Selective internal radiotherapy (SIRT)

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Disclosure

Speaker name: Michael Moche

I have the following potential conflicts of interest to report:

- Consulting
- Employment in industry
- Stockholder of a healthcare company
- Owner of a healthcare company
- Other(s)

☒ I do not have any potential conflict of interest
Multimodal therapy approach for liver cancer

Curative treatment

- LTX
- Resection

Local control / Bridging

- RFA
- & others

SIRT

Local control / Palliation

- TACE
- CT
Radiotherapy of liver cancer

- **30 Gy**: in liver parenchyma low risk of RILD (< 5%)
- **43 Gy**: 50% Komplikationen
- **50 Gy**: CRC
- **70-90 Gy**: HCC
- **120 Gy**: SIRT

References:
Background

- Double blood supply of liver
- Tumor perfusion > 80% arterial
- $^{90}$Y-labeled microsphere (≈ 30μm diameter)
- $\beta$-emission (0.93MeV)
- Half-life 64.2 h
- Tissue penetration Ø 2.5 mm, max. 10 mm
- Tumor dose up to 100-1000Gy
Preparation, Technique and Workflow

Preparation
- CT of MR-Imaging for planning
- Interdisciplinary tumor board decision

Technique and Workflow
1. Evaluation
- Coilembolisation of extrahepatic feeders (A. gastrroduodenalis, A. hep. dextra, A. cystica)
- $^{99m}$Tc-MAA -injection in final catheter position and SPECT
- Calculation of the lung shunt from SPECT
- Volumetry of liver (CT) for dose calculation

2. Therapy (1-3 weeks later)
- DSA A. hepatica for extrahepatic feeders
- Application of $^{90}$Y-labeled microsphere
Indications

- advanced liver tumors that are not (yet) resectable
- “Liver-dominant” or “liver-only” disease
- hypervascular tumours
- not suitable for RFA or others
- ECOG performance status 0-2
- Life expectancy > 3 months
### Outcome for HCC

<table>
<thead>
<tr>
<th>Progression Analyses</th>
<th>TACE (n)</th>
<th>TARE-Y90 (n)</th>
<th>(P) Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TTP</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall (mo)</td>
<td>8.4 (122)</td>
<td>9.6 (67)</td>
<td>.023</td>
</tr>
<tr>
<td>Child-Pugh A</td>
<td>17.4 (67)</td>
<td>22.1 (67)</td>
<td>.13</td>
</tr>
<tr>
<td>Child-Pugh B</td>
<td>17.4 (53)</td>
<td>17 (54)</td>
<td>.7</td>
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<tr>
<td>BCLC A</td>
<td>45.4 (47)</td>
<td>27.3 (43)</td>
<td>.74</td>
</tr>
<tr>
<td>BCLC B</td>
<td>17.5 (61)</td>
<td>17.2 (65)</td>
<td>.42</td>
</tr>
<tr>
<td>BCLC C</td>
<td>9.3 (12)</td>
<td>22.1 (13)</td>
<td>.04</td>
</tr>
</tbody>
</table>

**Salem et al. (2011), Gastroenterology**

**Outcome for HCC**

- Transient lymphocytopenia (60-75%)
- Fatigue (57%)
- Pain (23%)
- Nausea (20%)
- Fever (3%)
- Diarrhea (2%)

4x less frequent PES than in TACE

30-day mortality low (~3%)
Outcome for mCRC

Chemotherapy Refractory mCRC

Overall Survival

Progression-Free Survival in the Liver

- 7.9 month improvement in median PFS in the liver
- 31% reduction in risk of disease progression in the liver

1. line FOLFOX + SIRT

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>FOLFOX (+ bev)</td>
<td>263</td>
<td>12.6 months</td>
</tr>
<tr>
<td>FOLFOX (+ bev) + SIRT</td>
<td>267</td>
<td>20.5 months</td>
</tr>
</tbody>
</table>

Seidensticker R et al. Cardiovasc Intervent Radiol 2012

Example

Baseline

Follow Up

3 months
Take home

- SIRT essential treatment option for HCC and mCRC
- Significant survival benefit vs. TACE in advanced HCC
- Significant survival benefit vs. BSC for CT refractory mCRC
- Evidence to decrease risk of tumor progression in early mCRC
- Interdisciplinary decision and cooperation is crucial for effective workflow and good clinical results

Acknowledgement: J. Fuchs, TO Petersen, S Purz, T Lincke
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