LIVER METASTASIS

OUTLINE

- Introduction
- Clinical presentation
- Diagnosis: Histology and Imaging
- Management

INTRODUCTION

- The liver is a common site of distant metastasis originating from different neoplasms including gastrointestinal (pancreatic, stomach, colorectal), lung, breast cancers, melanoma (eye, skin), renal and gynaecological system.
- Also primary liver tumours such as cholangiocellular carcinomas (CCC), cancers of the bile ducts , may disseminate into the liver.

most common

*Metastasis either to outside of the liver or a tissue inside the liver and the mets is within the liver

Gut. 2002 Nov; 51Suppl 6():VI1-9.

THE HIGH FREQUENCY OF LIVER METASTASES IS CAUSED BY:

75% from portal vein

25% from common hepatic artery

1. The liver's vast blood supply, which originates from portal and systemic systems.
2. The fenestrations of the hepatic sinusoidal endothelium may facilitate penetration of malignant cells into the hepatic parenchyma.
3. Humoral factors that promote cell growth and cellular factors, such as adhesion molecules, favour metastatic spread to the liver.
4. The liver's geographic proximity to other intra-abdominal organs may allow malignant infiltration by direct extension.

→ duodenum
kidneys
adrenal gland

Winter, J., & Auer, R. A. C. (2012)

INTRODUCTION

↑ liver resection surgeries
→ improved outcomes especially for colorectal mets

- Oncologists were so pessimistic about the appearance of hepatic metastases that "no treatment" was often the recommendation.
- Advancing technology and improved surgical techniques.
- Patient selection is the most important aspect of surgical therapy for metastatic disease in the liver and clinical follow-up of resected patients has identified those most and least likely to benefit. Therefore, realistic expectations and honest patient education is an important aspect of treatment.

CLINICAL PRESENTATION

- Variable and subtle.
- Most patients are asymptomatic; a minority may report abdominal pain, jaundice, or pruritus.
- Symptoms of the carcinoid syndrome. → symptoms of the primary tumor because it secretes certain hormones which can reach systematic circulation before destroyed by the liver
- Physical examination may reveal hepatomegaly, a friction rub over hepatic metastases, or ascites caused by hepatic venous obstruction or peritoneal carcinomatosis. (peritoneal dissemination)

Kemeny, N., & Kemeny, M. L. (2008)

BIOCHEMICAL LABORATORY TESTS

- The laboratory tests that are available for liver function assessment are not very sensitive.
- CEA remains the most sensitive test for metastatic colon cancer, but even this test can be normal in the presence of liver metastases, especially with minimal hepatic disease.

mainly colorectal tumor

IMAGING TECHNIQUES

- The choice among the various techniques, and the sequence with which they are used, should be guided primarily by the clinical indication, taking into account the primary type and the different possible treatments, which also depend on the general status of clinical history of the patient.
- Dedicated liver imaging is not needed in patients diagnosed with disseminated, inoperable disease.

Hepatobiliary Tumors Radiol Clin N Am, 49-679,2011

ULTRASONOGRAPHY

- Transabdominal ultrasonography (US) → مجلي مع (for pregnant ladies)
- Contrast-enhanced US → focusing on one lesion to further analyze it differentiating; if it's cyst or not, liver mets or not
- Endoscopic ultrasound (EUS) → endoscope + probe (tip) → check for lobes surrounding the stomach → left lobe, lobe around the pancreas
- Intraoperative US (IOUS): detects 5-10% of missed lesions.

① more accurate than transabdominal ② you can do invasive procedure like FNAB/ biopsy

↳ superior to CT scan → sterile probe directly over the liver.

(Diagnostic + therapeutic for benign conditions)

COMPUTED TOMOGRAPHY (CT)

→ Detecting mets size of > 1cm

useless for liver met

- Noncontrast CT.
- Contrast CT.
  - → Not used for people with renal pathologies (limitation).
  - → Iodine based
  - → for liver mets contrast is needed
  - → arterial + venous

HCC → Triphasic CT

COMPUTED TOMOGRAPHY (CT)

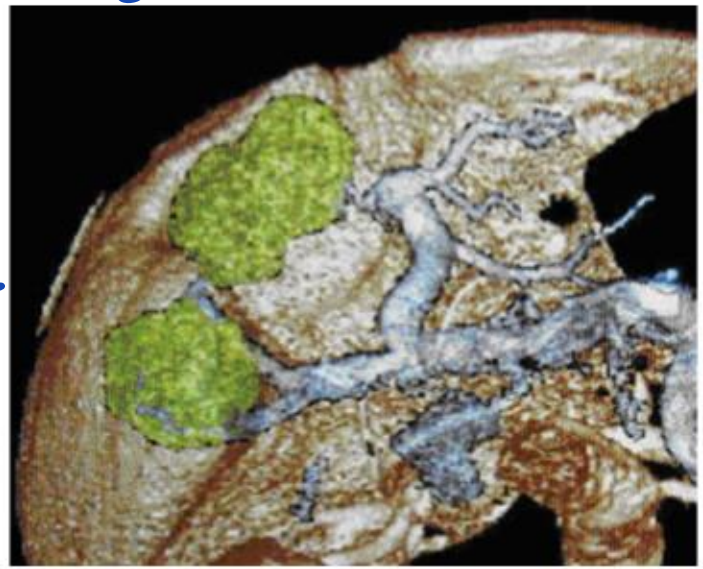
*Anything white → hyperdense lesion

→ arterial phase

hyperdense liver

. Computed tomography of hypervascular liver metastases from a renal primary tumor at the arterial phase.

3D



blood vessels ← especially portal vein

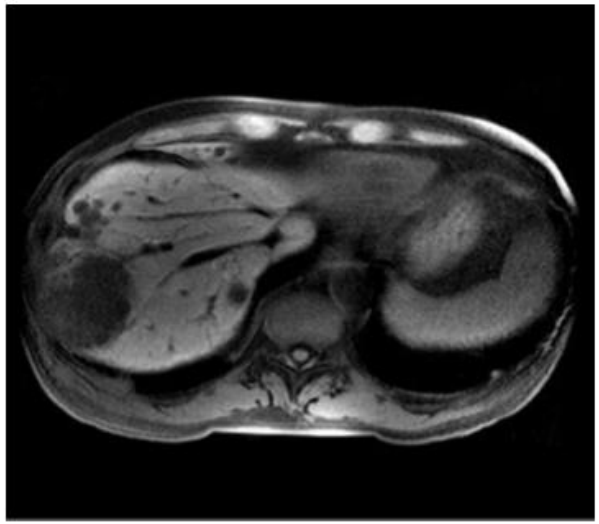
Computed tomography 3-D reconstruction before surgical showing liver metastases

- patients with renal impairment (contrast contraindicated)
- Mets <1cm
- young patient (Avoid recurrent CT) → US / MRI if obese

MAGNETIC RESONANCE IMAGING (MRI)

Dynamic, breath-hold MR imaging with a gadolinium-based contrast material is considered to be the most sensitive MR technique for detection of hepatic metastases

especially small (<1cm)



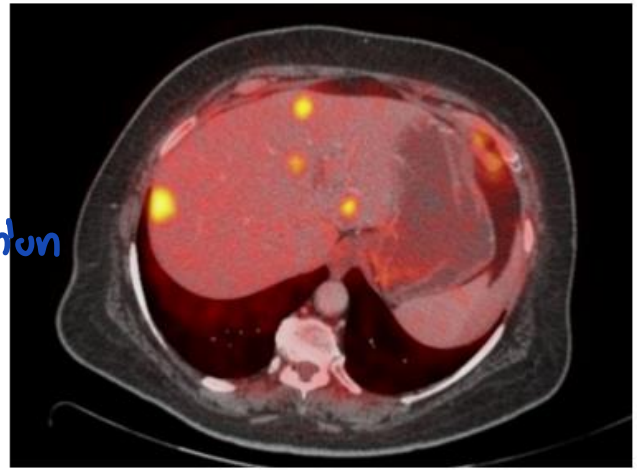
. Liver metastases after Mn DPPD or mangafodipir injection.

POSITRON EMISSION TOMOGRAPHY (PET)

Cells depend on glucose for metabolism, and tumor: hyperactive cells ↑ sugar use more than normal tissue → uptake → light up on special detectors

- The majority of clinical experience relies on the uptake and use of glucose in human cells.
- 18F-Fluorodeoxyglucose 18FDG, the most commonly used marker in PET imaging, is an analogue of glucose in which a carbon atom is replaced by a radioactive fluorine isotope.
- Combined PET/CT scanners allow the precise localization of the abnormal areas of uptake.

*not specific → uptake could be at a site of inflammation



. PET/CT Cancer pancreas with liver metastases (http://www.radrounds.com/photo/petct- -2context).

*PET scan : without specifying the organ

HISTOPATHOLOGY

- The histologic appearances of metastatic deposits in the liver may resemble those of the primary tumors.
- Because the metastatic cell population may not be representative of the primary tumour, it can be difficult to determine the site of origin based on the histologic appearance of the metastases alone.

HISTOPATHOLOGY

The initial light-microscopic findings can be used to categorize the tissue into one of three groups:

1. poorly differentiated carcinoma or adenocarcinoma.
2. well-differentiated adenocarcinoma. → if it's similar to the primary cancer
3. squamous carcinoma.

In most cases, immunohistochemical studies further differentiate these metastases.

Tumor	Antigens
Colonic adenocarcinoma	CEA
Pancreatic carcinoma	CEA, pancreatic carcinoma-associated antigen
Lung carcinoma	CEA, cytokeratin, neuron-specific enolase
Breast carcinoma	CEA, milk-fat globulin, hCG
Thyroid carcinoma	Thyroglobulin
Prostate carcinoma	Prostate-specific acid phosphatase, PSA
Melanoma	S-100, vimentin, neuron-specific enolase
Carcinoid	Chromogranin, neuron-specific enolase
Lymphoma and leukemia	CLA
Sarcoma	
Smooth muscle	Type IV collagen, vimentin, desmin
Skeletal muscle	Myoglobin, vimentin, desmin
Neurogenic	S-100, myelin basic protein
Cartilage	S-100, vimentin
Bone	Vimentin
Germ cell tumors	α-fetoprotien, α1-antitrypsin
Trophoblastic tumors	hCG, α-Fetoprotein

Immunohistochemical antigens for the identification of primary tumors.

CRLM

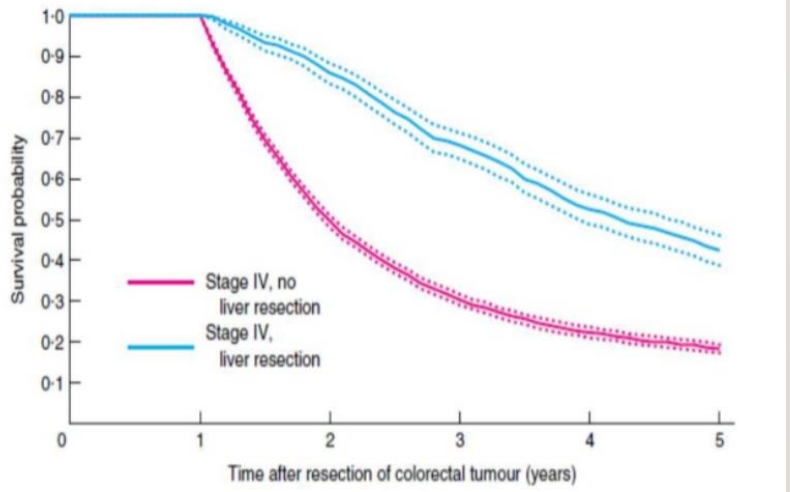
- Colorectal cancer (CRC) is one of the most common cancers in the world, ranking third in terms of incidence (10.2% of all cancer cases worldwide) and second most common cause of cancer mortality (9.2% of all cancer mortality) in the world. Over 1.8 million new CRC cases and 881,000 deaths are estimated to occur in 2018, accounting for about 1 in 10 cancer cases and deaths.

almost resected tumor when there's liver mets

Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries.*Bray F, Ferlay J, Soerjomataram I, Siegel RL, Torre LA, Jemal ACA Cancer J Clin. 2018 Nov; 68(6):394-424.*

Surgical management and outcomes of colorectal cancer liver metastases

British Journal of Surgery 2010; 97: 1110–1118



injection only to the liver (similar to cath idea)

*Ideal is resection

CRLM

local chemotherapy

still refractory

systemic chemotherapy

- if the patient isn't fit for resection
- Near a major vessel

Management

- Hepatectomy
- Locally ablative therapy
- Chemotherapy
  - systemic
  - Hepatic Arterial Infusion (HAI)
- Embolization - Chemoembolization

Portal vein

CHEMOTHERAPY

- Neoadjuvant → downstaging
- Adjuvant → after operation
- Palliative

to stabilize the liver
size → for example near IVC : compression of IVC
ascite, lower limb edema...

THANK YOU