How to integrate surgery in the treatment of patients with liver-only metastatic disease

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DISCLOSURE

Nothing to disclose
Liver metastases colorectal cancer

Surgical resection

5-year Survival

10-year Survival

Figure 2 Kaplan-Meier cumulative survival curves of the patients who underwent liver resection (LR) for colorectal cancer (CRC) hepatic metastasis by recurrence-free survival (RFS) and overall survival (OS).

Chan et al. World Journal of Surgical Oncology 2014, 12:155

Tomlinson JS et al. Journal of Clinical Oncology 2007; 25: 4575
Liver metastases colorectal cancer

1. Diagnosis and treatment management: Multidisciplinary Board

2. Surgical techniques: Anatomy and Technology

3. New strategies and new therapies
MULTIDISCIPLINARY BOARD

Evaluation of cases
Diagnostic work-up
Best strategy discussion
Selection for surgical approach
Timing for surgery
Feed-back results
Figure 2. Categorisation of patients according to technical and oncological criteria. FOLFOX, infusional 5-fluorouracil, leucovorin, oxaliplatin.
Liver metastases colorectal cancer

*Surgical resection offers a substantial chance of cure*

**Keys**

**Primary tumour** *under control*

**Complete resection (R0)**

- Number
- Extension
- Margins

**Liver remnant**

25-40% *future liver remnant (FLR)*

Ratio FLR/total body weight > 0.5

(e.g. > 350 g of liver remnant for a 70 Kg patient)

Normal liver ≥ 25%
Neoadjuvant Chemo ≥ 30%
Cirrhosis ≥ 40%
Liver metastases colorectal cancer

**Goal of preoperative imaging and clinical performance**

Identify potentially resectable patients

1. Define the number and segmental distribution of LM
2. Determine surgical resectability
3. Identify extra-hepatic disease

**Computed tomography (CT-scan)**
- Thorax-abdomen-pelvis
- Volumetry

**Magnetic Resonance Imaging (MRI)**

**FDG-Positron Emission Tomography (FDG-PET)**

*Stepwise imaging approach*

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**Table 2. Contraindications to hepatic resection in patients with CRC liver metastases (adapted from Adam et al. [110] with permission from AlphaMed Press)**

<table>
<thead>
<tr>
<th>Category</th>
<th>Contraindication</th>
</tr>
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<tbody>
<tr>
<td>Technical (A)</td>
<td>1. Absolute                        Impossibility of R0 resection with ≥30% liver remnant</td>
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<tr>
<td></td>
<td>2. Relative                        R0 resection possible only with complex procedure</td>
</tr>
<tr>
<td></td>
<td>(portal vein embolisation, two-stage hepatectomy, hepatectomy combined with ablation*)</td>
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<tr>
<td></td>
<td>R1 resection</td>
</tr>
<tr>
<td>Oncological (B)</td>
<td>1. Concomitant extrahepatic disease (unresectable)</td>
</tr>
<tr>
<td></td>
<td>2. Number of lesions ≥5</td>
</tr>
<tr>
<td></td>
<td>3. Tumour progression</td>
</tr>
</tbody>
</table>

Patients should be categorised as A1 or A2/B1, B2 or B3.
*All methods, including radiofrequency ablation.

ESMO, 2016
Liver metastases colorectal cancer

**PREOPERATORY IMAGING**

- CT-scan
- MRI
  
  *FDG-Positron Emission Tomography (FDG-PET)*

**INTRAOPERATORY IMAGING**

  **INTRA-OPERATIVE ULTRASONOGRAPHY**
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**CT-scan**

Contrast enhancement
Arterial (20") and portal (60") phases

**CRCLM:**
Hypovascular
Rim enhancement washed out on later phases

**Limitations:**
Exposure to ionizing radiation
Reactions to iodinated contrast
Sub-centimetre lesions
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**MRI**

**MRI**
- Does not use ionizing radiation
- Higher contrast resolution
- Multiparametric imaging: T1, T2, Diffusion-weighted imaging (DWI)
- Better for lesions < 1cm
- Better for patients with steatosis or changes due to Chemotherapy

**CRCLM:**
- Hypointense T1
- Hyperintense T2
- Gadolinium hypovascular enhancement pattern

**Limitations:**
- Availability
- Radiology expertise
- Patient characteristics: claustraphobia, pacemaker...
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INTRA-OPERATIVE ULTRASOUND

IOUS + surgical exploration may change the planned surgery up to 20%
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**Preoperative evaluation and imaging**

**Surgical eligibility**

1. Complete resection of all lesions including extrahepatic disease
2. Free margin resection (R0)
3. Adequate functional liver remnant
4. Fitness for major abdominal surgery and general anaesthesia

**Clinical Scenarios**

- **Resectable M1 and fit for surgery**
- **Non-resectable M1 but fit for surgery**
  Conversion surgery after combined therapies
- **Unresectable M1 or unfit for surgery**

Volumetry
Preserve two contiguous segments
with adequate vascular inflow, outflow and biliary drainage
Liver metastases colorectal cancer

Resectable M1 in patients fit for surgery
Liver metastases colorectal cancer

Surgical technique

ANATOMY

and

TECHNOLOGY
Management of colorectal cancer presenting with synchronous liver metastases
Siriwardena AK et al. Nature Reviews Clinical Oncology 2014; 11: 446–459

The Brisbane 2000 terminology of hepatic anatomy and resections.
The terminology committee of the IHPBA.

http://www.ahpba.org/liverterms.php
Intra-operative ultrasonography

Argon Beam Coagulator

CUSAs

Tissuelink®
Open approach
Laparoscopic approach
Liver metastases colorectal cancer

Surgical standards

Morbidity $\sim$ 25 %
Mortality $\sim$ 1.5 %
5-year S $\sim$ 41 %
10-year S $\sim$ 25 %

MORBIDITY < 30 %
MORTALITY < 5 %
Non-resectable M1 in patients fit for surgery
Liver metastases colorectal cancer

New strategies

✓ Neoadjuvant Chemotherapy
✓ Radiofrequency ablation
✓ Portal embolization
✓ Two-stage hepatectomy
✓ Combinations
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NEOADJUVANT CHEMOTHERAPY

*Conversion is the goal*

M₁ UNRESECTABLE

M₁ RESECTABLE
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**RADIOFREQUENCY ABLATION**
Liver metastases colorectal cancer

RADIOFREQUENCY ABLATION
Liver metastases colorectal cancer

PORTAL EMBOLIZATION

A

B
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TWO STAGE HEPATECTOMY

5-Year S
32-64 %

Median survival
24-44 m

Drop-out
35 %

Torzilli G et al.
Liver Cancer 2017
Liver metastases colorectal cancer

**TWO STAGE HEPATECTOMY**

Associated liver partition and portal vein ligation for staged hepatectomy (ALPPS)

Two-stage hepatectomy with very short interval
Shortening of the interval between surgeries minimizes the drop-out risk
Extraordinarily rapid hypertrophy of the FRL (10 days)
Rescue in patients with portal embolization failure

**Stage 1**
- Clearance of the FRL
- Portal vein ligation
- Liver parenchyma division

**Stage 2**
- Hepatectomy when the FRL is considered to be large enough

Fernando A. Alvarez, Jose Iniesta, Jose Lastiri, Marina Ulla, Fernando Bonadeo Lassalle y Eduardo de Santibañes. Cir Esp 2011; 89 (10):645-649
Liver Metastases

Resectables
- Prognosis factors
  - Low risk
  - High risk

Non-Resectables
- Prognosis factors
  - Low risk
  - High risk

Surgery → Adjuvant therapy

Neoadjuvant therapy
- Stable or Responder +
- Progression

Change strategy Chemo

Surgery

Adjuvant therapy

Palliative

Surgery

Adjuvant therapy

Resectable

Neoadjuvant therapy

Surgery

Adjuvant therapy

Resectable +
- Portal Embolization
- Radiofrequency
- Two-stage Hepatectomy

Change strategy Chemo

Palliative

Adjuvant therapy

*Nordlinger (96), Fong (99)... Konopke (09)
Number, Size, Lymph node-status,
Margin, CEA, Extrahepatic disease,
Synchronous...
Summary

Multidisciplinary Treatment
Appropriate selection for the best therapeutical treatment
Oncological and surgical strategies
Complex surgical techniques in specialized centres
Raúl Javier Sales Sevilla · The Color of Life – Medical cinema
Department of Surgery – University of Valencia
Thank you!!