

Surgery with HIPEC offers effective regional treatment for select metastatic abdominal cancers



Hyperthermic intraperitoneal chemoperfusion (HIPEC) is a regional chemotherapy that is paired with cytoreductive surgery (CRS) to eliminate cancer cells that remain in the abdominal cavity after visible cancer cells have been removed. The chemotherapy drug is warmed and circulated throughout the abdomen to kill microscopic cancer cells and reduce the risk of cancer recurrence. Because the chemotherapy agent does not circulate through the bloodstream, higher doses can safely be used without the side effects usually associated with systemic chemotherapy.

Patients who are good candidates for cytoreductive surgery with hyperthermic intraperitoneal chemoperfusion are those with low-grade malignancies that have spread within the abdominal cavity, but are not at high risk to metastasize outside the abdomen. These patients — who do not typically respond well to systemic chemotherapy — include those with low-grade appendiceal and colorectal tumors and patients with low-grade peritoneal mesothelioma. Patients whose appendiceal adenomas have led to pseudomyxoma (see sidebar) are especially good candidates for the procedure.

Ultimately, CRS/HIPEC can be applied to a variety of clinical situations and tumor types. Treatment decisions should be made on a case-by-case basis in consultation with an experienced surgeon.

Pseudomyxoma effectively treated with CRS/HIPEC

Pseudomyxoma peritonei is a clinical syndrome often caused by an adenomatous lesion within the appendix (low-grade mucinous neoplasm of the appendix, or LAMN) that secretes a gelatinous substance called mucin. The appendix dilates as it fills with mucin and over time can rupture, spilling adenomatous cells and mucin into the abdominal cavity, explains Jonathan C. King, MD, assistant professor of general surgery at UCLA.

The adenoma cells can implant throughout the abdomen, primarily in the omentum and along the surfaces of the intestines and other visceral organs. These cells autonomously produce more mucin, and can eventually fill the entire abdomen with the substance.

“Pseudomyxoma is a surgical disease. There is no systemic chemotherapy that will effectively treat this condition,” says Dr. King. “The only effective treatment is to remove mucin and tissue that contains adenomatous cells and perfuse the abdomen using HIPEC to treat the remaining microscopic cells.”

About the procedure

Treatment begins with cytoreduction to remove the primary tumor. To the extent possible, palpable or visible disease is removed from wherever it has spread in the abdomen. Omentectomy is often performed as a precaution as metastatic cancer often first spreads to the omentum. For female patients, prophylactic oophorectomy is also sometimes performed.

Chemoperfusion immediately follows the cytoreduction. The abdomen is temporarily closed and a perfusion cannula is inserted. A heated solution of the chemotherapy agent is pumped through the cannula and perfuses the abdomen. The chemotherapy solution — usually mitomycin C — is heated to between 41 and 43 degrees Celsius. The heat enhances the cytotoxicity of the chemotherapy agent as the cancer cells have a disordered heat-shock response and are more sensitive to moderate hyperthermia.

Because there is limited absorption of the drug into the patient's circulation during HIPEC, physicians are able to administer very high doses of the chemotherapy agent that are extremely toxic to the cancer cells while avoiding the side effects typically seen when chemotherapy drugs are administered intravenously.

The heated chemotherapy solution is circulated continuously while the abdomen is agitated to ensure even distribution of the chemotherapy solution at a uniform temperature. After 100 minutes of perfusion, the abdomen is reopened and the perfusion cannula is removed. If bowel anastomosis is necessary to rejoin sections of bowel where tissue has been resected, it is performed after perfusion. The procedure is completed with a final closure of the abdomen.

Results of CRS and HIPEC

Outcomes of CRS/HIPEC for patients with pseudomyxoma are among the most favorable. Survival rates for these patients measure in decades in large studies.

For abdominal malignancies that are not likely to spread beyond the abdomen — including low-grade appendiceal and colorectal cancer and peritoneal mesothelioma — the prognosis for treatment with cytoreduction and HIPEC relies heavily on tumor histology, though other indicators, including serum tumor markers, can help the surgeon predict the response to this treatment. Outcomes are greatly dependent on the extent of the disease and degree to which the surgeon is able to resect the cancer.

Cytoreduction can be limited by a number of factors, notably by involvement along the small bowel and the need to leave enough of the small bowel intact to ensure the patient's nutritional needs are met.

Risks of CRS/HIPEC include those typical for this type of resective procedure, including wound infections and healing of any anastomoses. Because there is limited absorption of the chemotherapy agent, side effects are less commonly seen than with systemic chemotherapy, but for mitomycin include low concentration of white blood cells (neutropenia), which can be treated with growth factors.

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