epithelial cells were present. Given the mucinous nature of the aspirate, an appendiceal tumour origin was then considered.

The pathology specimen from her appendectomy 19 years prior was located and reviewed by our pathologist. Mucinous material was noted in the perforated wall of the appendix. A cross-section through the non-inflamed part of the appendix showed a hyperplastic mucus-secreting epithelium. Sections were also reviewed from the mucinous material on the peritoneal cavity and

BACKGROUND

This case is important as it describes a presentation which has an incidence of 1–2 per million per year. In this case, the disease had been present for 19 years before it manifested clinical signs of pain. The case also emphasises the importance of careful histological examination and diligent follow-up of histology reports from ‘typical appendicitis’ by the clinician to ensure timely diagnosis of rare pathologies.

Owing to the small number of cases of pseudomyxoma peritonei (PMP), guidance on the best clinical management is controversial. Most surgeons and oncologists agree that complete cytoreduction is key to long-term survival; however, the addition of intraperitoneal chemotherapy is debated. Our case demonstrates a successful outcome with surgery alone.

CASE PRESENTATION

A 52-year-old postmenopausal woman presented with abdominal pain and distension for 4 months, with no other gastrointestinal or urinary symptoms. Her history was significant for an appendicectomy 19 years earlier at a different institution. Physical examination revealed generalised mild abdominal tenderness with distension. Routine blood tests were normal.

A CT of the thorax, abdomen and pelvis was performed, which demonstrated a right pleural effusion, ascites and a cystic structure in the right

Figure 1 Coronal image of CT of the abdomen and pelvis, demonstrating a cystic structure in the right paracolic gutter.

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Figure 2 Sagittal MRI showing a large fluid-filled mass within the pelvis.

immunochemistry confirmed the total absence of epithelial cells in the mucin. These findings are typical of PMP, confirming a PMP and a concomitant ruptured acute appendix with mucous gland hyperplasia were present at the time of her appendectomy.

After a multidisciplinary meeting and a detailed discussion of risks and benefits with the patient, an extended right hemicolectomy with greater omentectomy and complete clearance of pelvic jelly-like material was performed. Extended right hemicolectomy was performed due to the presence of a gelatinous tumour, adherent to the original appendix stump. It was felt that a macroscopic curative resection was achieved. The patient was discharged on postoperative day 7 after an uneventful recovery. She continues to do well 2 years after her operation.

INVESTIGATIONS

A CT of the thorax, abdomen and pelvis was performed for initial workup to identify the cause of abdominal pain. A subsequent MRI was performed to further clarify the cystic structure seen on CT. The biopsy was done to obtain a sample for histology and cytology to aid diagnosis.

Figure 3 Axial MRI demonstrating a large fluid-filled mass within the pelvis.

A colonoscopy was performed to rule out any synchronous tumours and this was normal.

TREATMENT

After a multidisciplinary meeting and discussion, an extended right hemicolectomy with greater omentectomy and complete clearance of pelvic jelly-like material was performed. It was felt that a macroscopic curative resection was achieved.

OUTCOME AND FOLLOW-UP

The patient was discharged on postoperative day 7 after an uneventful recovery. She continues to do well 2 years postoperatively. Long-term follow-up was performed by physical examination and assessment of tumour markers CEA and CA 19.9 every 6 months. A CT scan is performed annually.

Histological examination later confirmed the diagnosis of PMP with a low-grade mucinous neoplasm in the appendiceal stump, which was similar to that seen in the specimen from her original appendicectomy.

DISCUSSION

First described by Werth in 1884, the syndrome of PMP involves the presence of copious amounts of mucinous ascites or intra-abdominal jelly collections. It is caused by the rupture of a mucinous tumour with eventual thick coating of intra-abdominal viscera with a jelly-like substance, but invasion into the visceral tissue does not occur.¹

This unique syndrome is commonly appendiceal or ovarian in origin and therefore appears to be more prevalent in women. PMP typically has a slow and indolent course with non-specific clinical features like increasing abdominal girth, pain and discomfort in the early stages, and later a pelvic mass, compression and obstructive bowel symptoms.

Diagnosis involves the combination of radiological imaging² and histology, with recent studies illustrating the possibility of genetic mutations that can be used to diagnose and guide treatment.³ Alakus *et al*⁴ demonstrated that there is a different molecular make-up to mucinous neoplasms of the appendix to colorectal cancer with GNAS wild-type (5/6) mutations implicated in high-grade dysplasia. Establishing an accurate diagnosis of a mucinous tumour of the appendix versus appendicitis is important as untreated mucinous tumours will progress eventually to PMP.

Traditionally, optimal treatment is considered a combination of both surgical removal/debulking with or without hyperthermic intraperitoneal chemotherapy (HIPEC).⁵ However, some recent studies have demonstrated that cytoreductive surgery alone may result in comparable survival outcomes versus those achieved with combined surgery and HIPEC.⁶ Despite the type of surgery chosen, in the presence of a mucocoele, care must be taken to avoid damaging or rupturing the appendix.

PMP is described as an uncommon phenomenon, with an incidence of approximately 1–2 cases per million per year and found in approximately 0.2–0.7% of appendicectomy specimens.⁷ It is deemed a slowly progressive condition with the locally destructive mucinous deposits progressively causing fibrosis and obstruction of abdominal viscera.⁸

Without aggressive, radical treatment including surgical debulking, PMP typically results in death due to mass accumulation of intraperitoneal mucus. It is traditionally thought that when treated primarily by surgical means, prognosis is poorer than when treated with cytoreductive surgery and intraperitoneal chemotherapy.⁸ This information is garnered only from retrospective trials with no randomised trials to date examining

treatment strategies. The largest trial to date by Chua *et al*⁹ concluded that cytoreductive surgery and intraperitoneal chemotherapy was favourable to surgery alone; however, optimal surgical resection achieves the best outcomes. Not all patients are suitable to undergo both cytoreductive surgery and intraperitoneal chemotherapy. In a 2013 study, patients with multiple comorbidities and extremes of age were considered ineligible to receive intraperitoneal chemotherapy.¹⁰

However, some recent studies have shown that treatment by surgical cytoreduction alone may have outcomes comparable to those with both cytoreduction and intraperitoneal chemotherapy. A case series by Wheeler *et al*⁶ showed a 5-year survival of 64% post-cytoreductive surgery alone. A 2011 study by Youssef *et al*¹¹ showed an overall 5-year and 10-year survival of 69% and 57%, respectively, in patients treated with surgical cytoreduction alone.

Furthermore, a meta-analysis by McBride *et al*¹² in 2013 concluded that despite having better survival outcomes, treatment of PMP with cytoreductive surgery and intraperitoneal chemotherapy is associated with increased morbidity when compared with debulking alone.

Overall the evidence is somewhat inconclusive, careful patient selection may lead to the omission of intraperitoneal chemotherapy in some. Given that our patient was diagnosed with a low-grade neoplasm, this may suggest that she could have a satisfactory long-term survival outcome, without the risk of major complications associated with intraperitoneal chemotherapy.

An interesting aspect of this case was the slow progression of disease over the 19-year course between her original appendectomy and later diagnosis. A report by Touloumis *et al*¹³ in 2013 stated that PMP can occur anywhere between 5 and 35 years after the initial appendiceal event.

The management of PMP can range from watchful waiting to more radical surgical and oncological treatments. The choice depends on the findings at presentation and this variability in treatment options reflects the slow progression of the disease.¹³ Faris and Ryan¹⁴ in 2013 showed that in low-grade cases of PMP, watchful waiting with serial CT scans or tumour markers

or serial cytoreductive procedures alone can be sufficient for follow-up management. Owing to the low-grade nature of the histology in our patient's case, this seems to be an appropriate management plan.

Carmignani *et al* showed that tumour markers such as CEA are useful in the diagnosis and prediction of disease prognosis and progression. This study also found that patients with elevated preoperative CEA levels were at risk of developing recurrent disease, despite aggressive therapy.¹⁵ On presentation, our patient had an elevated CEA level. However, she is symptom free at 2 years. She continues to undergo serial surveillance.

Contributors PFW collected clinical details of the case and contributed to the write up. TC and JSK contributed to the write up of the case and literature review. WPJ oversaw the write up and advised on discussion and learning outcomes.

Competing interests None declared.

Patient consent Obtained.

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Learning points

- Our case demonstrates that pseudomyxoma peritonei (PMP) can be a very slowly progressing disease.
- We highlight the importance of diligent follow-up of all histology reports, even in cases which appear routine such as appendectomy.
- To date, our patient has had a satisfactory outcome; however, more studies will be needed to support recent evidence that there can be comparable outcome in low-grade PMP treated with surgery alone versus surgery and hyperthermic intraperitoneal chemotherapy.

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