Bedside Intraperitoneal Chemotherapy for Recurrent Pseudomyxoma Peritonei, an Alternative to Current Methods in a Low-Resource Tertiary Center

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Pseudomyxoma peritonei (PMP) is a condition presenting with tumors of the abdominal cavity presenting which could lead abdominal distention and ascites secondary to mucus production. Tumors of this type are potentially fatal due to their obstructing of abdominal structures. The current management of the condition includes surgical debulking with intraoperative or postoperative chemotherapy with protocols such as hyperthermic intraperitoneal chemotherapy and early postoperative intraperitoneal chemotherapy (EPIC), respectively. We describe herein a case in which a tumor debulking surgery was performed. Afterwards, we placed intraperitoneal catheters so that a 4-day regimen of bedside intraperitoneal 5-fluorouracil chemotherapy could be administered on her bedside. Chemotherapy was infused and removed with the use of Hemovac and Jackson-Pratt drainage catheter systems attached to suction, for the intrahospital management of recurrent PMP in a young Hispanic female patient. Though it requires further study, we propose this method as a safe and effective alternative to current strategies at low income or resources centers. [*P R Health Sci J 2022;41(2):96-99*]

Key words: Pseudomyxoma peritonei, Intraperitoneal chemotherapy, EPIC, HIPEC

Pseudomyxoma peritonei (PMP) is a rare condition that leads to a low-grade intra-abdominal tumor that tend to arise from appendiceal adenomas that cause lumen closure, rupture, and mucus spreading (1,2). Cases are found in 1 of every million individuals in the United States (2). These tumors lack the capacity to metastasize to solid organs, yet they can be fatal by causing intra-abdominal compression with associated complications, hence the need for surgical cytoreduction with a chemotherapeutic modality) (1,3). There is extensive evidence that these regimens lead to improved survival (1,2).

Many therapies are available after surgical tumor debulking. Early postoperative intraperitoneal chemotherapy (EPIC) consists of drug administration into the peritoneal cavity from the first postoperative day to the fourth up to the seventh. After infusion, the chemotherapy solution dwells in the peritoneum for 23 hours and is then drained for 1 hour before re-administration (4). Current standard therapies also include hyperthermic intraperitoneal chemotherapy (HIPEC), which consists of a 42°C solution containing a chemotherapeutic agent that combines, intraoperatively a chemotherapeutic effect, hyperthermic malignant cell destruction, and increased abdominal cavity penetration (5,6). HIPEC is associated with increased survival time for patients affected by peritoneal carcinomatosis (7,8). It has also proven to be effective for both palliative and adjuvant purposes (9). As new chemotherapeutic regimens have appeared, retrospective assessments of FOLFOX-4, which consists of the infusion of oxaliplatin, L-folinic acid, and 5-fluorouracil (5-FU), have shown this chemotherapy to be promising in unresectable cases (10,11). Additional therapies consisting of platinum, mitomycin C, cisplatin augmentation with doxorubicin, and taxanes are available for HIPEC–EPIC chemotherapeutic regimens (12).

Many limitations exist regarding the availability of the intraoperative HIPEC infusion system and FOLFOX. Cost, equipment, and personnel are the most common limitations in our practice, a reality that warrants consideration in terms of aiding our most vulnerable patient population. At our institution, due to the unavailability of intraperitoneal chemotherapy at community and specialized centers, we present a feasible, safe, and effective strategy of bedside early postoperative FOLFOX intraperitoneal chemotherapy administration. Our goal is to present a safe, economic, and efficient system for intraperitoneal chemotherapy administration when HIPEC is not available.

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Patient history

This is the case of a 44-year-old female who was diagnosed with appendiceal mucinous cystadenocarcinoma in 2015. After multiple abdominal surgeries, neoadjuvant chemotherapy, and several recurrences, she underwent tumor debulking surgery; intraperitoneal catheter placement was performed on August 5, 2019.

Surgical procedure

The patient was taken to the operating room for an exploratory laparotomy. The abdominal cavity was entered, and multiple pelvic and intraperitoneal implants were dissected until no macroscopic evidence of disease was present. Six drainage catheters were placed in all 4 quadrants of her abdomen, after which, the area was closed without complications. The procedure was well tolerated, and the patient was taken to the intensive care unit.

Chemotherapy regimen and setup

The chemotherapy regimen consisted of 5-FU, 800 mg, and 50 mEq of sodium bicarbonate in 1 L of D5W via the upper right quadrant abdominal catheter, at full drip. The other 5 catheters were clamped for 23 hours, with the solution dwelling in the intra-abdominal cavity (Figures 1 and 2).

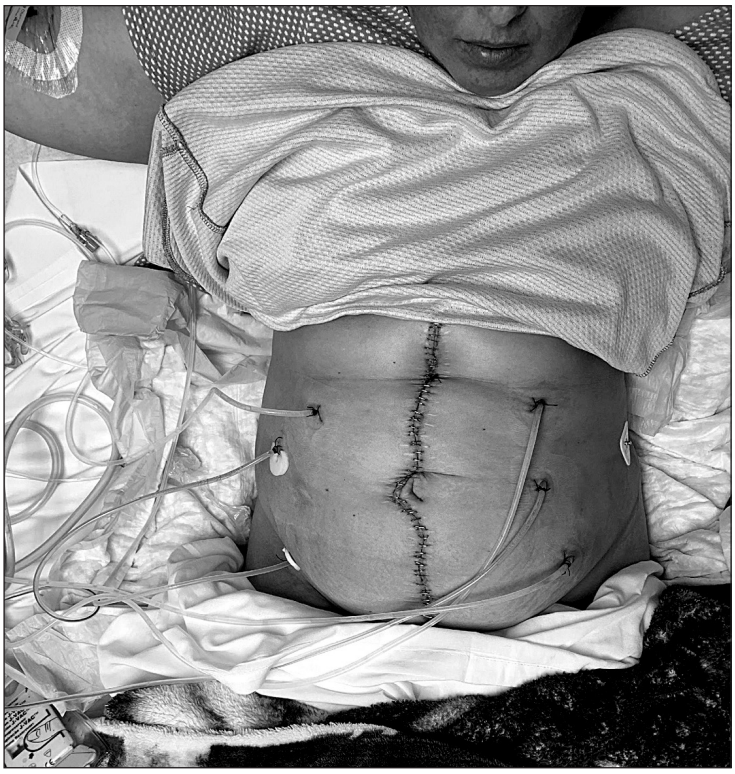

Figure 1. Display of abdominal placement of EPIC administration and suction lines. The patient is in a supine position with an input catheter placed in the upper right position and with 5 suction lines connected to suction cannisters.

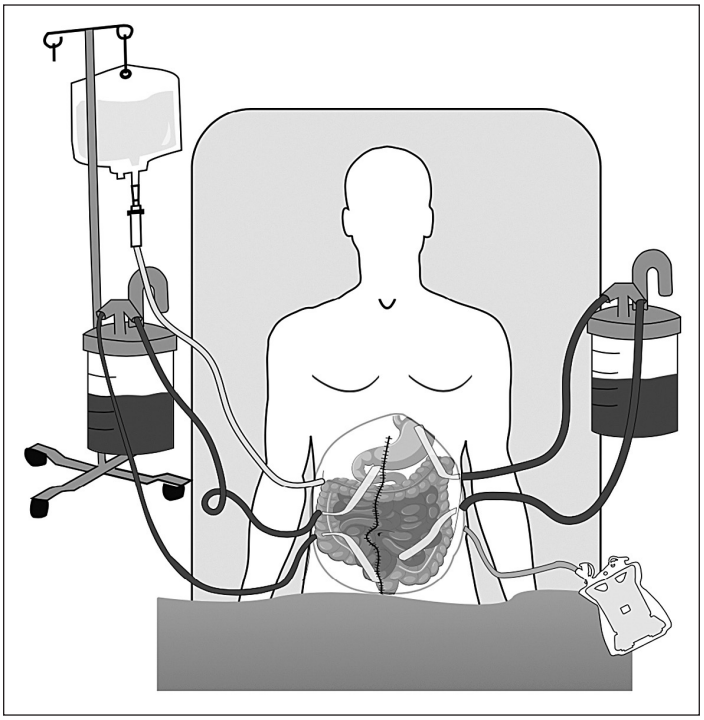

Figure 2. Schematic display of the abdominal placement of EPIC administration and suction lines. Upper left corner shows the chemotherapeutic agent; the suction cannisters are shown bilaterally, in addition to the suction drainage in the lower right corner.

The patient was directed to change positions every 30 minutes for optimization of the chemotherapy delivery throughout the abdominal cavity and pelvis. After the 23-hour period, the chemotherapy solution was removed through the intra-abdominal catheters, which were connected to suction canisters with a wall suction system.

EPIC was started on postoperative day 2. Fluid in the abdominal cavity was removed via the intraperitoneal catheters prior to the administration of chemotherapy. After suctioning the abdominal cavity fluid and while the patient was in a supine position, the EPIC protocol was administered. To verify that over 95% of the chemotherapy solution had been removed, the total output of the suction catheters was measured. The regimen was administered continuously for 4 days, with 1-hour intervals for the removal of the solution between cycles. The patient received nothing by mouth during chemotherapy administration, and her hemodynamics were monitored continuously.

Hospitalization outcomes

The patient remained hospitalized for a 9-day period without any episodes of fever or leukocytosis; nor were there any wound complications. The patient did not have any complaints, except for postoperative

pain, which was managed using a multimodal approach. The patient tolerated chemotherapeutic infusion. She remained hemodynamically stable and had adequate urine output. Our patient cooperated by making regular position changes during the chemotherapy administration, hence displaying no significant incapacity secondary to possible treatment-associated symptoms. The patient started to pass flatus after 72 hours, postoperatively. A regular diet was started on postoperative day 7. The patient received her last therapeutic session in the surgical ward. Intra-abdominal catheters were removed prior to her discharge. The patient resumed postoperative care with the oncology services, demonstrating an adequate response to therapy. Two years after the intervention, in September 2021, the patient resumed follow-up with surgical and hematology oncology and is currently in remission from disease, on surveillance.

Discussion

Tumor debulking surgery and intraperitoneal chemotherapy increase survival time and disease-free interval. HIPEC is considered the gold standard for managing these types of tumors with good outcomes (7,8). Unfortunately, HIPEC is an expensive and laborious alternative due to the need for intraoperative administration and prolonged operative time, as well as the requirements of special infusion and solution temperature control with specialized equipment, which is not readily available in all medical institutions in the United States. In low-resource centers, alternative strategies consisting of using cardiac pumps, which are not approved for administering HIPEC, have been used (13,14).

Approximately 25% of patients who receive HIPEC experience elevated morbidity, including, for example, cardiopulmonary complications (3,15). Furthermore, the literature has demonstrated that there are challenges with HIPEC equipment in terms of controlling fluid flow and temperature. In addition, the contamination of healthcare workers with antineoplastic medications during HIPEC administration has been described (16). Klaver et al concluded that in animal models, the higher temperature solution of the chemotherapeutic solution used for HIPEC improved survival compared to the intraperitoneal chemotherapy solution delivered at room temperature (17). Even though EPIC has been associated with increased hospital stays, it is a feasible option when HIPEC is not available. In animal models, EPIC has been demonstrated to be superior to HIPEC at increasing survival time (18). It also offers a localized therapy that reduces the potential for recurrence (19,20). The current HIPEC protocols have been shown to have better outcomes when EPIC is incorporated (21).

We developed a successful method for delivering this therapy, one whose efficacy was not reduced by ours being a low-resource institution and that ensured both the adequate administration of chemotherapy and effective patient monitoring.

Conclusion

In hospital institutions where HIPEC is not available for administration, the EPIC protocol provides an excellent alternative for intraperitoneal chemotherapy administration without the associated cost of equipment, patient morbidity, and risk to personnel.

Further prospective studies to determine the efficacy of EPIC compared to that of HIPEC are warranted; it is our assertion that EPIC can be administered through intraperitoneal catheters without increasing morbidity. Studies with a larger are needed to determine the effectiveness of this protocol in terms of survival. We recommend our approach as a safe and effective short-term alternative to HIPEC in the provision of intraperitoneal chemotherapy for the management of PMP.

Resumen

Pseudomyxoma Peritonal (PMP) son tumores en la cavidad abdominal que podrían presentarse con distención abdominal y ascitis secundaria a producción de moco. Son potencialmente fatales por la obstrucción a estructuras abdominales. El manejo actual incluye cirugía citorreductora con protocolos de quimioterapia intraoperatoria o postoperatoria como quimioterapia intraperitoneal hipertérmica y quimioterapia intraperitoneal postoperatoria inmediata. Describimos un caso en el cual, luego de la cirugía citorreductora se colocaron catéteres intraperitoneales para administrar un régimen de 4 días de quimioterapia con 5-fluorouracilo en la cama de la paciente. Se administró y removió usando sistema de catéteres de drenaje Jackson-Pratts (JP) y Hemovac adheridos a sistemas de succión de pared para una latina joven con PMP recurrente. Proponemos una alternativa para aplicar, requiriendo más estudios para administración a corto plazo de EPIC.

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