PERITONECTOMY

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PGY-3
Outline:

- Peritoneal Surface Malignancies
- Peritoneum
- Patient Selection
- Operative Technique
- HIPEC
- EPIC
Peritoneal Surface Malignancies:

- **Primary:**
  - Primary Peritoneal Carcinoma
  - Malignant Peritoneal Mesothelioma

- **Metastatic:**
  - Appendiceal
  - Colorectal
  - Gastric
  - Pancreatic
  - Ovarian
## Incidence by Primary Site:

<table>
<thead>
<tr>
<th>Type of Malignancy</th>
<th>Estimated Annual Incidence in U.S.</th>
<th>Estimated Annual Incidence of Peritoneal Involvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary peritoneal cancer</td>
<td>1000</td>
<td>1000</td>
</tr>
<tr>
<td>Malignant peritoneal mesothelioma</td>
<td>400</td>
<td>400</td>
</tr>
<tr>
<td>Appendiceal cancer</td>
<td>1500</td>
<td>1350</td>
</tr>
<tr>
<td>Colorectal cancer</td>
<td>146,970</td>
<td>31,000</td>
</tr>
<tr>
<td>Gastric cancer</td>
<td>21,130</td>
<td>10,000</td>
</tr>
<tr>
<td>Ovarian cancer</td>
<td>21,550</td>
<td>18,000</td>
</tr>
<tr>
<td>Pancreatic cancer</td>
<td>42,470</td>
<td>2500</td>
</tr>
<tr>
<td>Endometrial cancer</td>
<td>42,160</td>
<td>1500</td>
</tr>
</tbody>
</table>
Peritoneum:

- Serosal membrane
- Single layer of flat mesothelial cells supported by submesothelial connective tissue.
Peritoneum:
Major Areas of Involvement:

- Right upper quadrant and porta hepatis
- Omentum, spleen, and lesser sac
- Left upper quadrant and stomach
- Colon and colic gutters
- Small bowel and mesentery
- Pelvic peritoneum and pelvic organs
Patient Selection:

- Age
- Comorbidities
- Type of Malignancy
- Extent of Disease
## Patient Selection:

<table>
<thead>
<tr>
<th>Disease or Condition</th>
<th>Example</th>
<th>Accepted</th>
<th>Under Investigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noninvasive peritoneal carcinomatosis, any volume</td>
<td>Pseudomyxoma peritonei</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Malignant peritoneal mesothelioma (MPM), any volume</td>
<td>MPM</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Invasive cancer, low volume</td>
<td>Colorectal cancer</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Gastrointestinal cancer with positive cytology or perforation</td>
<td>Gastric cancer</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Recurrent ovarian cancer unresponsive to systemic chemotherapy</td>
<td>Recurrent ovarian cancer</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Gastrointestinal cancer with invasion of adjacent organs or positive margins</td>
<td>Colorectal cancer</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Ovarian cancer, initial diagnosis of stage IIIB or IIIC</td>
<td>Ovarian cancer</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Malignant ascites (for palliation)</td>
<td>Pancreatic cancer</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Noninvasive sarcomatosis, any volume</td>
<td>Recurrent retroperitoneal fibrosarcoma</td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>
## Extent of Disease

### Peritoneal Cancer Index

<table>
<thead>
<tr>
<th>Regions</th>
<th>Lesion Size</th>
<th>Lesion Size Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 Central</td>
<td>__________</td>
<td>LS 0: No tumor seen</td>
</tr>
<tr>
<td>1 Right Upper</td>
<td>__________</td>
<td>LS 1: Tumor up to 0.5 cm</td>
</tr>
<tr>
<td>2 Epigastrium</td>
<td>__________</td>
<td>LS 2: Tumor up to 5.0 cm</td>
</tr>
<tr>
<td>3 Left Upper</td>
<td>__________</td>
<td>LS 3: Tumor &gt; 5.0 cm or confluence</td>
</tr>
<tr>
<td>4 Left Flank</td>
<td>__________</td>
<td></td>
</tr>
<tr>
<td>5 Left Lower</td>
<td>__________</td>
<td></td>
</tr>
<tr>
<td>6 Pelvis</td>
<td>__________</td>
<td></td>
</tr>
<tr>
<td>7 Right Lower</td>
<td>__________</td>
<td></td>
</tr>
<tr>
<td>8 Right Flank</td>
<td>__________</td>
<td></td>
</tr>
<tr>
<td>9 Upper Jejunum</td>
<td>__________</td>
<td></td>
</tr>
<tr>
<td>10 Lower Jejunum</td>
<td>__________</td>
<td></td>
</tr>
<tr>
<td>11 Upper Ileum</td>
<td>__________</td>
<td></td>
</tr>
<tr>
<td>12 Lower Ileum</td>
<td>__________</td>
<td></td>
</tr>
</tbody>
</table>

PCI: __________
Extent of Disease:

![Survival Percentage Graph](image)

- <13 (N = 9)
- ≥13 (N = 34)

p = 0.0107
Cytoreductive Surgery:

- Remove all visible disease
- Remove Affected Peritoneum
Cytoreductive Surgery:

1. Greater omentectomy and splenectomy
2. Left subdiaphragmatic peritonectomy
3. Right subdiaphragmatic peritonectomy
4. Lesser omentectomy and cholecystectomy with stripping of the omental bursa
5. Complete pelvic peritonectomy
6. Partial or complete gastrectomy
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Hyperthermic IntraPEritoneal Chemotherapy

Why Hyperthermic?
- Heat increases drug penetration into tissue.
- Heat increases the cytotoxicity of selected chemotherapy agents.
- Heat has anti-tumor effects by itself.
- Intraoperative chemotherapy allows manual distribution of drug and heat uniformly to all surfaces of the abdomen and pelvis.
- Renal toxicities of chemotherapy can be avoided by careful monitoring of urine output during chemotherapy perfusion.
- Nausea and vomiting are avoided because the patient is under general anesthesia.
- The time that elapses during the heated perfusion allows a normalization of many functional parameters (temperature, blood clotting, hemodynamics, etc.).
EPIC and HIPEC

- Both Prolonged Survival, Disease free time.
- Under investigation
- HIPEC vs EPIC vs HIPEC and EPIC
Why was this Patient a good candidate for Cytoreductive surgery?
Prognostic Features of 51 Colorectal and 130 Appendiceal Cancer Patients with Peritoneal Carcinomatosis Treated by Cytoreductive Surgery and Intreperitoneal Chemotherapy

Annals of Surgery
Paul H. Sugarbaker, and Kathleen Jablonski
From the Washington Cancer Institute, Washington Hospital Center, and Medlantic Research Institute
Prognostic Features:

- Appendix vs Colon
- Grade
- Complete vs Incomplete Cytoreduction
- Lymph Node Metastasis
<table>
<thead>
<tr>
<th>Prognostic Feature</th>
<th>3-year Survival</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appendix</td>
<td>73%</td>
<td>0.0001</td>
</tr>
<tr>
<td>Colon</td>
<td>36%</td>
<td></td>
</tr>
<tr>
<td>Grade 1</td>
<td>81%</td>
<td>0.003</td>
</tr>
<tr>
<td>Other Grade</td>
<td>41%</td>
<td></td>
</tr>
<tr>
<td>Complete</td>
<td>82%</td>
<td>0.0001</td>
</tr>
<tr>
<td>Incomplete</td>
<td>20%</td>
<td></td>
</tr>
<tr>
<td>Met Positive</td>
<td>70%</td>
<td>0.0001</td>
</tr>
<tr>
<td>Mets Negative</td>
<td>37%</td>
<td></td>
</tr>
<tr>
<td>Volume Mod</td>
<td>75%</td>
<td>0.0001</td>
</tr>
<tr>
<td>Volume Large</td>
<td>20%</td>
<td></td>
</tr>
</tbody>
</table>
Randomized Trial of Cytoreduction and Hyperthermic Intraperitoneal Chemotherapy versus Systemic Chemotherapy and Palliative Surgery in Patient with Carcinomatosis of Colorectal Cancer
p = 0.032, logrank test, two-sided
Review:

- Randomized Study between 1998-2001, 105 patients
- Cytoreduction followed by HIPEC significantly reduced the risk of dying (hazard ratio, 0.55; 95% CI, 0.32 to 0.95; log rank P = 0.032)
- Median Surgical in the standard group was 12.6 months and in the experimental group 22.4 months