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Case Report

Diffuse malignant peritoneal mesothelioma presenting as small bowel obstruction ☆,☆☆

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ABSTRACT

Mesotheliomas are aggressive malignant tumors which can occur most commonly in the pleural space, however can occur in the peritoneum in those with an extensive history of asbestos exposure. Primary peritoneal mesothelioma is relatively rare and is a fatal diagnosis. The prognosis of primary peritoneal mesothelioma is very poor and individuals are at high risk of developing mesothelioma in another cavity within the first year after initial diagnosis. Herein, we present a case of primary peritoneal mesothelioma, presenting as small bowel obstruction.

Introduction

Mesotheliomas are aggressive malignant tumors comprising mesothelial cells from the pleura, peritoneum, tunica vaginalis, testes and pericardium [1]. Malignant mesothelioma is known to be caused by asbestos, however the attributable risk due to asbestos exposure is lower in women [1,2]. Mesothelioma is thus more common in men, with a 20-50 year latency following exposure to asbestos [2]. The most common location is of the thoracic pleura; however, the most lethal location is the peritoneum due to the ability for locoregional progression [3,4].

The first known case of malignant peritoneal mesothelioma (MPeM) was in 1908 in Birmingham, England in a patient who had ascites and weight loss [3]. Since 1972 approximately 169 cases have been reported [3]. The true incidence of MPeM in the United States is unknown but approximately 500-700 new cases are diagnosed each year [3]. MPeM accounts for approximately 15%-30% of all mesotheliomas [1,3–5]. Cumulative asbestos exposure increases the risk of malignant mesothelioma, specifically increasing the risk of MPeM

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[2]. Miners, insulators or occupations exposing employees to thorotrast, erionite, or radiation also increase the risk of MPeM [2].

Most patients are asymptomatic until advanced stages, but may present with abdominal pain, increased abdominal girth, weight loss, fevers, nausea and vomiting, anorexia and early satiety [1–3,5]. Because mesothelioma cells are atypical morphologically, it is difficult to distinguish between malignant mesothelioma in situ and invasive disease [6]. Additionally, no specific imaging or symptom criteria is used to diagnose malignant mesothelioma, therefore accurate tumor immunohistochemistry is imperative for diagnosis [3,4]. Computerized tomography (CT) may show extensive ascites, diffuse peritoneal thickening, nodular involvement of the mesentery and/or calcified plaques if related to asbestos exposure [2]. Positron emission tomography (PET) scans have a limited role in diagnosis, but are more useful in detecting recurrent disease [2]. There must be at least 2 positive antibody stains, such as cytokeratine 5/6, calretinin and WT-1, and 2 negative markers, such as MOC-31, CEA, PAX8 and CDX-2, in order to diagnose malignant mesothelioma [2,3].

Herein, we present a case of primary peritoneal mesothelioma in a male who previously worked in a wire hanger factory.

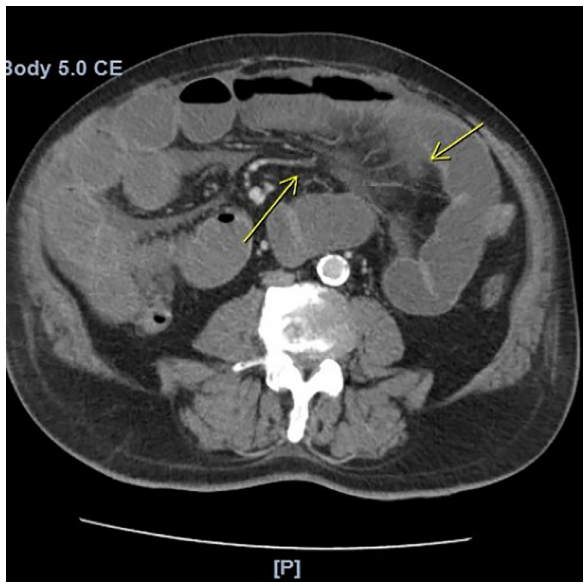

Fig. 1 – Computerized tomography of the abdomen and pelvis with intravenous contrast demonstrating mesenteric edema. Sagittal view demonstrating diffuse mesenteric edema, indicated by the arrows.

Case presentation

An 81-year-old- Arabic male with an extensive past medical history, presented to the emergency department (ED) with worsening nausea, vomiting, abdominal distention and diarrhea, lasting 3 weeks prior to presentation. He reported over 20 episodes of nonbloody, nonbilious emesis during this time frame and was unable to tolerate oral intake. His bowel movements were small volume, but frequent loose stools associated with urgency. He denied hematochezia or melena. He was previously seen by the ED 3 weeks ago at the onset of his diarrhea, where an initial computerized tomography scan (CT) of the abdomen and pelvis with contrast showed fluid distending the small and large bowel diffusely, mild fat stranding in the ascending colon, and mild wall thickening of the descending colon (Fig. 1). There was also prostatomegaly, a small amount of ascites, and slight contour nodularity of the liver possibility with cirrhosis. At that time, examination was remarkable for generalized abdominal pain and mild distention, but laboratory values, including stool cultures, were within normal limits. He was diagnosed with gastroenteritis and discharged home on famotidine and ondansetron. He followed up with his primary care physician (PCP) who prescribed a 7-day course of ciprofloxacin and metronidazole, however his symptoms persisted leading to his current presentation to the ED.

Of note, his past medical history included coronary artery disease status post cardiac stent placement, hypertension, dyslipidemia, hypothyroidism, benign prostate hypertrophy, osteoarthritis, sleep apnea and history of gout. Through further history, the patient reported working as a factory worker where wire hangers were manufactured for many years. He thinks he inhaled asbestos-containing metal particles there. He is a lifetime nonsmoker and does not drink alcohol or use illicit drugs. The patient does not recall any endoscopy or colonoscopy in the past.

On examination, he was afebrile, with a blood pressure of 192/102 mm Hg, heart rate of 85 beats per minute, respiratory rate of 18 breaths per minute, and was saturating 100% of oxygen on room air. His physical exam was unchanged from the last ED visit, with remarkable abdominal distention and generalized tenderness without signs of peritonitis. Laboratory studies revealed mild hyponatremia (133 mEq/L), hyperglycemia (124 mg/dL), elevated alanine transaminase (54 unit/L) with otherwise normal aspartate transaminase, bilirubin and alkaline phosphatase and his lipase level was slightly decreased (10 unit/L). The patient's inflammatory markers were elevated (C-reactive protein 87 mg/L; Erythrocyte sedimentation reaction 30 mm/h) and he had leukocytosis ($12.9 \times 10\text{^}3/mm^3$) without left shift or bandemia. A lactic acid was within normal limits, but he did test positive for COVID-19 at that time. A repeat CT abdomen and pelvis with intravenous contrast was performed, suggestive of small bowel obstruction with increased dilatation of small bowel and transition at the level of thickened terminal ileum (Figs. 2 & 3). He was admitted for small bowel obstruction (SBO) and treated with intravenous normal saline, metronidazole (500 mg every 8 hours) and amoxicillin-clavulanate (500-125 mg every 8 hours).

The patient underwent a diagnostic laparoscopy, conversion to open laparotomy, drainage of abdominal fluid, lysis of adhesions, right hemicolectomy with ileo-colonic stapled anastomosis and omentectomy. The pathology report showed the resected bowel to be diffuse peritoneal malignant mesothelioma, epithelioid-type, extensively involving small bowel muscularis propria and submucosa, and focally involving the lower mucosa of the ileocecal region. The ma-

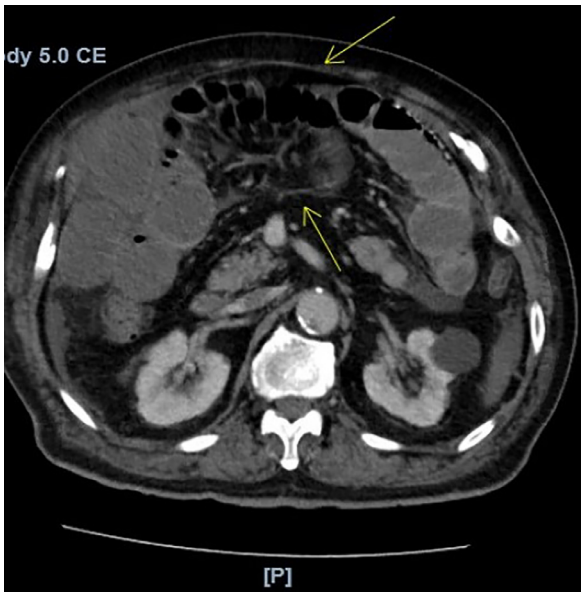

Fig. 2 – Computerized tomography of the abdomen and pelvis with intravenous contrast demonstrating persistent mesenteric edema with small bowel obstruction. Sagittal view demonstrating diffuse mesenteric edema and air-filled bowel loops, as evidenced by the arrows.

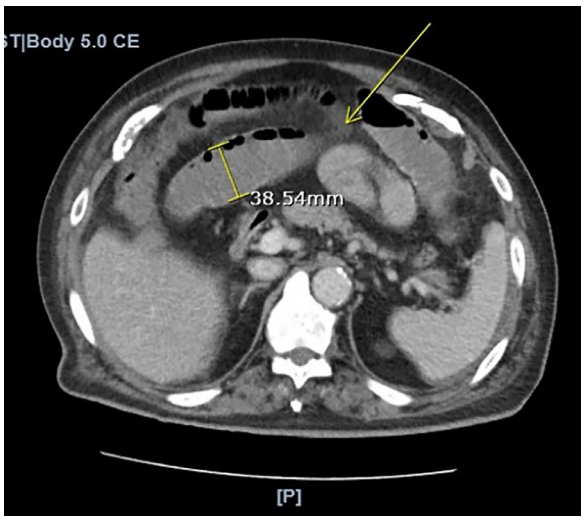

Fig. 3 – Computerized tomography of the abdomen and pelvis with intravenous contrast demonstrating the transition point. Sagittal view demonstrating small bowel obstruction. Arrows indicate transition point at terminal ileum and dilated bowel measuring approximately 4 cm.

lignancy was staged T0N0. Immunohistochemical analysis showed strong positive reactions with calretinin, CK 5/6, WT-1 and D2-40. Negative reaction was present with CK20, synaptophysin, chromogranin, and prostatic markers.

One month after discharge, the patient underwent a positron emission tomography (PET-CT) showed a small hypermetabolic peritoneal nodule in the lower lateral right abdomen with associated peritoneal thickening suspicious for malignancy, but no metastatic disease. Laboratory studies at that time showed Lactate dehydrogenase of 186 U/L. He received 12 cycles of nivolumab 3 mg/kg every 3 weeks and 7 cycles of ipilibumab every 6 weeks. His most recent CT showed stability of the malignant primary mass along the right anterior abdominal musculature with no other acute findings and no changes in his other abnormal imaging findings discussed above. He was discharged under Oncological Care and was ultimately transferred to hospice approximately 2 years after his initial diagnosis due to increased tumor burden despite palliative radiation and adjunctive chemotherapy.

Discussion

The etiology and epidemiology differ based on the site of origin [2]. In men, asbestos exposure is the most common cause of malignant mesothelioma of the pleura in both Europe and North America, however in women asbestos can cause mesothelioma in any part of the body [5,7]. MPeM as the primary source is uncommon with mesothelioma, accounting for only 10%-30% of all mesotheliomas, which in itself accounts for only 2500 patients each year [2]. Asbestos exposure confers a lower risk of MPeM in males [5,7]. Our male patient was a factory worker likely exposed to asbestos and developed peritoneal mesothelioma, which is not only a less common location for mesothelioma, but particularly in males [5]. One study identified numerous mineral fibers in almost 50% of MPeM's suggesting that mineral fibers may be an alternative etiology in both men and women [7]. Known fibers include erionite, fluoro-edenite and balangeroite [7]. Chronic peritonitis can cause MPeM, such as recurrent diverticulitis or patients with Crohn's disease, and additionally some germline mutations/deletions of BRCA1-associated protein-1 leads to mesothelioma among many other malignancies [7]. In adolescents or young patients, a history of thorotrast administration, radiation, Mediterranean fever or ventriculoperitoneal shunts have all been observed in patients with MpeM [7].

Patients with MPeM are typically younger at time of diagnosis than those with pleural involvement and are usually women [2,5]. Our patient was in his 80′s at time of diagnosis and was a male [5]. Most cases of MPeM and pleural mesothelioma are epithelial, but often 2 indolent pathological subtypes are seen in MPeM specifically [2,5]. They are called well-differentiated papillary mesothelioma (WDPM) and benign multicystic mesothelioma (BMM) [2].

The prognosis for malignant mesothelioma is poor, but newer hyperthermic chemotherapy regimens have improved survival over the last ten years [1,4]. Chemotherapy alone is insufficient in treating malignant mesothelioma, however may be used for palliative purposes in those who are not candidates for combination cytoreductive surgery and hyperthermic perioperative chemotherapy as radical treatment [1,4]. Chemotherapy agents such as pemetrexed and raltitrexed plus cisplatin for MPeM can lead to survival of 12-14 months [1]. Nonetheless, MPeM is a rare and fatal cancer which carries high morbidity due to the locoregional progression [3]. Those with MPeM have a shorter median survival than those with pleural involvement [2]. The median overall survival for

MPeM without treatment is less than 1 year, with a 5-year survival rate of 29%-63% in those who do undergo radical treatment [1,3]. Patients with a single cavity disease are most likely to have a second cavity disease within the first year after diagnosis, however there are no current recommendations for MPeM surveillance after radical treatment [4,8]. Additionally, there is little evidence to suggest treatment or predict prognosis in those with multifocal disease, such as those with both pleural and peritoneal mesothelioma [8]. A retrospective study determined that female gender and intraperitoneal dwell chemotherapy were independent factors that prolonged survival in those with multifocal disease [8]. Other studies have identified 3-year and 5-year survival rates of 76% and 68% for women versus 50% and 39% for males [2]. This is in part due to less aggressive histology at time of diagnosis in females [2]. Our patient outlived his life expectancy given his age, gender, location of mesothelioma, etiology and histological subtype [5].

Conclusion

Malignant mesothelioma is a rare and fatal disease, often caused by asbestos exposure and most commonly occurs in the pleural space. Primary peritoneal mesothelioma accounts for less than 30% of all mesotheliomas and median survival is less than pleural involvement. Our patient outlived his life expectancy given his age, gender, location of mesothelioma, etiology and histological subtype. The presentation of our patient's peritoneal mesothelioma causing small bowel obstruction was also unique.

Author contribution

Tagliaferri and Melki performed the literature review and wrote the manuscript, and all authors contributed to the final editing and collection of the patient's clinical data. All work was performed at St. Joseph's University Medical Center.

Ethical review

Ethical review is not necessary, because this is a case report.

Patient consent

Consent was obtained for the purpose of this paper, in keeping with journal guidelines.

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