# Appendiceal Cancer

## summary

cancers and tumors (neoplasms) of the appendix are extremely rare with an estimated incidence of 0.15-0.9 per 100,000 people. the average age of onset is between 50 and 55 years, and they affect men and women equally. they most typically present either as appendicitis, a hernia filled with mucin, increasing abdominal girth, abdominal discomfort, an abdominal/pelvic mass, as an incidental finding on some form of imaging or at the time of surgery for a different indication. in women, they often spread to the ovaries and can be easily confused with ovarian cancer. making the diagnosis of appendiceal cancer requires examination of a tumor specimen. after starting in the appendix, appendiceal tumors and cancers frequently spread inside the abdominal cavity. depending on the type of tumor or cancer, this can lead to either the build-up of mucinous fluid in the abdomen known as pseudomyxoma peritonei (see separate rare disease report) or a condition referred to as peritoneal carcinomatosis (growth of cancer cells in the abdominal cavity—see related disorders section). treatment for appendiceal tumors and cancers varies depending on the stage (extent) of disease and the subtype.

## introduction

in addition to being quite rare, cancers and tumors of the appendix come in a wide variety of types. the most common type of tumor or cancer that occurs in the appendix is a neuroendocrine or carcinoid tumor. neuroendocrine tumors (nets) are derived from specialized cells that reside in the wall of the appendix or other part of the intestine called enterochromaffin (ec) cells. ec cells make chemicals that help facilitate gastrointestinal motility and digestion. nets (or carcinoid cancers) of the appendix have a unique tumor biology

and are treated differently than epithelial tumors or cancers of the appendix which arise from gland-forming cells lining the inside of the appendix. one of the functions of epithelial cells is to make mucin – a jelly-like substance that helps protect the lining of the intestine.

epithelial tumors and cancers of the appendix are further categorized based upon how the cells look microscopically and whether or not they are invading the wall of the appendix. the main categories include goblet cell carcinoid (see separate rare disease report), low-grade mucinous neoplasm of the appendix (lamn), high-grade mucinous neoplasm of the appendix (hamn) and adenocarcinomas. the adenocarcinomas are further classified as: well- differentiated, moderately-differentiated, poorly-differentiated and signet ring cell (src). these classifications are important for determining prognosis and treatment recommendations.

show less

print / download as pdf

synonyms

low grade mucinous neoplasm of the appendix (lamn)

high grade mucinous neoplasms of the appendix (hamn)

mucinous adenocarcinoma of the appendix

adenocarcinoma of the appendix

signet ring cell cancer of the appendix

goblet cell carcinoid

cystadenocarcinoma

nonmucinous adenocarcinoma

colonic type adenocarcinoma

subdivisions

goblet cell carcinoid

low-grade mucinous neoplasm of the appendix (lamn)

high-grade mucinous neoplasm of the appendix (hamn)

adenocarcinoma: well-differentiated

adenocarcinoma: moderately-differentiated

adenocarcinoma: poorly-differentiated

adenocarcinoma: signet ring cell (src)

signs & symptoms

at the time of diagnosis, appendiceal cancer can be either localized to the appendix or have spread to other parts of the body – particularly the abdominal cavity or peritoneum. for appendiceal cancers that are localized, the most common signs and symptoms are those of acute appendicitis – namely right lower abdominal pain. for appendiceal cancers that have already spread away from the appendix, the most common presenting signs and symptoms are vague abdominal discomfort and increasing abdominal girth. in men, the first presenting sign may

be a hernia that gets distended by mucin. in women, the first presenting sign may be a pelvic mass that is presumed to be ovarian cancer. due to the very thin wall of the appendix, finding appendiceal cancer that has already spread at the time of diagnosis is more common than finding it confined to the appendix.

due to the structure of the appendix (a long, thin-walled, finger-like projection off the right colon), it is easy for tumor or cancer cells to break through the wall and spread in the abdominal cavity. consequently, most appendiceal cancers, even the less aggressive ones, tend to present at an advanced stage with peritoneal carcinomatosis. once the cancer cells have spread, they continue to grow and may cause abdominal discomfort, distention, a fluid build-up called ascites or pseudomyoma peritonei (mucinous ascites), and intestinal blockage or dysfunction. over time this can lead to decreased appetite, early satiety (feeling full after eating only a small amount), nausea and vomiting.

appendiceal cancers rarely spread outside the abdominal cavity, and it is most commonly seen in poorly-differentiated or signet ring cell (src) cancers. however, once the cancer cells escape from the appendix, they can continue to grow in the abdominal cavity, on the surface of other organs such as the omentum, intestines, ovaries, uterus, liver, spleen and peritoneum (lining of the abdominal cavity). this condition is called peritoneal carcinomatosis (see related disorders) – which means growth of cancer cells within the abdominal cavity. over time, without treatment, this condition can result in blockage of the intestines or loss of intestinal function.

causes

the exact cause of appendiceal cancer is unknown. there are no genetic, familial or environmental factors known to cause this

disorder. it does not run in families. one study has shown a correlation with the presence of the intestinal bacterium helicobacter pylori and pseudomyoma peritonei from appendiceal neoplasms. this has prompted a clinical trial using antibiotic therapy to eradicate the bacteria. this study is still on-going at the time of this report. recent studies have shown that appendiceal cancer do have a unique genomic profile distinct from adenocarcinomas of the colon which may offer future, appendix-specific and targetable pathways for treatment.

affected populations

appendiceal cancer is very rare with approximately 1-2 cases per 1 million individuals. appendiceal cancers can occur at any age, with the peak occurrence in the 6th decade (average age of 50 at diagnosis). most studies report that men and women are affected in equal numbers, while a few have suggested a slightly increased frequency in women.

disorders with similar symptoms

peritoneal carcinomatosis is the spread and growth of cancer cells in the abdominal cavity. cancers that are most frequently associated with peritoneal carcinomatosis include the gastrointestinal (colon, rectal, appendiceal, gastric, pancreas, small bowel and gallbladder) and the gynecologic (ovarian, primary peritoneal, and uterine) cancers. other cancers that can spread to the abdominal cavity include breast, esophagus, and melanoma. gastrointestinal stromal tumors (gists) are a subtype of sarcoma of the intestine that can also present with multiple cancer tumors in the abdomen. peritoneal mesothelioma is a cancer that originates in the lining of the abdominal cavity (peritoneum) and presents with signs and symptoms of peritoneal carcinomatosis.

## diagnosis

because there are no unique features of appendiceal cancer on imaging studies such as ultrasound, ct scan, pet scan or mri, the actual diagnosis of appendiceal cancer cannot be made until a tumor specimen is examined by a pathologist. this is frequently accomplished at the time of appendectomy for appendicitis, surgery for an intestinal blockage or presumed ovarian cancer, or through a diagnostic tumor biopsy performed for an abnormal clinical or radiographic finding such as a palpable tumor or tumors seen on an imaging study. the finding of a dilated, mucin filled appendix on ct scan or mri should prompt concern for an appendiceal tumor and an appendectomy should be considered. the different types of appendiceal tumors and cancers can be distinguished by the appearance of the cells under the microscope and by staining them for specific markers. goblet cell carcinoid tumors tend to be easier to identify because of the unique combination of neuroendocrine and epithelial cells.

## standard therapies

once the diagnosis is established, a staging work-up including imaging studies (most commonly a ct scan of the chest, abdomen and pelvis) and tumor marker blood tests (cea, ca 19-9 and ca 125) should be performed. (tumor markers are proteins made by the cancer cells that can be measured in the blood.) treatment recommendations depend on both the histology (the microscopic structure of the tumor cells) of the cancer cells and whether or not it is localized or disseminated. most of the larger and more recent studies recommend surgical removal of the right side of the colon (right hemicolectomy) for moderately-, poorly-differentiated and src appendiceal cancers to ensure that all the disease has been removed and to test the regional lymph nodes for any cancer cells. there is some debate about the utility of right hemicolectomy for well-differentiated appendiceal cancers as the risk of spread to regional lymph

nodes is low (<5%). lamn do not require a right hemicolectomy as they do not spread to regional lymph nodes.

for lamn that have not spread in the abdomen, an appendectomy is all that is required. for adenocarcinomas that have not spread to the abdomen, surgery to remove the right side of the colon where the appendix originates is recommended to determine if there has been any spread of cancer cells to the local lymph nodes. for tumors and cancers that have spread away from the appendix and into the abdominal cavity or into the local lymph nodes, either intravenous chemotherapy and/or additional surgery to remove the cancer, and often heated chemotherapy delivered directly into the abdomen (hipec) should be considered.

the role of right hemicolectomy in hamn is still being determined.

for moderately-, poorly-differentiated and src appendiceal cancers that have spread to regional lymph nodes or other organs outside the abdominal cavity, the usual recommendation is for systemic (intravenous) chemotherapy. 5-flourouracil-based chemotherapy regimens (the same that are used to treat colon cancer) are typically recommended. if the cancer has spread in the abdominal cavity, cytoreductive surgery to remove the cancer and abdominal perfusion with hyperthermic (heated) chemotherapy (a procedure known as hipec) to prevent cancer recurrence should be considered as part of the treatment regimen along with systemic chemotherapy. this should be performed at an experienced hipec center. for lamn and well-differentiated appendiceal cancers that have spread to the abdominal cavity, the usual recommendation is for cytoreductive surgery and hipec.