In January 2006, a clinical announcement made by the National Cancer Institute suggested that intraperitoneal chemotherapy become standard care for patients with newly diagnosed stage III, optimally debulked epithelial ovarian cancer. Intraperitoneal chemotherapy is new to many healthcare providers (i.e., physicians, nurses, and pharmacists). This article will discuss how to implement intraperitoneal chemotherapy in practice. Education and experience are the keys to successful implementation.

**FEATURE ARTICLE**

**Implementation of Intraperitoneal Chemotherapy for the Treatment of Ovarian Cancer**

Catherine Hydzik, RN, MS, AOCN®

Intraperitoneal (IP) chemotherapy is emerging as the standard of care for patients with newly diagnosed stage III, optimally debulked epithelial ovarian cancer. IP chemotherapy first was introduced in 1955 by Weisberger, Levine, and Storaasli, who used nitrogen mustard intraperitoneally for malignant ascites. The rationale for IP chemotherapy was described in 1978 by Dedrick, Myers, Bungay, and DeVita using a mathematical model. The authors demonstrated that certain agents had a greater concentration and longer half-life in the peritoneal space when compared with IV administration. In search of new treatments for ovarian cancer, researchers conducted clinical trials with IP chemotherapy starting in the mid-1980s; the initial studies focused on safety and feasibility. IP chemotherapy was never accepted completely by the healthcare community because it required more resources, involvement, and expertise than IV chemotherapy. In addition, healthcare providers were concerned about outcomes, adverse effects, and toxicities for patients as well as the need to identify ideal candidates (i.e., patients with limited, small-volume residual disease without adhesions). In January 2006, the National Cancer Institute (NCI) reported that clinical trials showed IP to be safe and effective. As a result of the announcement, interest in IP chemotherapy was renewed. According to Armstrong et al. (2006), IP chemotherapy improves progression-free survival (PFS). The median PFS in a patient group that underwent IV therapy alone was 18.3 months compared to 23.8 months in a group that underwent combined IV and IP therapy. In addition, an improvement of 15.9 months was reported in median overall survival (49.7 and 65.6, respectively) of patients with ovarian cancer whose tumors were optimally debulked (Armstrong et al.).

IP chemotherapy is new to many healthcare providers; therefore, this article will discuss how to implement IP chemotherapy in practice. For implementation of any new procedure to be successful, healthcare providers must be educated and develop expertise.

**At a Glance**

- A National Cancer Institute announcement supported the use of intraperitoneal (IP) chemotherapy for patients with newly diagnosed stage III, optimally debulked ovarian cancer.
- Resources and education can assist staff in caring for patients receiving IP chemotherapy.
- Healthcare professionals should educate patients and families regarding symptom management strategies.

**An Institutional Approach**

Memorial Sloan-Kettering Cancer Center (MSKCC) began using IP chemotherapy in 1984. A nursing task force was created to establish IP chemotherapy as a standard of care and ensure that staff members were knowledgeable about current IP practices. The task force is ongoing and consists of gynecologic nurses from surgery, medicine, and treatment units. The task force consults with the nursing education service, surgeons, medical oncologists, and pharmacists as needed. Other institutions frequently contact the task force for information regarding IP chemotherapy standards.

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The task force developed an IP manual, which contains the IP chemotherapy administration procedure, IP chemotherapy skill checklist, and literature (i.e., NCI announcement, recent studies, and IP chemotherapy articles and resources) so information and references are readily available to staff members. See Figure 1 for a list of Internet resources.

Education

Education and a cohesive healthcare unit are imperative to provide the best care. IP chemotherapy education begins by understanding the history of epithelial ovarian cancer (see “Ovarian Cancer: An Overview of Treatment Options” on pp. 201–207), establishing an IP chemotherapy procedure, and identifying ideal candidates for IP chemotherapy (i.e., patients with newly diagnosed stage III, optimally debulked (< 1 cm residual) ovarian cancer). Therapy administration requires access to the peritoneal cavity using an implantable port with another device, such as a fenestrated catheter (e.g., 14.3 French). Healthcare professionals also recommend using a single-lumen venous implantable port with a blunt, open-ended catheter (e.g., 9.6 French). See Figure 2 to compare the devices. The fenestrated catheter is large with multiple openings and significantly differs from the blunt, open-ended design of the open-ended catheter. Healthcare professionals have suggested that the use of peritoneal catheters with fenestrations and Dacron cuffs correlates with a greater incidence of bowel adhesions and erosion (NCI, 2006; Walker et al., 2006). IP ports currently do not have Dacron cuffs, and a randomized trial has not been conducted to determine which implantable port should be used for IP chemotherapy. Markman and Walker (2006) stated that fenestrated catheters seem to encourage fibrous sheath formation and bowel adhesions and are difficult to remove in the ambulatory setting; however, no complications with IP port removal were noted in personal experience. Davidson et al. (1991) analyzed 227 patient charts at MSKCC, reporting that 8.8% (n = 20) of patients had inflow obstruction, 5.3% (n = 12) had catheter-related infections, and 3.5% (n = 8) had bowel perforations. However, a decade later, Makhija et al. (2001) reported a decrease in complication rates for IP ports in a study of 301 patients at MSKCC. The results showed that, overall, 10% (n = 30) of the patients had catheter-related complications, 6.3% (n = 19) experienced inflow obstruction, and 3.6% (n = 11) experienced infection. Ninety-three percent of the patients completed their planned therapy. Catheter-related complications have decreased, suggesting that placement technique, administration, and management of IP chemotherapy have improved, although further research is needed in this area.

Ideally, the port is placed on the inferior thorax at the midclavicular line during the initial cytoreductive procedure. Gynecologic oncologists should discuss potential benefits of IP chemotherapy during patients’ preoperative visits.

Administration

The MSKCC performance checklist outlines IP chemotherapy administration (see Figure 3). Prior to accessing the IP port, nurses verify placement based on the postoperative note or computed tomography scan. The catheter lies or floats freely in the peritoneal space. Patients may have a venous and IP port; nurses should identify each port before administration. Treatment is given using a 19-gauge, noncoring, right-angle Huber needle. Depending on patients’ size and port placement, nurses select the appropriate needle length (1” or 1.5”). The procedure is performed using a sterile technique. Following port access, nurses secure the noncoring Huber needle in place with a transparent dressing. At MSKCC, the IP port is not heparinized because blood does not return in the peritoneal space; no problems have been experienced using normal saline. Some institutions do heparinize; heparin-flush dosing for IP ports ranges from 100–2,000 units. The IP procedure is performed preferably in a bed with a patient lying flat. If a patient is uncomfortable, the bed may be adjusted by elevat-
General Procedure
- Performs pretreatment assessment on patient
- Verifies Adult Treatment Order according to MSKCC’s [Memorial Sloan-Kettering Cancer Center’s] policy
- Obtains prepared agent(s) from pharmacy. With a second RN, checks patient’s name and MRN [medical record number], date of administration, agent, dosage, and route against physician’s order
- Instructs patient/care partner(s) regarding possible side effects and self-care measures to minimize or prevent these side effects

Accessing Intraperitoneal Port
- Verifies peritoneal port placement via operative note or scan
- Instructs patient to empty his/her bladder
- Positions patient in comfortable reclining position in bed
- Primes normal saline with macro drip tubing
- Identifies implanted port system by palpating outer raised perimeter of port
- Assesses port for signs and symptoms of infection
- Opens sterile dressing kit and dons mask
- Dons sterile gloves
- Sets up supplies on sterile field
- Using sterile technique places appropriate length noncoring Huber point needle on sterile field
- Applies Chloraprep® [Enturia Inc.] applicator, by using a back and forth scrubbing motion for 30 seconds, and allows to dry for 30 seconds
- Withdraws normal saline into syringe from vial using multidose vial access adaptor and attaches syringe to extension tubing of noncoring Huber point needle administration set
- Flushes noncoring Huber point needle administration set with 1–2 ml normal saline and leaves syringe attached to extension tubing
- With nondominant hand, stabilizes perimeter of port with index finger and thumb and holds it there while accessing port
- With dominant hand, accesses port by
  - Holding hub of noncoring Huber point needle and stabilizes needle by exerting pressure on right angle with index finger
  - Asking the patient to take deep breath and hold (if possible); inserts needle at a straight angle into port septum, using steady firm pressure until the needle stops at the base of the reservoir
- Instills remaining 8–9 ml normal saline into port noting ease of flow of normal saline or swelling/pain around port site
- Pulls back on syringe plunger to assess for ascitic fluid (Back flow of ascitic fluid will not always occur because of one-way valve effect.)
- If unable to obtain fluid, attempts to flush port with saline again
  - If still unable to obtain fluid but there is no resistance and fluids run freely, proceeds with treatment
  - If resistance is felt or if there are signs of swelling, discontinue procedure and remove noncoring Huber needle.
  - Attempt to reaccess port a second time, using new sterile equipment.

Administering Treatment
- Attaches primed normal saline IV tubing to extension tubing of noncoring Huber point needle and opens clamp of extension tubing
- Opens clamp completely on IV tubing and infuses approximately 50 ml of NS [normal saline] while observing for signs of swelling; if no swelling, places transparent dressing over needle to secure in place
- Connects the tubing with the intraperitoneal agent to the distal clave of the primary IV line, opens clamp of agent, and closes clamp of normal saline
- Instructs patient to lie flat in bed during drug instillation

Directions: Evaluator must validate competency on three occasions. Evaluator will document the date/initials after staff successfully demonstrates competency.
ing the head up to 30°. Bed rest is recommended during the administration. When IP chemotherapy is complete, the port is flushed with 10 ml of normal saline and deaccessed. Nurses should apply a pressure dressing and instruct patients to turn from side to side every 15 minutes for an hour. The IP port and catheter may be removed three to four weeks after completion of IP chemotherapy.

To administer treatment, nurses must be familiar with the regimen, specific agent(s), and clinical consideration for each agent. A preprinted chemotherapy order can be developed to standardize IV and IP chemotherapy administration and decrease potential errors. For example, at MSKCC, IP cisplatin requires patients to receive 2 L of IV hydration and antiemetic premedication and void at least 100 ml per hour for two hours. IP cisplatin chemotherapy is mixed in 2 L of normal saline and administered by gravity at room temperature; some institutions warm the solution to body temperature before administration to prevent patients from feeling cold. Most patients do not feel a temperature change during IP administration. If patients report feeling cooler, blankets provide quick and easy relief. Currently, no evidence-based guidelines exist regarding solution temperature during administration.

Management

Nursing management for patients receiving IP chemotherapy is outlined in Table 1. Patients should be educated about potential side effects and complications (see “Your Guide to Intraperitoneal Therapy” on pp. 215–216). Nurses should inform patients that most side effects will subside within 48 hours after chemotherapy administration is completed.

Limitations

When implementing IP chemotherapy in the ambulatory setting, resources, scheduling system, and unit flow should be considered. IP treatment should be performed in a bed near a bathroom. Compared to IV, IP chemotherapy requires more patient visits. Patients undergoing the standard IV chemotherapy regimen are scheduled to make six treatment visits as opposed to the 18 visits made by patients receiving IV and IP chemotherapy. In addition, IV and IP visits are longer, and 12 visits require patients to receive treatment while in bed. MSKCC currently

Table 1. Nursing Management for Patients Receiving Intraperitoneal Chemotherapy

<table>
<thead>
<tr>
<th>PROBLEM</th>
<th>INTERVENTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of treatment knowledge</td>
<td>Assess patients’ knowledge of disease and treatment options. Explain chemotherapy agents, routes of administration (i.e., IV and intraperitoneal), side effects, symptom management strategies, and when and where to call.</td>
</tr>
<tr>
<td>Abdominal distention and pain</td>
<td>Assess abdomen prior to therapy. Assess for pain. If pain occurs during infusion, slow infusion until discomfort stops. Administer pain medications as needed. Instruct patients to eat a light meal and wear comfortable clothes. Post-therapy, instruct patients to turn side to side every 15 minutes for an hour.</td>
</tr>
<tr>
<td>Dyspnea</td>
<td>Assess pretreatment respiratory status. Instruct patients to report difficulty breathing. Inform patients that the side effect is temporary. Instruct patients in measures to relieve shortness of breath, such as adjusting the bed by elevating the head, sitting upright, and increasing ambulation.</td>
</tr>
<tr>
<td>Electrolyte imbalance</td>
<td>Monitor electrolytes (i.e., magnesium, potassium, and calcium) and replace as needed. Assess for signs and symptoms of hypomagnesemia, hypokalemia, and hypocalcemia.</td>
</tr>
<tr>
<td>Peripheral neuropathy</td>
<td>Assess patients for peripheral neuropathy, including risk factors. Instruct patients to avoid extreme temperatures. Use assistive devices as needed. Manage pain.</td>
</tr>
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(Continued on next page)
The combination of IV and IP chemotherapy has demonstrated a significant survival benefit for women with optimally debulked epithelial ovarian cancer. Unanswered nursing questions still exist and should be addressed through research. Healthcare professionals must look for opportunities to improve patient care and quality of life.

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**References**


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**Table 1. Nursing Management for Patients Receiving Intraperitoneal Chemotherapy (Continued)**

<table>
<thead>
<tr>
<th>PROBLEM</th>
<th>INTERVENTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequent urination</td>
<td>Instruct patients to void prior to treatment and to call if urination does not return to normal in 48 hours. Inform patients that frequent urination is a possible side effect.</td>
</tr>
<tr>
<td>Nausea and vomiting</td>
<td>Assess patients’ risk factors. Administer antiemetic based on agent; consider acute, delayed, and anticipatory nausea. Instruct patients to eat small, frequent meals. Monitor weight.</td>
</tr>
<tr>
<td>Constipation</td>
<td>Assess patients’ normal pattern. Instruct patients regarding diet, hydration, physical activity, and use of bowel regimen and laxatives.</td>
</tr>
<tr>
<td>Diarrhea</td>
<td>Assess patients’ normal pattern. Instruct patients regarding diet, hydration, and antidiarrheal medications.</td>
</tr>
<tr>
<td>Infection</td>
<td>Monitor blood counts. Assess for and instruct patients to report signs and symptoms of infection.</td>
</tr>
<tr>
<td>Neutropenia</td>
<td>Monitor blood counts. Administer colony-stimulating factors and antibiotics as ordered. Institute neutropenic precautions. Treatment may be held and doses modified.</td>
</tr>
<tr>
<td>Thrombocytopenia</td>
<td>Monitor platelet counts. Institute thrombocytopenic precautions. Treatment may be held and doses modified.</td>
</tr>
<tr>
<td>Anemia</td>
<td>Monitor blood counts. Administer darbepoetin alfa and transfusion as ordered. Assess for fatigue, activity, and exercise, and instruct patients to rest as needed.</td>
</tr>
</tbody>
</table>

opens one hour earlier four days a week and premixes IP chemotherapy to decrease patients’ wait time.

**Conclusion**

The combination of IV and IP chemotherapy for ovarian cancer opens one hour earlier four days a week and premixes IP chemotherapy to decrease patients’ wait time.