Principles of surgery in Hepatic Tumours

Defining operable, borderline and Inoperable
AIG hospital, Gachibowli, Hyderabad
Principles of surgery in Hepatic Tumours

• Dr Sumana K Ramachandra

ASTS FELLOWSHIP IN MULTIORGAN TRANSPLANT SURGERY, THOMAS E STARZL INSTITUTE, UPMC, PITTSBURGH USA

FELLOWSHIP IN PEDIATRIC TRANSPLANT, CHP, UPMC

Phone no - 9650230555, email - krsuman@gmail.com
Principles of surgery in Hepatic Tumours

Plan

• Brief history of modern liver surgery
• General Principles of liver Surgery
• Staging System for HCC
• Surgical Management of HCC
• Extended criteria for management of HCC, role of TACE and SBRT
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Milestones in liver surgery

Mystic Organ to a Transparent Organ

The liver surgery has progressed tremendously in the last 50 years

From mortalities ranging from 10-20 % it is now < 2 %

A better knowledge of Liver segmental Anatomy, and Inventions in Imaging techniques and techniques of Surgery and post operative management
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Couinaud’s classification 1954
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Milestones in liver surgery

**Henry Bismuth** introduce the concept of Anatomical resections

IOUS - 1984

**Thomas E Starzl** performed the first liver transplantation in 1963

**Strong** First LDLT from adult to child in July 1989 was performed in Australia

**Lo** First Adult LDLT in 1996
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• A good knowledge of the anatomy is a prerequisite
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Liver anatomy

- Right hepatic vein divides the right lobe into anterior and posterior segments
- Middle hepatic vein divides the liver into right and left lobe, this runs from IVC to GB fossa and is called cantle’s line
- Left hepatic vein divides the left lobe into medial and lateral part
- Portal vein divides the liver into upper and lower part
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Safe Liver Resection

- Adequate Biliary drainage
- Adequate inflow
- Adequate outflow
- Adequate functioning Parenchyma
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Risk Factors for Resection

Advanced Age
Co morbidities
Chronic liver Disease
Cholestatic Disease
Post Chemotherapy
Extent and Complexity of the Liver Resection
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Imaging of the liver

Pre operative simulation using a **triple phase Contrast CT scan**

- Accurate assessment of the segmental anatomy
- Liver Vasculature
- Volumetry

**MRCP** - Biliary Tree

**MR spectrography/ Fibroscan** -

**Functional Status** - ICG
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- POST OPERATIVE LIVER FAILURE IS THE COMMONEST CAUSE OF MORTALITY
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• Cause of Post op Liver failure

Impaired Functional reserve

Inadequate residual volume
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Residual volume

Future Remnant Liver Volume FLR

\[ \text{Residual Liver Volume} = \frac{\text{Total liver Volume} - \text{tumour volume}}{\text{FLRV}} \]
- Total liver volume 2625
- Right lobe without MHV 1840 (70%)
- Left lobe with MHV 785.9(30%)
- Left lateral 546( 20.81)%
- Tumour volume 1253
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Large mass: LHA, Rt ant PV, MHV
Plan – extended left hepatectomy

Total volume of liver: 1481 ml
  # Liver: 892 ml (60.2 %)
  # IVC
  # Vein
  # Rt posterior: 589 ml (39.8 %)

Cut area of liver: 126 cm²
Total volume of liver: 1481 ml
  # Liver: 892 ml (60.2 %)
  # IVC
  # Vein
  # Rt posterior: 589 ml (39.8 %)
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Strategies to deal with Impaired Functional reserve

- Parenchymal sparing resection
- Resection after PVE
- Resection in combination with RFA
- Two staged Resection ALLPS
- Resection after chemo
- Resection after TACE
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Augmentation of FLRV

PVE
PV ligation
Repeat CT after 3 weeks
FLRV increases by 20-46 %
Resectability 70-100%
Can be used as a dynamic test for Liver Regeneration
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Portal vein embolisation
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Anatomic VS Non Anatomic Resections

Anatomic vs non-anatomic resections

- Anatomic resections preferred for malignancies
  - ↑ Ro resections
    - (Anatomical vs non-anatomical: 2% positive margins vs 60%)
  - ↓ blood loss

- Non-anatomic resections
  - Preserve parenchyma
  - Indications:
    - Benign hepatic tumours
    - Malignancies in cirrhotic pts

- Margin width? >1mm shown to be adequate
ANATOMIC VS NON ANATOMIC RESECTIONS

- Right hepatectomy
- Extended right hepatectomy
- Left hepatectomy
- Extended left hepatectomy
right posterior sectionectomy

right anterior sectionectomy

left medial sectionectomy

left lateral sectionectomy
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HEPATOCELLULAR CARCINOMA

Challenges

5th most common cancer world wide

80% of the times develops in a diseased organ.

Disease free survival is relative

Time to symptomatic progression is confounded

Surgical resection or liver transplant - curative

Surgery Remains the Gold Standard
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Resection in Cirrhotics

Best in Single lesions, Asymptomatic
Absent Portal Hypertension

- HVPG <10 mm of Hg
- Platelet >1L
- Normal bilirubin
- No Varices

70 % survival at 5 yrs

Only 5-10 % meet the criteria

Lloveet al resection vsTx Hepatology 1999
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Criteria for selection and operability

Anatomical

- Imaging
- Simulation

Functional

- Clinical
- Biochemical
- Functional
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Hepatocellular carcinoma

PRACTICAL APPROACH

Diagnosis - is tissue and issue

Staging (prognosticating) - which system?

Treatment Indications (fitting the treatment to the tumour and the underlying liver disease) - which service knows the best
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Multidisciplinary Approach for Management of HCC

- Radiologist
- Hepatologist
- Oncologist
- Surgeon
- Interventional radiologist
- Pathology

Outside referrals
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INDIVIDUALISED CARE

No single staging system with arrows connecting the stage to treatment will be a substitute replace the need to have a thinking clinician

Jordi Bruix, MD;
HCC Staging

HCC Staging is Multifaceted

- Staging is used for prognosis and to guide treatment\(^1\)
  - Staging HCC\(^1\)
    - Most patients have underlying liver disease
    - Key prognostic indicators are not clearly defined
    - Prognostic indicators vary during the course of disease
- Factors affecting staging systems\(^{2,3}\)
  - Tumor stage
  - Liver function
  - Health status
  - Impact of treatment
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STAGING

• STAGING
• No single universally accepted staging system ( >10 in use )
• Many (AASLD) have adopted the BCLC ( validated )
• 5 stages
• Variables
  • Tumor stage
  • Physical and liver functional status
  • Cancer related symptoms
• Treatment Algorithm
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STAGING SYSTEMS

Figure 1

Timeline of hepatocellular carcinoma staging system. AJCC: American Joint Committee on Cancer; UICC: International Union Against Cancer; CLIP: Cancer of the Liver Italian Program; GRETCH: Groupe d'Etude et de Traitement du Carcinome Hépatocellulaire; BCLC: Barcelona Clinic Liver Cancer; CUPI: Chinese University Prognostic Index; JIS: Japan Integrated Staging Score; TNM: Tumor Node Metastasis.
Table 2

Variables included in the main prognostic systems

<table>
<thead>
<tr>
<th>Variables</th>
<th>Prognostic scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child-Pugh score</td>
<td>X</td>
</tr>
<tr>
<td>Ascites</td>
<td>X</td>
</tr>
<tr>
<td>Albumin</td>
<td>X</td>
</tr>
<tr>
<td>Total Bilirubin</td>
<td>X</td>
</tr>
<tr>
<td>Alkaline phosphatase</td>
<td>X</td>
</tr>
<tr>
<td>Alpha-fetoprotein</td>
<td>X</td>
</tr>
<tr>
<td>Tumor size</td>
<td>X</td>
</tr>
<tr>
<td>Numbers of nodules</td>
<td>X</td>
</tr>
<tr>
<td>TNM stage</td>
<td>X</td>
</tr>
<tr>
<td>Portal vein thrombosis</td>
<td>X</td>
</tr>
<tr>
<td>Metastasis</td>
<td>X</td>
</tr>
<tr>
<td>Portal hypertension</td>
<td>X</td>
</tr>
<tr>
<td>Presence of symptoms and/or</td>
<td>X</td>
</tr>
<tr>
<td>General Status</td>
<td></td>
</tr>
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Open in a separate window

CLIP: Cancer of the Liver Italian Program; GRETCH: Groupe d’Etude et de Traitement du Carcinome Hépatocellulaire; BCLC: Barcelona Clinic Liver Cancer; CUPI: Chinese University Prognostic Index; JIS: Japan Integrated Staging Score; TNM: Tumor Node Metastasis.
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BARCELONA CANCER

![Flowchart showing the stages and treatments for Hepatocellular Carcinoma (HCC).]
BCLC 2022

**Prognosis**
- Based on tumor burden, liver function, and physical status
- Refined by AFP, ALBI score, Child-Pugh, MELD

**Patient characterization**
- To decide individualized treatment approach

**1st Treatment option**
- Ablation
- Resection
- Ablation
- Transplant
- TACE
- Systemic treatment
- BSC

**Expected survival**
- >5 years
- >2.5 years
- >2 years
- 3 months

**Treatment stage migration**
- Primes lower priority options due to non-liver related clinical profile
- (Age, comorbidities, patient values, and availability)

**Clinical decision-making**
- Radioembolization (only for single lesion ≤8 cm)

- Not feasible or failure
- Successful downstaging

**1st Line**
- Atezolizumab-Bevacizumab/Durvalumab-Tremelimumab
  - If not feasible: Sorafenib or Lenvatinib or Durvalumab

**2nd Line**
- Regorafenib (sorafenib-refractory)
- Cabozantinib
- Ramucirumab (AFP >400 ng/ml)
  - Post sorafenib
  - Post atezolizumab-bevacizumab
  - Post durvalumab-tremelimumab

**3rd Line**
- Cabozantinib

*Except for those with tumor burden acceptable for transplant
*Resection may be considered for single peripheral HCC with adequate remnant liver volume

Alternative sequences may be considered but they have not been proved

Clinical trials
Preserved liver function*

*Except for those with tumour burden acceptable for Transplant

Child-Pugh score
- Ascites
  - Minor ascites, easy to treat
  - Tense ascites, high diuretics dosing
  - Refractory ascites, hyponatremia
  - Spontaneous bacterial peritonitis
- Encephalopathy
  - Secondary due to infection, constipation, etc
  - Recurrent encephalopathy
- Bilirubin
- Prothrombin time
- Albumin

ALBI score
- Albumin
- Bilirubin

MELD/MELD-Na score
- Creatinine
- Bilirubin
- INR
- Sodium

Alfafeto-Protein (AFP)


<table>
<thead>
<tr>
<th>Stage</th>
<th>Very early stage (0)</th>
<th>Early stage (A)</th>
<th>Intermediate stage (B)</th>
<th>Advanced stage (C)</th>
<th>Terminal stage (D)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Based on tumor burden, liver function and physical status</td>
<td>Single ≤2 cm</td>
<td>Single, or ≤3 nodules each ≤3 cm</td>
<td>Multinodular</td>
<td>Portal invasion and/or extrahepatic spread</td>
<td>Any tumor burden</td>
</tr>
<tr>
<td>Refined by AFP, ALBI score, Child-Pugh, MELD</td>
<td>Preserved liver function*, PS 0</td>
<td>Preserved liver function*, PS 0</td>
<td>Preserved liver function*, PS 0</td>
<td>Preserved liver function, PS 1-2</td>
<td>End stage liver function, PS 3-4</td>
</tr>
</tbody>
</table>

**ALBI score**

- ✓

**Child-Pugh score**

- ✓

**MELD**

- ✓

**AFP**

- ✓

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- Variceal bleeding
- Malnutrition
- Hepatorenal syndrome
- Arterial hypotension

**Clinical Decision-Making**

- Child-Pugh, MELD, ALBI do not identify 100% of endstage patients

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*References*

Downstaging in BCLC 2022 approach

The goal of downstaging is to reduce tumour burden in order for residual viable tumours to fall within acceptable LT criteria, with Milan Criteria being the commonest endpoint of downstaging


- The upper limit of where a downstaging approach is considered varies across LT regions.
- This also affects the specific imaging criteria used to define baseline and post-treatment staging and evaluation of response.
- There is need to develop further studies to validate such approach and establish how to best apply a downstaging protocol.

Patients with an AFP >1000 ng/mL who experienced biochemical response (at least a decrease to >500 ng/mL) to locoregional therapies have a post-LT outcome comparable to the reported within MC

Mehta et al. Hepatology 2019; Mehta et al. Transplantation 2020
HCC
Hongkong liver cancer staging system

![HCC Staging System Diagram](image-url)
QUESTIONS TO BE ASKED IN CLINICAL PRACTICE

TUMOR CHARACTERISTICS

Diagnosis , is biopsy needed
  Segmental anatomy
  Tumour size and no
  Extra hepatic spread

CONDITION OF THE LIVER

  Functional status
  Is there e/o Portal hypertension
  What is the FLRV
PATIENT FACTORS

Age
Co morbidities
Performance status

FITTING THE TREATMENT TO THE TUMOUR AND THE UNDERLYING LIVER DISEASE
EVALUATION OF THE HEPATIC RESERVE OF PATIENTS WITH HCC

Quantity and Quality of the FLRV

**Quantity**

>25% for normal liver

>40% for Cirrhotic Liver


**Quality** -

LFT (alb, INR, Platelets)

HVPG

OGD

Liver Biopsy
HCC

Resection for HCC

**NON CIRRHOTIC.** - Only 5-10 % of the patients

Extended Resections can be done after proper evaluation

**CIRRHOTIC** — Child s A - Major hepatectomy(Avoid R hepatectomy)

Child s B - segmental or subsegmental resection

Child S C - contraindication for resections
HCC

Resection for HCC

<table>
<thead>
<tr>
<th>Function</th>
<th>Single</th>
<th>Multiple</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PHT**</td>
<td>No PHT</td>
</tr>
<tr>
<td>Child-Pugh A</td>
<td>68%</td>
<td>71%</td>
</tr>
<tr>
<td>Child-Pugh B</td>
<td></td>
<td>Over all 5 year survival 19%</td>
</tr>
<tr>
<td>Resection after recurrence*</td>
<td>79%</td>
<td>81%</td>
</tr>
</tbody>
</table>

*3 year survival

**PHT defined as varices and/or platelets less than 100000

Resection after Downstaging

Neoadjuvant and down staging prior to resection

Not recommended if the tumour is resectable

Delay

Technically more difficult

May be associated with more morbidity

Not resectable due to anatomic reasons, 6-28% become resectable

Recurrence rate is 40 -85 %

Survival, 5 year 25 to 60 %
20% who meet the current EASL/AASLD criteria are denied surgery and this increases mortality.

Common practice is to offer surgery beyond the criteria.

Down staging and LR is offered for patients who have locally advanced tumour.

Downstaging and LR has better survival compared to locoregional therapies like TACE.

In real life LR for HCC is based on individual components and local conditions which are not captured by guidelines.
Surgical treatment of hepatocellular carcinoma

HEPATOTOLOGY
CORRESPONDENCE
HEPATOTOLOGY, March 2016

Hepatic Surgeons Are Like the Child Who Rescued Dying Fish

TO THE EDITOR:

Let us first share with you a story. Under a scorching sun, numerous fish were stranded on the beach after a receding tide, waiting to die. A child picked these fish up one by one and threw them back into the sea. An old man asked the child, “There are so many of them, who cares for one or two fish?” The child did not stop his work and replied, “Look, this one cares, and that one cares too.”

We, hepatic surgeons, are like this child. We are aware that we are unable to cure all our patients with hepatocellular carcinoma (HCC), but we never stop to give a chance of cure to them by surgery. Although the current European and American guidelines for HCC do not recommend hepatic resection for patients with intermediate or advanced HCCs, with Child B liver function, or concurrent portal hypertension, many hepatic surgeons around the world still operate on such patients on a selective basis provided the perioperative mortality and morbidity rates are estimated to be low.\(^1\text{-}\text{3}\) In real life, a significant proportion of these patients would also choose surgical resection because of the potential cure despite a high tumor recurrence rate after resection.

Tian Yang, M.D.\(^1\)
\(^1\)Department of Hepatic Surgery
Eastern Hepatobiliary Surgery Hospital
Second Military Medical University
Shanghai, China
\(^2\)Faculty of Medicine
The Chinese University of Hong Kong
Hong Kong SAR, China
Liver Transplantation for HCC
Liver Transplantation for HCC

HCC – A wide Spectrum

- Early HCC, single lesion
- Multifocal HCC
- < 3 tumours < 3 cm max dia
- Large HCC with vascular involvement
Liver Transplantation for HCC

Conventional Criteria - LT for HCC

Milan group -- single ≤ 5cm, ≤ 3 tumours ≤ 3cm (on imaging)

**Mazzaferro et al, NEJM 1996

~ Accepted by UNOS as “Conventional Criteria” since 1998
UCSF Criteria

- Lesion <6.5cm
- 2-3 lesions
  - Largest <4.5cm
  - total dia <8cm
- No vascular invasion
- No extrahepatic metastases
- One yr survival 90%
- Five yr survival 75%

Yao FY et al. Hepatology 2001;33: 1394-403
Liver Transplantation for HCC
EXPANDED CRITERIA

<table>
<thead>
<tr>
<th>Criteria Name, year</th>
<th>Criteria</th>
<th>No. of patients</th>
<th>OS / RFS using expanded criteria</th>
<th>OS / RFS for within Milan</th>
<th>Prognostic factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pamplona Criteria, 2001</td>
<td>1 nodule ≤ 6 cm or 2-3 nodules ≤ 5 cm</td>
<td>63 pts, 12 beyond Milan</td>
<td>79% OS at 5 yrs in entire group, 70% RFS</td>
<td>NA</td>
<td>-</td>
</tr>
<tr>
<td>Mt.Sinai criteria, 2002</td>
<td>≥ 1 nodule 5-7 cm (with neoadjuvant Chemo + TACE)</td>
<td>31 pts in expanded criteria</td>
<td>55% 5 yr OS in pts beyond Milan and within Mt.Sinai</td>
<td>NA</td>
<td>-</td>
</tr>
<tr>
<td>Edmonton Criteria, 2004</td>
<td>1 nodule &lt;7.5 cm, or any number &lt; 5 cm</td>
<td>40 pts, 21 pts beyond Milan</td>
<td>83% 4 yr OS and 77% RFS</td>
<td>87% OS at 4 yrs</td>
<td>Sirolimus helps in beyond criteria</td>
</tr>
<tr>
<td>UCSF Criteria, 2007</td>
<td>Single tumour ≤ 6.5 or ≤ 3 nodules ≤ 4.5 and TTD ≤ 8 cm</td>
<td>168, 38 beyond Milan</td>
<td>75% OS at 5 yrs, RFS 93%</td>
<td>80% OS 5 yrs, RFS 90%</td>
<td>-</td>
</tr>
<tr>
<td>Up to Seven, 2009</td>
<td>Seven as sum of largest tumour dia (cm) and no. of tumours</td>
<td>1556 pts, 1112 beyond Milan</td>
<td>71.2% OS at 5 yrs</td>
<td>73% OS for within Milan</td>
<td>MVI significantly affects survival</td>
</tr>
<tr>
<td>UNOS Region 4, R4T3 Criteria, 2010</td>
<td>1 lesion &lt;6 cm; ≤3 lesions, none &gt;5 cm and total dia &lt;9 cm</td>
<td>445 pts, 363-MC and 82 expanded</td>
<td>3 yr OS 77.1%, RFS 86.9%</td>
<td>3 yr OS 72.9%, RFS 90.5%</td>
<td>-</td>
</tr>
</tbody>
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Upto 3 nodules, upto 7.5cm max dia | 31 to 1556 pts | > 70 % 5-yr OS in most
# Liver Transplantation for HCC

## EXPANDED CRITERIA

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<tr>
<td>Tokyo (5-5 rule), 2007</td>
<td>≤ 5 nodules and ≤ 5 cm</td>
<td>Total 78 patients</td>
<td>5-yr OS 75% 5-yr RFS 94%</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>Kyoto Criteria, 2007</td>
<td>≤ 10 nodules, all ≤ 5 cm and DGCP (PIVKA II) ≤ 400 mAU/ml</td>
<td>Total 136, 62 beyond Milan</td>
<td>87% OS and 5% recurrence rate at 5 yrs</td>
<td>10% recurrence rate at 5 yrs for tumours in Milan</td>
<td>-</td>
</tr>
<tr>
<td>Asan Criteria, 2008 (on explant path)</td>
<td>tumor diameter ≤ 5 cm, ≤ 6 lesions, no gross vascular invasion</td>
<td>221 patients</td>
<td>82% 5 yr OS</td>
<td>76% for within Milan</td>
<td>Higher discriminatory power compared to Milan and UCSF</td>
</tr>
<tr>
<td>Kyushu Criteria, Japan, 2009</td>
<td>Any number of tumours, &lt; 5 cm in size, PIVKA II &lt; 300</td>
<td>90 pts, 54 pts beyond Milan</td>
<td>83% OS at 5 yrs 87% RFS at 5 yrs</td>
<td>95.6% OS at 5 years</td>
<td>Pre-op DGCP ≥ 300 mAU/mL and tumour size ≥ 5 cm</td>
</tr>
<tr>
<td>Hangzhou, 2008</td>
<td>Tumour size &lt; 8 cm in total, any tumour number. If &gt; 8 cm, grade I/II + AFP &lt; 400 ng/mL</td>
<td>92 patients</td>
<td>72% 5-yr OS</td>
<td></td>
<td>Preop AFP and tumour differentiation</td>
</tr>
<tr>
<td>Toronto Criteria, 2011</td>
<td>No number-size criteria. Poor tumour differentiation as exclusion</td>
<td>294 patients</td>
<td>70% OS and 70% DFS at 5 yrs</td>
<td>72% OS at 5 years</td>
<td>-</td>
</tr>
</tbody>
</table>

71 to 221 pts  
Upto 10 cm, upto any no.  
> 75% OS, > 70% RFS  
Outcomes comparable to within Milan
**Published expanded criteria - LDLT**

<table>
<thead>
<tr>
<th>Criteria Name, year</th>
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<td>Total 78 patients</td>
<td>5-yr OS 75%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Kyoto Criteria, 2007</td>
<td>≤ 5 nodules</td>
<td>Total 11 patients</td>
<td>5-yr OS 94%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Asian Criteria, Japan</td>
<td>≤ 5 nodules and ≤ 5 cm</td>
<td>Total 67 patients</td>
<td>5-yr OS 86%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Hangzhou, 2010</td>
<td>No number-size criteria. Poor tumour differentiation as exclusion</td>
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<td>Upto 10 cm, upto any no.</td>
<td>&gt; 75% OS, &gt; 70 % RFS</td>
<td>Outcomes comparable to within Milan</td>
<td>-</td>
<td>-</td>
</tr>
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</table>

- Significant expansion beyond Milan
- Mostly from the Asian countries where DDLT is not common
- Main impetus -- No EHD and no gross vascular invasion (not so much number/size)
- Use of tumour markers in prediction of outcomes - tumour biology
Tumour Biology is the King!!
Not just size and numbers..
EXTENDED CRITERIA

ROLE OF SBRT / TACE / TARE
LIVER TRANSPLANTATION FOR HCC

DOWNSTAGING

- Conventionally PVTT is contraindication for Liver Transplant

- With Downstaging, even this group can have long time survival with Resection and or LT.

- Double Equipoise concept (maximum recipient benefit with minimum donor risk )

- Downstaging recommended in LDLT even if Adverse Biological factors

- Minimal recipient survival is contentious and Transplant Benefit, a better metric
LIVER TRANSPLANTATION FOR HCC
DOWNSTAGING FOR LOCALLY ADVANCED HCC

Down-Staging of Hepatocellular Carcinoma via External-Beam Radiotherapy With Subsequent Liver Transplantation: A Case Report

Living Donor Liver Transplantation for Advanced Hepatocellular Carcinoma with Portal Vein Tumor Thrombosis after Concurrent Chemoradiation Therapy

Liver Transplantation After Transarterial Chemoembolization and Radiotherapy for Hepatocellular Carcinoma with Vascular Invasion
Successful pre-Tx downstaging of HCC-PVTT gives good results after LDLT

AMC, Seoul Jeong Y, Lee SG et al., J Gastrointest S 2016

17 HCC patients with PVTT underwent DS with TACE and radiotherapy, and LDLT the 3-year DFS and OS were 57.8 and 60.5 %, respectively.

Fig. 1 Survival outcomes. a Intrahepatic recurrence-free survival (IHX-RFS) rate. b Disease-free survival (DFS) rate. c Overall survival (OS) rate.
Experience With LDLT in Patients With Hepatocellular Carcinoma and Portal Vein Tumor Thrombosis Postdownstaging

Arvinder S. Soin, MS, FRCS, Prashant Bhangui, MS, Tejinder Kataria, MD, Sanjay S. Baijal, MD, Tarun Piplani, MD, Dheeraj Gautam, MD, Narendra S. Choudhary, DM, Srinivasan Thiagarajan, MS, Amit Rastogi, MS, Neerali Saraf, MD, and Saniy Saidal, DM
LIVER TRANSPLANTATION FOR HCC

Survival in 25 HCC PVTT patients following LDLT Postdownstaging

![Graph showing survival rates](image)

Soin AS, Bhangui P. et al. Transplantation 2020
### Selection criteria based on Transplant benefit

**Transplant benefit** = gain offered by LT in comparison with the best alternative therapy

<table>
<thead>
<tr>
<th>40/M, Childs B, HBV</th>
<th>2 HCC nodules, largest 6 cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outside Milan/UCSF</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>65/M, Child A, HCV</th>
<th>1 HCC nodule, 4 cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Within Milan/UCSF</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Description</th>
<th>3/5 yr post Tx survival</th>
<th>5yr survival</th>
</tr>
</thead>
<tbody>
<tr>
<td>MC-in HCC, Child’s C</td>
<td>85/80%</td>
<td></td>
</tr>
<tr>
<td>No transplant</td>
<td>25/0%</td>
<td></td>
</tr>
<tr>
<td>8cm, 7 tumors, no PVTT</td>
<td>75/65%</td>
<td></td>
</tr>
<tr>
<td>No transplant</td>
<td>10/0%</td>
<td></td>
</tr>
<tr>
<td>HCC+PVTT – DS (TARE+SBRT)+LDLT</td>
<td>65/55%</td>
<td></td>
</tr>
<tr>
<td>No transplant</td>
<td>0/0%</td>
<td></td>
</tr>
</tbody>
</table>
# LIVER TRANSPLANTATION FOR HCC

## CASE REPORTS

### CASE 1  (TARE + LDLT)

<table>
<thead>
<tr>
<th>Date</th>
<th>AFP</th>
<th>PIVKA</th>
</tr>
</thead>
<tbody>
<tr>
<td>26/12/19</td>
<td>7.2</td>
<td>25453</td>
</tr>
<tr>
<td>31/1/20</td>
<td>11.5</td>
<td>8600</td>
</tr>
<tr>
<td>16/3</td>
<td>6.9</td>
<td>2793</td>
</tr>
<tr>
<td>23/4</td>
<td></td>
<td>166</td>
</tr>
</tbody>
</table>

- 65 yr old, **Lyricist**, 
- NASH related CLD (child s A) detected to have Advanced HCC (VP 2-3)
LIVER TRANSPLANTATION FOR HCC
Tumor size reduced 9.1x 7.2 cm 4.7 x 3.7 cm
PVTT —— Complete metabolic resolution and enhancement of filling defect

NO EXTRA HEPATIC DISEASE

Pathology

WELL DIFFERENTIATED TUMOR

THE SIZE OF THE TUMOR - <2 CMS WITH MORE THAN

AND NO E/O TUMOR IN THE PV .
Liver Transplantation for HCC

Case report

- Case 2,
- 61 yrs old NASH related CLD Childs A, with HCC
SBRT for down staging for Ltx
Surgical Management of HCC is evolving

Potential cure is increasing with down staging modalities like TACE, TARE, SBRT followed by LR or LT,

Patients with PVTT or locally advanced tumours - have not hit the end of the road.

Multidisciplinary approach

Genomics is becoming a part of prognostication and diagnosis

Personalised medicine and individualised treatment is the future
Some downstage patients with good tumour biology do well with LR and LT

When we expand the criteria for LDLT,

Double Equipoise, (recipient outcomes and donor safety) Should be strictly followed

Minimum Acceptable recipient survival is contentious and Transplant Benefit, a better metric
Liver Transplant for HCC

Multidisciplinary Approach for Management of *locally advanced* HCC

- Radiologist
- Hepatologist
- Pathology
- Oncologist
- Surgeon
- Interventional radiologist
- Radiation Oncologist
Seeking Optimal Outcomes in an Era of Personalised Medicine and Transplant Oncology .... Beyond Convention Yet Evidence Based
THANK YOU