



Appendicitis Secondary to Cecal Cancer

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Abstract

Introduction: Appendicitis is nearly always a benign condition, but is rarely associated with cecal tumors. We present a case of a 79 year old male with signs and symptoms of appendicitis that was found to have a cecal mass on computed tomography scanning. On exploration he was found to have a cecal mass obstructing the appendiceal lumen which caused his appendicitis. A right hemicolectomy was performed and final pathology revealed a T3N0M0 adenocarcinoma. He has recovered without complication.

Conclusion: Although rare, appendicitis resulting from a cecal mass does occur and requires a high index of suspicion especially in patients over 40 years of age. Colonoscopy should be considered in this patient group because the delay in diagnosis following appendectomy results in a lower five-year survival than other patients with colon cancer.

Keywords: Appendicitis; Cecal mass; Colon cancer

Introduction

Appendectomies are one of the most common operations a general surgeon performs because the estimated lifetime risk of acute appendicitis is near 8%. The most common cause of appendicitis in children and young adults is obstruction of the appendiceal lumen by fecaliths or lymphoid hyperplasia [1,2]. In contrast, appendicitis in the elderly is more likely secondary to appendiceal atrophy, fibrosis, vascular ischemia, and neoplasms [3]. Neoplasm induced appendicitis occurs by three mechanisms: physical obstruction of the appendiceal orifice, obstruction due to surrounding inflammatory changes in the cecum, or distal colonic obstruction causing back pressure in the cecum [1,4]. While carcinoid is the most common malignancy of the appendix, neoplasms obstructing the appendiceal origin are most commonly adenocarcinoma. Cecal carcinoma as the cause of appendicitis was first described in 1906 by Dr. Shears. Several subsequent reports have been published suggesting cecal adenocarcinoma is responsible for less than 2% of all appendicitis [3-8].

Case Presentation

A 79-year-old white male presented in March 2014 with a 12-hour history of right lower quadrant pain associated with nausea and emesis. His past medical history was remarkable for diastolic heart disease, obstructive lung disease, GERD, chronic renal insufficiency, prostate cancer s/p total prostatectomy, and bladder carcinoma *in situ* s/p cystectomy with neobladder creation. Upon presentation he was a febrile with a white blood cell count of $10.8 \times 10^3/\mu\text{L}$ but demonstrated focal peritonitis with right lower quadrant guarding. Computed Tomography (CT) abdomen and pelvis was obtained by the Emergency Department for further workup given his complicated abdominal surgical history. CT demonstrated non-perforated appendicitis and an associated cecal mass that appeared to be obstructing the appendiceal orifice. The remainder of the CT scan was insignificant without radiographic evidence of metastatic disease. Of note, in 2010 he underwent routine screening colonoscopy with removal of a benign serrated polyp near the appendiceal orifice with a recommendation for repeat colonoscopy in 5-years. Given the concern for colon cancer and his previous abdominal surgeries, he was taken to the operating room for an exploratory laparotomy through his previous midline incision. Upon entering the abdomen, a cecal mass was palpable near the base of an extremely dilated appendix. Given a palpable mass within the cecum, a formal right hemicolectomy was performed with special attention to appropriate margins and mesenteric resection to ensure adequate nodal sampling. The patient had an uneventful postoperative course and was discharged home on post-operative day five. Final pathology demonstrated a T3N0 moderately differentiated 3.6 cm adenocarcinoma of the colon with 0/15 lymph nodes positive. The tumor was noted adjacent a sessile serrated adenoma within the cecum with obstruction of the appendiceal orifice and secondary acute appendiceal inflammation. Microsatellite testing demonstrated no

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instability. He was subsequently referred to a medical oncologist but no chemotherapy was pursued due to his medical co-morbidities. He continues to undergo standard surveillance colonoscopy without evidence of colonic recurrence.

Discussion

Eight to ten percent of all colorectal cancer occurs in the cecum. Some estimate the incidence of cecal cancer presenting as appendicitis to be as high as 25%, although the exact figures are unknown [9]. Conversely, Lai et al. [1] found only 0.85% of patients with appendicitis were found to have colorectal cancer, when adjusted for age over forty, the rate more than doubled to 1.76% [1]. A study from Sweden demonstrated that 2.9% of those over the age of 40 with acute appendicitis were diagnosed with colorectal carcinoma within 3 years of appendectomy, a 30-fold increase compared to an age matched cohort [10]. Unfortunately, underlying colon cancer is often missed at appendectomy with only 18% to 38% diagnosed and resected at the initial operation, resulting in a mean delay in diagnosis of nearly six months [1,11].

To prevent a delay in diagnosis, a high index of suspicion for carcinoma should exist for patients who do not follow the expected post-operative course. Complications following appendectomy or abscess drainage such as recurrent wound infections, draining sinus tract, fecal fistula, or a persistent right lower quadrant mass should raise concern for an underlying carcinoma. Lai et al. [1] demonstrated the odds of colon cancer increased 38.5-fold among patients over 40-years of age with acute appendicitis leading some to recommend screening colonoscopy 6-weeks after appendectomy [1]. This recommendation seems justified as there is a decreased 5-year survival among those diagnosed with cecal cancer after appendectomy when compared to patients without a recent appendectomy [12].

CT scanning evaluation of abdominal pain and in the confirmation of appendicitis has become increasingly prevalent. Information obtained from the CT scan may raise or lowers the suspicion of underlying colon carcinoma in the setting of appendicitis. Such information offers significant benefits in patient management. First, the surgeon has the opportunity to select an appropriate operation prior to starting with the ability to consent the patient for a more involved procedure, such as a right hemicolectomy. Additionally, the surgeon is able to set appropriate pre-operative expectations with a patient and family. Although diagnosis is confirmed following pathology reports, setting that expectation prior to intervention and explanation that he or she will require intervention beyond a simple appendectomy is crucial. Many surgeons are comfortable with laparoscopic colonic resection; however, some surgeons may choose to perform resection via an open midline incision. The ability to discuss a realistic operative approach, potential for open midline approach, and setting patient expectations accordingly is important, especially given expectations of low conversion rate for laparoscopic appendectomy.

Despite the entire diagnostic tools available incidental ileocecal masses are sometimes discovered at the time of appendectomy. An ileocecal mass can pose a dilemma for a general surgeon as the mass may be secondary to benign conditions including appendicitis with perforation, cecal diverticulitis, typhlitis, Crohn's disease, cecal ulcers, ileocecal tuberculosis, and parasites [9]. However, due to concern for underlying carcinoma, traditional management of a cecal mass has been a formal right hemicolectomy with mesenteric

dissection for nodal sampling. While the morbidity and mortality of the hemicolectomy has been justified due to the potential for cancer; recent studies have questioned the need for hemicolectomy in all patients. Tung-Ping Poon et al. [13] studied 52 patients who underwent ileocecal resection or right hemicolectomy for an ileocecal mass identified at an operation for appendicitis [13]. Ninety-five percent of patients had a benign disease process with cecal diverticulitis or appendiceal phlegmon accounting for the majority of diagnoses. They noted 90% of patients had the correct diagnosis made intraoperatively following back table specimen evaluation. Performing ileocecal resection is associated with shorter operative times, hospital length of stay, and decreased morbidity than a right hemicolectomy [13]. Based on this study, the initial management of an unexpected ileocecal mass at the time of appendectomy should be ileocecal resection; however, the specimen must be examined on the back table or by frozen section to evaluate for the possibility of neoplasm. If a tumor is identified, a formal right hemicolectomy with mesenteric node dissection should be performed.

While the majority of malignant tumors of the colon will be adenocarcinoma, carcinoid tumors can be seen in both the appendix and cecum. Colonic carcinoids tend to have a poorer prognosis and be more advanced at the time of diagnosis, with upwards of two-thirds demonstrating nodal or metastatic disease, at time of presentation compared with rectal or appendiceal primary [14-16]. Fortunately, surgical management of colonic carcinoid tumors is similar to that of any other colonic tumor as a formal right hemicolectomy with mesenteric nodal dissection is appropriate [17]. Imaging should be reviewed if concern for carcinoid exists with particular attention to the liver and mesenteric lymph nodes. Fortunately, ileocecal resection with back table evaluation followed by completion right hemicolectomy at the time of the index operation provides ideal surgical intervention.

Appendiceal carcinoid is much different and often less advanced at diagnosis than colonic carcinoid due to associated symptoms, namely appendicitis. For patients in whom a tumor greater than 2 cm is identified or if mesenteric lymph nodes appear to be involved, a formal right hemicolectomy is recommended [18]. Additionally, appendiceal tumors less than 1cm without evidence of nodal disease can be treated by appendectomy alone [18]. Unfortunately, no clear recommendations for tumors between 1cm to 2 cm exist as many advocate for formal right hemicolectomy in the setting of positive margins or mesoappendiceal invasion greater than 3 mm; however, some argue the morbidity of a right hemicolectomy over appendectomy outweigh the oncologic benefits [18]. Ultimately, back table evaluation of an appendiceal tumor for size determination is crucial to proper surgical management.

Finally, a consideration in our patient is the potential to have avoided colectomy. While he was able to undergo definitive management at the time of initial operative intervention, his episode of melanic stools more than a year prior to presentation might have been an opportunity to intervene. Unfortunately, the appropriate workup was not completed. Melena is most frequently the result of Upper Gastrointestinal (GI) bleeding; however, lower GI bleeding may manifest as melena, more often with ascending colon neoplasms. While the majority of lower GI bleeds are due to diverticulosis neoplasms account for 3% to 11% of lower GI bleeds [19]. Thus a complete workup of melena, particularly in the setting of an elderly patient with a history of polyps, should include colonoscopic

evaluation to evaluate for the possibility of malignancy. While impossible to say, the size of his tumor at time of appendectomy suggests a polyp would have been visible at the time of colonoscopy had it been performed. Management at that time could have included endoscopic resection and potentially prevented need for colonic resection his subsequent appendicitis.

Conclusion

Appendicitis may be the first manifestation of an underlying colon cancer. A high index of suspicion is needed in patients over 40 years of age and in those who do not follow the typical post-operative course. Due to the relationship of cancer and appendicitis, all patients over the age of 40 should undergo colonoscopy approximately 6 weeks after surgery. Ileocecal masses unexpectedly found intraoperatively are often benign and can be managed with ileocecal resection if the specimen is carefully examined. A formal right hemicolectomy is still indicated if a neoplasm is identified intraoperative.

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