Surgical Aspects of GI Cancer Operations

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Conflict of Interest Disclosure
I have no conflicts and nothing to disclose

Estimated New Cancer Cases* in the US in 2019

<table>
<thead>
<tr>
<th></th>
<th>Males 870,970</th>
<th>Females 891,480</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prostate</td>
<td>20%</td>
<td>30%</td>
</tr>
<tr>
<td>Lung &amp; bronchus</td>
<td>13%</td>
<td>13%</td>
</tr>
<tr>
<td>Colon &amp; rectum</td>
<td>9%</td>
<td>7%</td>
</tr>
<tr>
<td>Urinary bladder</td>
<td>7%</td>
<td>7%</td>
</tr>
<tr>
<td>Melanoma of skin</td>
<td>7%</td>
<td>5%</td>
</tr>
<tr>
<td>Kidney &amp; renal pelvis</td>
<td>3%</td>
<td>4%</td>
</tr>
<tr>
<td>Non-Hodgkin lymphoma</td>
<td>3%</td>
<td>4%</td>
</tr>
<tr>
<td>Oral cavity &amp; pharynx</td>
<td>4%</td>
<td>5%</td>
</tr>
<tr>
<td>Leukemia</td>
<td>4%</td>
<td>4%</td>
</tr>
<tr>
<td>Pancreas</td>
<td>3%</td>
<td>3%</td>
</tr>
<tr>
<td>All other sites</td>
<td>22%</td>
<td>21%</td>
</tr>
</tbody>
</table>

*Includes basal cell carcinoma and in situ and in situ malignant melanoma
Evaluation of Pancreas Tumors

Pancreatic Cancer

Count Basie - Jazz Musician Jack Benny
(Lung Cancer, Pancreatic Cancer) - Comedian
Joan Crawford - Actress
Dizzy Gillespie - Jazz Musician
Michael Landon - Actor
Henry Mancini - Musician
Randy Pausch - Computer Scientist
(Virtual Reality Pioneer, "The Last Lecture")
Luciano Pavarotti - Singer
Patrick Swayze - Actor
Gene Upshaw - Football Player
And many others
Tumor Location

Biliary Obstruction

CT Scan or MRI– Arterial and Portal Venous Phases
Operations

Partial (Distal) Pancreatectomy
Pylorus Sparing Whipple
Mobilization of Duodenum

Pancreatectomy with Distal Gastrectomy (Whipple)

Extended Pancreaticoduodenectomy
Morbidity & Mortality

- Mortality 3%
- Morbidity 30-60%
- Pancreatic leak ~ 30%
- Bile leak ~ 2%
- Enteric leak ~ 2%
  - Duodenopanostomy
  - Gastrojejunostomy
- Diabetes
- Delayed Gastric Emptying
- Pancreatic Exocrine Insufficiency

Pancreas Ablation

Duodenal Obstruction
Gastrectomy

Total Gastrectomy

Cardia GIST
Hepatic Malignancies

- Still the gold standard
- Current mortality 4-6%
- Hospital stay approximately 7 days
- Blood transfusion rate 7-10%

Surgical Resection

<table>
<thead>
<tr>
<th>Author (year)</th>
<th>No. Pts</th>
<th>Mortality (%)</th>
<th>Med Surv</th>
<th>1 year</th>
<th>5 year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hughes et al (88)</td>
<td>607</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>33</td>
</tr>
<tr>
<td>Gajewski et al (64)</td>
<td>204</td>
<td>0</td>
<td>33 mo</td>
<td>91</td>
<td>32</td>
</tr>
<tr>
<td>Schwee et al (89)</td>
<td>469</td>
<td>4</td>
<td>40 mo</td>
<td>83</td>
<td>39</td>
</tr>
<tr>
<td>Forgi et al (95)</td>
<td>571</td>
<td>4</td>
<td>40 mo</td>
<td>85</td>
<td>35</td>
</tr>
<tr>
<td>Joriens et al (97)</td>
<td>131</td>
<td>4</td>
<td>33 mo</td>
<td>81</td>
<td>25</td>
</tr>
<tr>
<td>Javdani et al (97)</td>
<td>200</td>
<td>6</td>
<td>33 mo</td>
<td>84</td>
<td>27</td>
</tr>
<tr>
<td>Forgi et al (99)</td>
<td>1001</td>
<td>3</td>
<td>42 mo</td>
<td>—</td>
<td>36</td>
</tr>
<tr>
<td>Schwee et al (95)</td>
<td>516</td>
<td>3</td>
<td>—</td>
<td>—</td>
<td>38</td>
</tr>
<tr>
<td>Chol et al (02)</td>
<td>226</td>
<td>1</td>
<td>46 mo</td>
<td>96</td>
<td>40</td>
</tr>
<tr>
<td>Fernandez et al (94)</td>
<td>100</td>
<td>1</td>
<td>—</td>
<td>86</td>
<td>59</td>
</tr>
<tr>
<td>Pavlik et al (98)</td>
<td>697</td>
<td>1</td>
<td>74 mo</td>
<td>97</td>
<td>58</td>
</tr>
</tbody>
</table>
Surgical Resection

- Still the gold standard
- Current mortality 3-6%
- Hospital stay approximately 1-5 days
- Blood transfusion rate 7-10%

Functional Liver Residual Volume
Ablation has been around for 4000 years
Middle ages: shaped instruments specifically to apply heat

History

Surgical Chronology
Choice of N.A. April 2011

Ablation Modalities

{ Coagulative Necrosis |
- Heat
- Radiofrequency
- Microwave
- Laser

Cell Lysis - Freezing
- Cryoablation
- Nanoknife
- Irreversible Electroporation

Morbidity & Mortality

<table>
<thead>
<tr>
<th></th>
<th>Major Complication</th>
<th>90-day Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resection</td>
<td>14%</td>
<td>1%</td>
</tr>
<tr>
<td>Resection + RFA</td>
<td>16%</td>
<td>7%</td>
</tr>
<tr>
<td>RFA</td>
<td>4%</td>
<td>0%</td>
</tr>
</tbody>
</table>

High Intensity Focused Ultrasound (HIFU)

- Location, location, location
- Critical Structure Proximity
- Adjacent to vascular elements

Limitations to Thermal Ablation
How Irreversible Electroporation (IRE) kills cells

- Strong electric fields applied across a cell can cause:
  - Irreversible permeabilization of the cell membrane: "IRE"
Increasing the Treatment Rate

How do we offer more patients a surgical treatment?

Chemo / Radio - Embolization

Strategies

- Decrease the Liver Volume Resected
  - Non-anatomic resections
  - Segmental resections
  - Tumor ablation
  - “Neoadjuvant” chemotherapy
  - Chemoembolization

- Increase the Total Liver Volume
  - Staged resections
  - Preoperative Portal Vein Embolization
Breast Cancer Screening Order and Completion Rates by Clinic Appointment Time

Unadjusted data are from September 1, 2014, to August 31, 2016, and based on each patient's first visit with the primary care physician. Data on order rates represent the day of the primary care visit. Data on completion rates represent a 1-year follow-up from the visit. Clinic appointment times are grouped by the start of each hour (eg, 8:15 am and 8:30 am were grouped to 8 am).

Liver Cancer Screening