Hepatocellular Carcinoma: Surgical Management

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Some Facts

90% of HCC occur in Pts with liver disease

- Majority due to HCV in N.A.
- NASH catching up
- Dx can be established without bx in most
  - Liver disease
  - HCV or HBV
  - Classic Imaging characteristics
  - AFP > 200
Intrahepatic Recurrence of HCC After Resection: 20% per Year

M. Chen, Arch Surg. 1994
Surgical resection for HCC

Best candidates for resection:
- Solitary HCC
- Child-Pugh A - No Portal HTN
- Normal Bilirubin

Survival analysis according to prognostic variables

Llovet JM. Hepatology, 1999
Factors that Determine Outcome and Treatment Decisions in Liver Cancer Surgery

- Patient factors
  - Health, preference
- Tumor factors
- Liver factors
  - type of disease, e.g. viral activity
- Treatment-related factors
- Social/economical/geopolitical
- Interactions between all the above
Clinical Management of Hepatocellular Carcinoma

Special article

Clinical Management of Hepatocellular Carcinoma. Conclusions of the Barcelona-2000 EASL Conference

Jordi Bruix, Morris Sherman, Josep M. Llovet, Michel Beaugrand, Riccardo Lencioni, Andrew K. Burroughs, Erik Christensen, Luigi Pagliaro, Massimo Colombo, Juan Rodés, for the EASL Panel of Experts on HCC

Organizing Committee of the Conference: Henri Bismuth, Luigi Bolondi, Jordi Bruix and Daniel Shouval

**BCLC Staging and Treatment Schedule**

**Stages A-C**
- Okuda 1-2, PS 0-2, Child-Pugh A-B
  - Early stage (A)
    - Single or 3 nodules < 3cm, PS 0
      - Single
      - Portal pressure/bilirubin
        - Increased
        - Normal
      - 3 nodules ≤3cm
  
**Stages A-C**
- Okuda 1-2, PS 0-2, Child-Pugh A-B
  - Early stage (A)
    - Single or 3 nodules < 3cm, PS 0
      - Single
      - Portal pressure/bilirubin
        - Increased
        - Normal
      - 3 nodules ≤3cm
  
**Stage D**
- Okuda 3, PS >2, Child-Pugh C
  - Advanced stage (C)
    - PVT, M1, PS 1-2
  
**Curative Treatments**
- Resection
- Liver Transplantation (CLT/LDLT)
- PEI/RF
- Chemoembolization
- New Agents

50% - 75% at 5 years

Randomized controlled trials
40-50% vs 10% at 3 years

Symptomatic treatment

Bruix J, Llovet JM. Hepatology 2002
Modification of BCLC Staging System in 2014

Stage 0
- PST 0, Child-Pugh A, Okuda 1

Very early stage (0)
- Single 2 cm carcinoma in situ

Early stage (A)
- 1 HCC or 3 nodules <3 cm, PST 0

Intermediate stage (B)
- Multinodular, PST 0

Advanced stage (C)
- Portal Invasion, N1, M1, PST 102

Terminal stage (D)

Portal pressure/bilirubin
- Increased
- Normal

Resection/RFA/MWA
- OLT

RFA / MWA
- DEBs-DOX / Y90
- IMRT

Curative Treatments
- Randomized Controlled Trials
- Symptomatic treatments

Sorafenib / Y-90

Symptomatic treatments
Proper Decision-Making Requires Knowledge and Expertise In:

- Medical and Surgical Oncology
- Modern imaging
- Liver surgery: Resection, Transplantation
- Hepatology
- Interventional radiology
- Pathology
- Liver tumor board
Meet our team
Biographies and video interviews of our physicians are available at VirginiaMason.org.

HEPATOLOGY

Blaire Burman, MD
Asma Siddique, MD
Amy Zeigler, PA-C
Liane Baumgart
Hepatology Coordinator

INTERVENTIONAL RADIOLOGY

Alvin Aceron, ARNP
Robert Crane, MD
Mehran Fotoohi, MD
Ellen Hauptmann, MD

MEDICAL ONCOLOGY

Bruce Lin, MD
Thomas Malpass, MD
Vincent Picozzi, MD

PALLIATIVE CARE

Lynne Taylor, MD

RADIATION ONCOLOGY

Thomas Malpass, MD
Guobin Song, MD

SURGERY

Adnan Alseidi, MD
Thomas Biehl, MD
Scott Helton, MD
Ravi Moonka, MD
Flavio Rocha, MD
Faye Lee, RN
Surgery Coordinator
Ø Invasive therapy

Clinical Condition: Advanced cirrhosis + small liver volume
Treatment Choice Influenced by Many Factors

- Efficacy of tumor control/cure
- Recovery complications
- Risks of death
- Impact on liver function

- Resection
  - Open
  - Laparoscopic
- Transplantation
  - Listing criteria, wait times, preventing drop off by neoadjuvant therapy
  - Ability to control HCV?
- Ablation
  - Open
  - Laparoscopic
  - Percutaneous
Patient Preference for Therapy

- Decisions on treatment should be individually tailored and constructed only after evaluation by a multidisciplinary team.

- Based upon patient preference after being educated about pros/cons/outcomes of various options.

Bruix and Sherman, Hepatology March 2011
Some Key Surgical Principles
Can the Pt Tolerate Operation?

1. Yes
   - Will operation make a difference?
     2. No
        - Non resection therapy
          - Portal Vein Embolization
          - Non resection therapy
          - RO possible?
            3. No
               - Non resect
            3. Yes
               - Adequate residual liver reserve?
                 4. No
                    - Non resect
                 4. Yes
                    - Resect
       2. Yes
          - RO possible?
            3. No
               - Non resect
            3. Yes
               - Adequate residual liver reserve?
                 4. No
                    - Non resect
                 4. Yes
                    - Resect

1. No
   - Non resection therapy
Adequate Liver Reserve

- Liver volume >450cc, > 25% of nl liver
  - >40% diseased liver
- Presence of normal, unobstructed, non-diseased liver
  - Absence of significant viral activity
  - No steatosis
- Consider pre op portal vein embolization for pts with borderline volume, function.
Key Principle

- Don’t biopsy the tumor
- Biopsy the non tumor liver!
  - It will tell us more about surgical options than anything else
Large HCC: Resection is Only Curative Option

Only 10% qualify
Will This Man Have Enough Functional Liver To Survive If All Tumor is Resected?
Unknown issues:
1. Does he have liver disease?
2. Is the left bile duct obstructed?
3. Can a tumor free margin be obtained?
Calculate Remnant Functional Liver Volume

Total Liv Vol: 3705 ml
Liver T Vol: 1200 ml
Liv functional vol: 2505 ml
Seg II + III vol: 450 ml

% remnant liver volume: 450/2505ml = 18%
Portal Vein Embolization
Inadequate Left Remnant

Pre resection growth of remnant after PVE

Post Right Hepatectomy
What Is Best Approach for Early HCC (< 3 cm single lesion) in a Fit Individual With Cirrhosis

- Resection?
- Ablation?
- Transplant?
Modern Results

- Ablation: out patient, prompt recovery, very low morbidity, return to work quickly, cheap.
- Resection: usually laparoscopic, quick recovery, out pt or 1-2 days in hospital, low morbidity. Moderate expense
- Transplant: morbid, prolonged recovery, expensive. Long term cure unless HCV+
Lap Ablation is an Out Patient Procedure
3 cm HCC in 450 Lb Woman
NASH-Cirrhosis, DM, Steroids

How Would You Treat Her?
Laparoscopic Ablation: 3 mm probe
6 min ablate; 45 min operation, Out Pt
Post Ablate, Dead Tumor
Peripheral HCC in Segment VI
Non anatomic, Parenchymal Preservation Resection
Port placement: Partial R. Hepatectomy
Laparoscopic Liver Resection

- EBL 20 cc, LOS < 24 hrs
- Went home to Idaho on the bus POD #1
- Path: stage I (no vascular invasion)
Two Meta-Analysis RFA vs Resect for Small HCC < 3 cm

- No diff in survival at 1, 3 yrs
- Advantage-RFA for early HCC
  - Less invasive, fewer complications,
  - Ease of access, reduced LOS
  - Cost savings
  - Improved QOL

Liu JG, W. J. Surg, 2009
Zhou, BMC Gastroenterol, 2010
Modern world experience

- Very early (<2cm) + early HCC (< 3cm)
  - Excluded tx candidates, child C
- All pts discussed prospectively in conference before treatment using BCLC guidelines
- RFA in OR: open and laparoscopic

HPB 2013, March
Radiofrequency ablation compared to resection in early-stage hepatocellular carcinoma

Samer Tohme¹, David A. Geller¹, Jon S. Cardinal¹, Hui-Wei Chen¹, Vignesh Packiam¹, Srinevas Reddy¹, Jennifer Steel¹,², James W. Marsh¹ & Allan Tsung¹

- Ablation success: 96% at 3 months

<table>
<thead>
<tr>
<th></th>
<th>RFA (n=60)</th>
<th>HR (n=50)</th>
<th>P value</th>
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<tbody>
<tr>
<td>Hospital LOS (d)</td>
<td>2.2 +/- 1.8</td>
<td>5.36 +/- 2.9</td>
<td>0.01</td>
</tr>
<tr>
<td>90 day complication</td>
<td>14.7%</td>
<td>30%</td>
<td>0.04</td>
</tr>
<tr>
<td>90 day mortality</td>
<td>2(3.3%)</td>
<td>0</td>
<td>ns</td>
</tr>
<tr>
<td>% recurrence, Median = 29 mo</td>
<td>35%</td>
<td>46%</td>
<td>ns</td>
</tr>
</tbody>
</table>
Sub Group with Child Class A

Tohme S., HPB 2013, March
Laparoscopic Liver Resection Is Increasing for Obvious Reasons
Transplantation for HCC
Milano Criteria
- Single HCC < 5 cm
- No vascular invasion
- 3 lesions, all < 3 cm
An Analysis of Resection vs Transplantation for Early Hepatocellular Carcinoma: Defining the Optimal Therapy at a Single Institution

Shimul A. Shah, Sean P. Cleary, Jensen C. C. Tan, Alice C. Wei, Steve Gallinger, David R. Grant, and Paul D. Greig

Long term survival should improve in the modern era for pts with HCV

Ann Surg Onc 2007
A Decade of Right Liver Adult-to-Adult Living Donor Liver Transplantation

The Recipient Mid-term Outcomes

**FIGURE 3.** Hepatocellular carcinoma right liver living donor liver transplantation recipient survivals: within versus beyond the Milan criteria.

Within Milan criteria (n=42)

Beyond Milan criteria (n=23)

Cumulative survival (%)

Survival time (months)

$p=0.737$
Which Therapy Is Best in 2015?

- Depends upon perspective and end points being measured.
  - Survival (short vs. long term)
  - Morbidity
  - QALY
  - Costs
Perspectives

- Patient
- Physician
- Payer
- Society

- Whose perspective is most important in an egalitarian society?
Patients’ preferences and trade-offs for the treatment of early stage hepatocellular carcinoma

Michele Molinari, MD, MSc, Sarah De Coutere, BN, Murray Krahn, MD, MSc, Scott Helton, MD, and David R. Urbach, MD, MSc

JSR 2014

Treatment Preferences for Small Hepatocellular Carcinomas

- RFA: 70.3%
- Hepatic Resection: 29.7%

p = 0.0001
Patients’ preferences and trade-offs for the treatment of early stage hepatocellular carcinoma

Michele Molinari, MD, MSc, a,* Sarah De Coutere, BN, a
Murray Krahn, MD, MSc, b Scott Helton, MD, d
and David R. Urbach, MD, MSc c

J Surg Res, 2014

Fig. 4 – Main reason that influenced participants’ decision to choose RFA over HR.
The Patient’s Voice

- Pt treatment preferences are subjective and often contrary to physician recommendations
- Depend upon pts personal values and attitudes towards risks and benefits
- Pt preferences should be elicited before treatment is recommended when competing strategies have different outcomes and safety profiles.

Molinari M, JSR 2014
Summary

- The decision process for appropriate and effective surgical therapy for pts with HCC is complex, and rapidly evolving.
- Depends upon multidisciplinary team working closely together in assessing, treating and following patients.
- Key issues are early detection through screening (more options and greater cure), close & frequent follow up (rescue Rx).
VM Liver Cancer: Contact

Questions? To learn more or to schedule an appointment, please call:

HEPATOLOGY: (206) 341-1323
INTERVENTIONAL RADIOLOGY: (206) 583-6591
MEDICAL ONCOLOGY: (206) 223-6193
SURGERY: (206) 341-1595
NanoKnife® System Clinical Advantages

- **Non-thermal**
  - Eliminates heat sink issues
  - Potential to ablate at or near vital structures (e.g., blood vessels, bile ducts, other tissues containing collagen/elastin)
Before IRE

After IRE