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# Nursing considerations in Selective Internal Radiation Therapy

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# What is Selective Internal Radiation Therapy?

- Treatment of unresectable liver disease
- Two step process:
  - Mapping
  - Treatment
- AKA "Radioembolization"
- Clinical trials date back to 1960!



# **Selective Internal Radiation Therapy**

• Targeted delivery of β-radiation to liver metastases

• Y-90 shrinks the metastatic tumor, decreases tumor burden

• Spares surrounding healthy liver tissue



# Liver -----Tumour -----SIRT beads ---Blood vessel -----Catheter

#### Selective internal radiation therapy (SIRT)

#### **SIRT Treatment Algorithm**



### **Candidates for SIRT**

• Non-resectable liver-dominant metastatic disease

• Past chemotherapy treatment

• ECOG performance scale score o-2



# **Candidates for SIRT**

• Bilirubin < 2.0 mg/dL

• Patent portal vein

• At least 3 months life expectancy

#### **ECOG** Performance Status

Table 4. ECOG Performance Status categories*		
Grade	Description	
0	Fully active, able to carry on all pre-disease performance without restriction	
1	Restricted in physically strenuous activity, but ambulatory and able to carry out work of a light or sedentary nature, e.g., light house work, office work	
2	Ambulatory and capable of all self care, but unable to carry out any work activities. Up and about more than 50% of waking hours	
3	Capable of only limited self care, confined to bed or chair more than 50% of waking hours	
4	Completely disabled. Cannot carry on any self care. Totally confined to bed or chair	
5	Dead	

\*Adapted from Oken, et al. 1982<sup>15</sup>





#### **Conscious Sedation**





### **Contrast Allergy**



ACR Manual on Contrast Media, 2013



# SIRT MAPPING

- Mapping is performed prior to treatment
  Estimation of shunting risk
- Angiogram

• Embolization of extrahepatic arteries

• Difficult anatomy

# PRE-OP (Mapping)

• Pre-op scans:

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- CT of chest/abdomen/pelvis
- Pet Scan
- Labs
  - CBC
  - Comprehensive Metabolic Panel
  - Tumor markers if indicated
  - COAGS: INR, PT, PTT



Baseline EKG

#### **PRE-OP (MAPPING)** Nursing Considerations

- No pre-medication is required for the mapping
- Foley catheter not required
- Supine
- Assess the femoral pulse

# **Initiating Access**



#### INTRA-OP (MAPPING) Nursing Considerations

- Palpate & mark bilateral dorsalis pedis and posterior tibial pulses prior to procedure
- Apply sequential compression device to extremities
- Application of patient warming device
- Always assess for contrast allergy!





- Estimates risk of shunting
- Half life of 6.02 hours
- Prepared from albumin
- 2-4 mCiTc-99/MAA injected
- Time Sensitive



# **POST-OP MAPPING**

#### **Nursing Considerations**

- Assess groin for hematoma and pulses for perfusion
  - Determine success of closure device
  - Apply dressing as indicated
- Post SPECT scan within 1 hour
  - Single Proton Emission Computed Tomography Scan
- Lung Shunt < 20%
- Scan determines dose of <sup>90</sup>yttrium for treatment



## <sup>90</sup>yttrium

- Beta emitting, radioactive isotope
- Half-life 64.1 hours
- Y-90 travels through the bloodstream by way of the hepatic arteries and into the liver
- Most of the radiation is delivered over the first 2 weeks of implantation



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### Therasphere<sup>®</sup> vs. SIR-sphere<sup>®</sup>

<b>Therasphere</b> ® MDS Nordion Toronto, Canada	<b>SIR-spheres</b> ® Sirtex Medical Ltd. Sydney, Australia
Glass Microspheres	Resin Microspheres
HCC	Metastatic Colon Cancer
1.2 million spheres per tx	60 million spheres per tx
1 high pressured bolus	Multiple aliquots



#### **Pre-Op (Y-90)** Nursing Considerations

- Treatment is normally scheduled 2 weeks following the mapping
- Health Physics staff and radiation safety members should be present
- Personal Protective equipment for staff
  - Double shoe covers
  - Double gloves
  - Floor drapes



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#### **Pre-Op (Y-90)** Nursing Considerations

- Patients should start proton-pump inhibitor 5 days prior to procedure
- Insertion of foley catheter
- IV medications
  - Zofran<sup>®</sup> (ondansetron) 4 mg IV once
  - Dexamethasone<sup>®</sup> (Decadron) 20 mg IV once
  - Ancef<sup>®</sup> (Cefazolin) IV 1 gm once
  - NS 0.9% @ 150 ml/hr pre-hydration
- T-bilirubin < 2.0 within 2 weeks of the procedure

#### INTRA-OP (TREATMENT) Nursing Considerations

- Treatment 60-90 minutes
- Monitor patient
  - Pain
  - Urine output
  - Changes in oxygen saturation
  - Monitor blood sugar Q2h: IDDM
- Use of intra-arterial nitroglycerin
  - Nitroglycerin 5000 mcg / 100 ml D5W
  - Increments of 25 mcg-200 mcg

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#### Treatment Time...









#### **Post-Op (Y-90)** Nursing Considerations

- Bremsstralung Scan within 30hrs of treatment
  - Evaluates distribution of microspheres
- PACU stay
  - 2-3 hours post treatment
  - Groin assessment
  - Accessed extremity straight for 2 hours (closure device)
  - Accessed extremity straight for 4 hours (manual pressure)
  - Treatment of post-op symptoms





• Patients may experience post radioembolization syndrome

– Fever

- Lethargy/Fatigue
- Nausea and abdominal pain
- Discharged home the same day!

## **Prescriptions & Follow-up**





#### **Prescriptions** Nursing Considerations

- Proton Pump Inhibitor for 4 weeks
  - Omeprazole<sup>®</sup> (Prilosec), Pantoprazole<sup>®</sup> (Protonix)
- Zofran<sup>®</sup> (Ondansetron) 4 mg q6h po PRN
- Methylprednisolone<sup>®</sup> (Medrol) dose pack
- Oxycodone<sup>®</sup> (Oxycontin) 5 mg po q4h prn



# **Radiation Safety**

- Y-90 microspheres are beta-radioactive sources
  - Small amount of radioactivity around the liver
  - Blood, urine, stool and vomit must be properly disposed of during the first 24 hrs
  - Y-90 half life is about 64 hours



# **Radiation Safety**

- Patients do NOT need to restrict close contact with family members
- Men should sit when voiding for the first 24 hours
- Hand washing after using the bathroom
- Wipe and flush any bodily fluid spills



# **Radiation Safety**

 Instruct patients if they need to go to the physician, emergency dept or have surgery within 3 days of treatment to notify medical staff that there is a small amount of radiation in the liver.



# Follow-up

• Within 6-8 weeks post-treatment:

- PET Scan

- CT SCANS (chest/abdomen/pelvis)
- Triple Phase Liver CT



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- Gastric or duodenal ulceration
- Radiation Pneumonitis
- Radiation Hepatitis
- Acute pancreatitis/cholecystitis



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# CASE STUDY #1

### Case Study: Gastric Ulceration Background

• 63 year old male patient

• Original diagnosis: Rectosigmoid adenocarcinoma

• Low anterior resection performed w/o complications



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### Background continued..

• Additional mets to segment 7 & 8 of the right lobe of the liver were discovered on imaging

• Successful resection and subsequent chemotherapy

• Disease free: 18 months

# Background Continued..

• Just shy of 3 years from original dx, recurrence of inoperable asymptomatic hepatic-isolated disease

• Patient and team decided on SIRT treatment



#### SIRT MAPPING & TREATMENT

- During mapping, gastroduodenal artery (GDA) was coil embolized to prevent flow to the bowel because the GDA was in close proximity to the left hepatic artery
- 10 days after mapping, treatment was performed with whole liver implantation of Y90 SIR-Spheres
- Pt discharged and took omeprazole 20mg BID



# **Complications Arise**

- 17 weeks following SIRT treatment, pt presented to the ED with the following symptoms:
  - -Melena
  - -Increasing lethargy

x 3 Days

-presyncope



# **Pyloric Ulceration**

- Patient continued to experience significant upper GI bleeding
- Non-healing pyloric ulceration
- Palliative Partial Gastrectomy performed
- Missed accessory right gastric artery

#### Gastrectomy specimen



Sjoquist K M et al. The Oncologist 2010;15:830-835



#### Gastrectomy specimen



Sjoquist K M et al. The Oncologist 2010;15:830-835





### **Post-Gastrectomy:**

- Progression of intra-hepatic disease
- ECOG status score = 3
- The patient succumbed to his illness and died 32 weeks after his SIRT treatment

#### Nursing Considerations -Ulceration

Monitor patients for signs of:

- Nausea/vomiting
- Epigastric discomfort
- Anorexia
- Melena



### **Preventative measures**

• Meticulous mapping by physician

Monitor for s/s of ulceration
– Patient education

• Continue on proton pump inhibitor as prescribed



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# CASE STUDY #2

# **Radiation Pneumonitis**

- Radiation Pneumonitis is a rare complication
- <sup>99-m</sup>Tc used to evaluate & assess tumor induced arteriovenous shunting to lung parenchyma
- Hepatopulmonary Shunt Fraction < 20%



# **Case Study: Radiation Pneumonitis**

- 50 y/o male
- Diagnosed with GIST tumor, 2001
- Shunt fraction > 20%
- Treated **twice** over a 4-month period with glass microspheres



# **Case Study Continued..**

• Cumulative radiation dose to lungs: 31.0 GY ± 13.0

• 3 weeks post-op: dyspnea & chest tightness

• New bilat ground-glass opacities

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#### **Radiation Pneumonitis**







# **RP Treatment: Corticosteroids**

- Initially treated with: oral prednisone 40mg/day
- 4 weeks later, symptoms worsened
- No infectious etiology with rapid pulmonary fibrotic changes
- IV Methylprednisone 500 mg BID x 3 days
  - Eventually tapered off steroids over 2 month period
  - Home O2



#### Signs & Symptoms Nursing Considerations

- Usually occurs 1-2 months after therapy
- Educate patients to report any of the following symptoms:
  - Non-productive cough
  - Dyspnea
  - Fever



### A Look at the Future..

- 37,000 doses of Y-90 have been given since mid 2013
- 12.9 month prolongation of life after SIRT with metastatic colorectal cancer
- SIRT: decreasing size of HCC lesion to allow for liver transplant or resection

"After SIRT I was told that all of my liver tumours had disappeared. Life's begun again!" Brian's story

> "My last scan has shown that my liver tumours and liver has reduced in size."

Jeffrey's story

"I'm feeling good and they say that the way you feel is an indication of what's going on inside."

Sarah's story



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#### References

#### Please feel free to contact me for a list of references

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