Management of Malignancy-Related Ascites

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A 65-year-old Polish immigrant named T.J. was diagnosed with metastatic colon cancer in January 2012 when he presented with obstructing sigmoid colon cancer and liver metastases. A diverting colostomy as well as biopsy of his liver metastases was performed and chemotherapy with FOLFOX (5-fluorouracil [5-FU], leucovorin, oxaliplatin) and bevacizumab was initiated. After three months, he transitioned to maintenance therapy with infusional 5-FU and bevacizumab until he progressed in August 2012. Oxaliplatin was reintroduced and he responded until he developed progressive neuropathy in November and his therapy was changed to FOLFIRI (5-FU, leucovorin, irinotecan) and bevacizumab. T.J. developed liver progression after three months and, because he was *Kras* wild type, irinotecan and panitumumab were initiated. Liver-directed therapy also was pursued and he underwent radioembolization with yittrium-90 followed by chemoembolization with irinotecan-eluded beads. At the time of these procedures, T.J.'s portal and hepatic venous systems were patent (i.e., no thrombosis or obstruction causing portal hypertension).

T.J. did well for seven months until he developed liver progression and, because his neuropathy had significantly improved, FOLFOX was reintroduced. He developed ascites after three months of therapy, with abnormal liver function tests and an elevated bilirubin as well as lower extremity edema. Computed tomography (CT) scans revealed progression of disease with no biliary duct dilatation, and liver dysfunction was attributed to parenchymal disease. A therapeutic paracentesis was performed and 4 L of straw-colored ascites were drained with cytology revealing malignant cells, consistent with a colon adenocarcinoma. T.J.'s ascites rapidly reaccumulated and he underwent another paracentesis one week later. An indwelling intraperitoneal drainage catheter was suggested to allow more convenient drainage at home and a Tenckhoff catheter was inserted.

Arrangements were made to obtain proper equipment as well as a visiting nurse to assist with home drainage. Dressing and cap changes were performed aseptically on a weekly basis or more often if needed. Drainage was performed by twisting the cap, which allowed fluid to drain out of the catheter and into a container. T.J. had difficulty with leakage around the catheter because of his rapid accumulation of ascites. He was draining 3–4 L twice per week but, when the schedule was changed to 1 L per day, leakage improved.

At an office visit, T.J. complained of abdominal pain, nausea, vomiting, and a low-grade fever. Skin around the catheter did not appear to be infected and leakage was minimal. T.J. was admitted to the hospital and CT scans revealed wall thickening of the transverse and sigmoid colon most consistent with inflammation or infectious etiology. The ascitic fluid was cultured and positive for enterbacter species and *Stenotrophomonas maltophilia*. He was treated with triple antibiotics, vancomycin, sulfamethoxazole-trimethoprim, and linezolid, and the indwelling intraperitoneal drainage catheter was removed. T.J. recovered from his infection; unfortunately, his liver dysfunction progressed and he died during his hospitalization.

This case sparked a quality improvement initiative to examine the catheters, equipment, and procedures used to manage outpatient peritoneal drainage catheters at the author's institution. A collaborative effort included office, infusion, and interventional radiology nurses, physicians from interventional radiology, infectious disease and the wound care service, as well as consultation with other institutions and medical equipment companies. Principles of management of an indwelling peritoneal catheter and drainage of malignant ascites will be addressed.

Malignancy-Related Ascites

Malignancy-related ascites are caused primarily by three conditions: peritoneal carcinomatosis, extensive liver metastases, or a combination of both (Runyon, 2014; Runyon et al., 1992). Malignant tumors, such as gastric, colon, pancreas, lung, and breast, are most often associated with liver metastases and peritoneal carcinomatosis, whereas ovarian and bladder cancers most frequently cause peritoneal carcinomatosis. Lymphoma can obstruct lymphatic drainage, resulting in chylous ascites, and hepatocellular cancer (HCC) occurs in the setting of cirrhosis of the liver, which also is associated with ascites (Runyon, 2014). This article will not address malignant ascites of lymphoma or HCC.

Malignancy-related ascites of advanced cancer carries a poor prognosis and limited lifespan of one to four months, except in untreated ovarian cancer (Ayantunde & Parsons, 2007). Ovarian cancer is very chemosensitive and responds to systemic as well as intraperitoneal chemotherapy and has a different disease trajectory. Ascites will affect the patient's quality of life, causing an array of symptoms such as abdominal distention and discomfort, shortness of breath, anorexia and early satiety, nausea and vomiting, reflux, lower extremity edema, fatigue, and decreased mobility (Tapping, Ling,

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