Minimally Invasive Procedures in Cancer Management
Disclosures

• No Disclosures
Objectives

• Define Interventional Oncology

• Provide an overview of Interventional Oncology procedures
  • Ablation
  • Embolization
  • Venous Procedures
  • Palliation of cancer related symptoms and feeding difficulties

• Overview of referral patterns and points of access to Interventional Oncology services
Interventional Radiology

• Subspecialty of Diagnostic Radiology (In Canada)
• Recognized by the College of Physicians
• Minimally-invasive image-guided procedures
It’s a Fan!

It’s a Spear!

It’s a Snake!

It’s a Wall!

It’s a Tree!

It’s a Rope!

Interventional Radiology

• Cancer – Interventional Oncology
• Vascular disease
• Women’s health conditions
• Men’s health conditions
Benefits

Recovery

Complications

Cost
Canada lags G7 in cost-saving IR procedures

TORONTO – Canada lags behind most G7 countries when it comes to the use of Interventional Radiology procedures, and is doing so despite evidence that IR results in lower costs for patients and lower complication rates.

The April 2014 study, titled “Interventional Radiology Effectiveness,” was conducted by Millennium Research Group. For its analysis, the group reviewed key therapy areas in interventional radiology (IR) to determine the value derived for patients and the healthcare system.

Source: Interventional radiology: global landscape and cost effectiveness. Millennium Research Group, April 2014
Interventional Oncology

• Percutaneous ablation
• Embolization
• Venous procedures
• Palliation of cancer related symptoms and feeding difficulties
Ablation

• Direct application of thermal or other non-thermal energy to eradicate or substantially destroy tumors\(^1\)

• Treatment objectives:
  • Curative intent
  • Cytoreduction in oligometastatic disease
  • Palliation

Ablation

• Thermal
  • Heat
    • Radiofrequency ablation
    • Microwave ablation
  • Cold
    • Cryoablation

• Non-thermal
  • Irreversible electroporation

• Chemical
  • Alcohol
Percutaneous Ablation

<table>
<thead>
<tr>
<th>Category</th>
<th>Subcategories</th>
<th>Collaboration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Renal tumors</td>
<td>T1A Renal Cell Carcinomas</td>
<td>In collaboration with urologists</td>
</tr>
<tr>
<td>Lung tumors</td>
<td>Primary Adenocarcinoma, Metastases</td>
<td>In collaboration with thoracic surgeons and radiation oncologists</td>
</tr>
<tr>
<td>Liver tumors</td>
<td>Primary (Hepatocellular carcinoma), Metastases</td>
<td>In collaboration with hepatobiliary surgeons, radiation oncologists, medical oncologists</td>
</tr>
<tr>
<td>MSK tumors</td>
<td>Osseous metastases, Desmoid fibromatosis</td>
<td>In collaboration with orthopedic oncology surgeons, radiation oncologists, medical oncologists</td>
</tr>
</tbody>
</table>
Abdominal Wall Desmoid Fibromatosis

- 36F
- Abdominal wall pain and discomfort
- Not a candidate for systemic therapy
Cryoablation – Abdominal Wall Desmoid
Cryoablation – Abdominal Wall Desmoid

Immediate post-procedural CT

1 year follow up MRI
Recurrent Lung Adenocarcinoma

• 78F
• 2.1 cm RUL pulmonary nodule
• Biopsy proved adenocarcinoma
• Not a surgical candidate
Microwave Ablation – Lung Adenocarcinoma
Microwave Ablation – Lung Adenocarcinoma
Microwave Ablation – Lung Adenocarcinoma

Pre ablation

3 months post ablation
Embolization

- Direct injection of various agents into the bloodstream or lymphatic system through catheters
  - Occlusive agents
  - Chemotherapy
  - Radioactive particles

Source: Amerra Medical 3D Medical Animation – YouTube Channel
Embolization

• Bland Embolization
  • Cessation of bleeding
  • Pre-operative

• Chemoembolization (TACE)
  • Hepatocellular carcinoma

• Radioembolization (TARE)
  • Hepatocellular carcinoma
  • Neuroendocrine tumors
Pre-operative Bland Embolization

- 57F
- Metastatic renal cell carcinoma
- Pathologic fracture of right proximal humerus
Pre-operative Bland Embolization
Pre-operative Bland Embolization

- Embolic agent
- Microcatheter placed within the tumor
  2.4 F = 0.8 mm
Pre-operative Bland Embolization
Pre-operative Bland Embolization
Surgical fixation post embolization

Pre

Post
Chemoembolization (TACE)

- Injection of a combination of an embolic agent and a chemotherapy drug into hepatic arteries
- Indications:
  - Hepatocellular carcinoma
Radioembolization (TARE)

- **Indications**
  - Hepatocellular carcinoma
  - Hepatic metastatic neuroendocrine tumor

- **Injection of yttrium-90 microspheres into hepatic arteries**
  - Beta emission from Y90 particles results in tumoral damage due to oxidative stress
Y90 Radioembolization
Y90 Radioembolization – Hepatic Artery
Venous Procedures

• Drug infusion port placement
• Inferior vena cava filter placement (and retrieval)
• Endovascular therapy for central venous occlusions
  • Superior vena cava syndrome
• Catheter directed thrombolysis and thrombectomy
  • Extensive deep venous thrombosis
  • Submassive/massive pulmonary embolism
Catheter directed thrombolysis and thrombectomy

• Technique:
  • Administration of tPA into thrombus via an infusion catheter
  • Various strategies to mechanical disrupt or remove thrombus

• Indications:
  • Extensive deep venous thrombosis
  • Submassive/Massive pulmonary embolism
  • Portal venous thrombosis
Catheter Directed Thrombolysis

Heparin through vascular sheath

tPA through infusion catheter
Femoral vein

Common Femoral vein
Stented common iliac vein

Femoral vein
Endovascular Therapy for Central Venous Obstruction

• Venous Recanalization
• Venous Stenting
• Catheter directed thrombolysis / thrombectomy
SVC Syndrome

• 55 F

• Severe superior vena cava (SVC) syndrome

• Due to severe tumoral compression of the SVC by a large mediastinal mass
55F with SVC syndrome due to tumoral compression
55F with SVC syndrome due to tumoral compression
Superior Vena Cava Syndrome

• Malignant
  • Extrinsic compression / occlusion
  • +/- thrombotic occlusion

• Benign
  • Catheter related
Endovascular Therapy for SVC Obstruction

- Advantages of endovascular therapy
  - Rapid symptomatic relief
  - Good long term patency

- Technical/Clinical Success Rate
  - Technical success
    - 95-100%
  - Symptom relief
    - > 90%
**Superior Vena Cava Syndrome—A Proposed Classification System and Algorithm for Management**

*James B. Yu, MD,* *Lynn D. Wilson, MD, MPH,* and *Frank C. Detterbeck, MD†*

<table>
<thead>
<tr>
<th>Grade</th>
<th>Category</th>
<th>Estimated Incidence (%)</th>
<th>Definition</th>
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</thead>
<tbody>
<tr>
<td>0</td>
<td>Asymptomatic</td>
<td>10</td>
<td>Radiographic superior vena cava obstruction in the absence of symptoms</td>
</tr>
<tr>
<td>1</td>
<td>Mild</td>
<td>25</td>
<td>Edema in head or neck (vascular distention), cyanosis, plethora</td>
</tr>
<tr>
<td>2</td>
<td>Moderate</td>
<td>50</td>
<td>Edema in head or neck with functional impairment (mild dysphagia, cough, mild or moderate impairment of head, jaw or eyelid movements, visual disturbances caused by ocular edema)</td>
</tr>
<tr>
<td>3</td>
<td>Severe</td>
<td>10</td>
<td>Mild or moderate cerebral edema (headache, dizziness) or mild/moderate laryngeal edema or diminished cardiac reserve (syncope after bending)</td>
</tr>
<tr>
<td>4</td>
<td>Life-threatening</td>
<td>5</td>
<td>Significant cerebral edema (confusion, obtundation) or significant laryngeal edema (stridor) or significant hemodynamic compromise (syncope without precipitating factors, hypotension, renal insufficiency)</td>
</tr>
<tr>
<td>5</td>
<td>Fatal</td>
<td>&lt;1</td>
<td>Death</td>
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</tbody>
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Feeding Tubes

• Interventional Radiology
  • Gastrostomy
  • Gastrojejunostomy (Trans-gastric jejunostomy tubes)
  • Percutaneous transesophageal gastrostomy (PTEG)

• Surgery
  • Jejunostomy
Percutaneous transesophageal gastrostomy
Palliation of Cancer Related Symptoms

• Pleural effusion and Ascites
  • Tunnelled pleural or peritoneal catheter placement

• Intractable Pain
  • Neural plexus blocks
Access to Interventional Oncology Services

• Local or regional tumor boards
• Direct referral to Interventional Radiologists
  • Medical imaging departments
Summary

• Interventional Oncology is a branch of Interventional Radiology
• Interventional oncologists perform a variety of procedures
  • Ablation
  • Embolization
  • Venous procedures
  • Procedures that palliate cancer related symptoms and feeding difficulties
• Access to IO services
  • Through local or regional tumor boards
  • Direct referral to Interventional Radiology
Thank You

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