Ultrasound in a LMIC context

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The Armisteads in Pakistan

Scott, JoAnn and their three sons, Jared, Noah and Seth

Objective:

By the end of this course students will be able to:

Recognize ultrasound findings in clinical scenarios encountered uniquely in LMICs in which infectious diseases accompanying poverty are prevalent

Method:

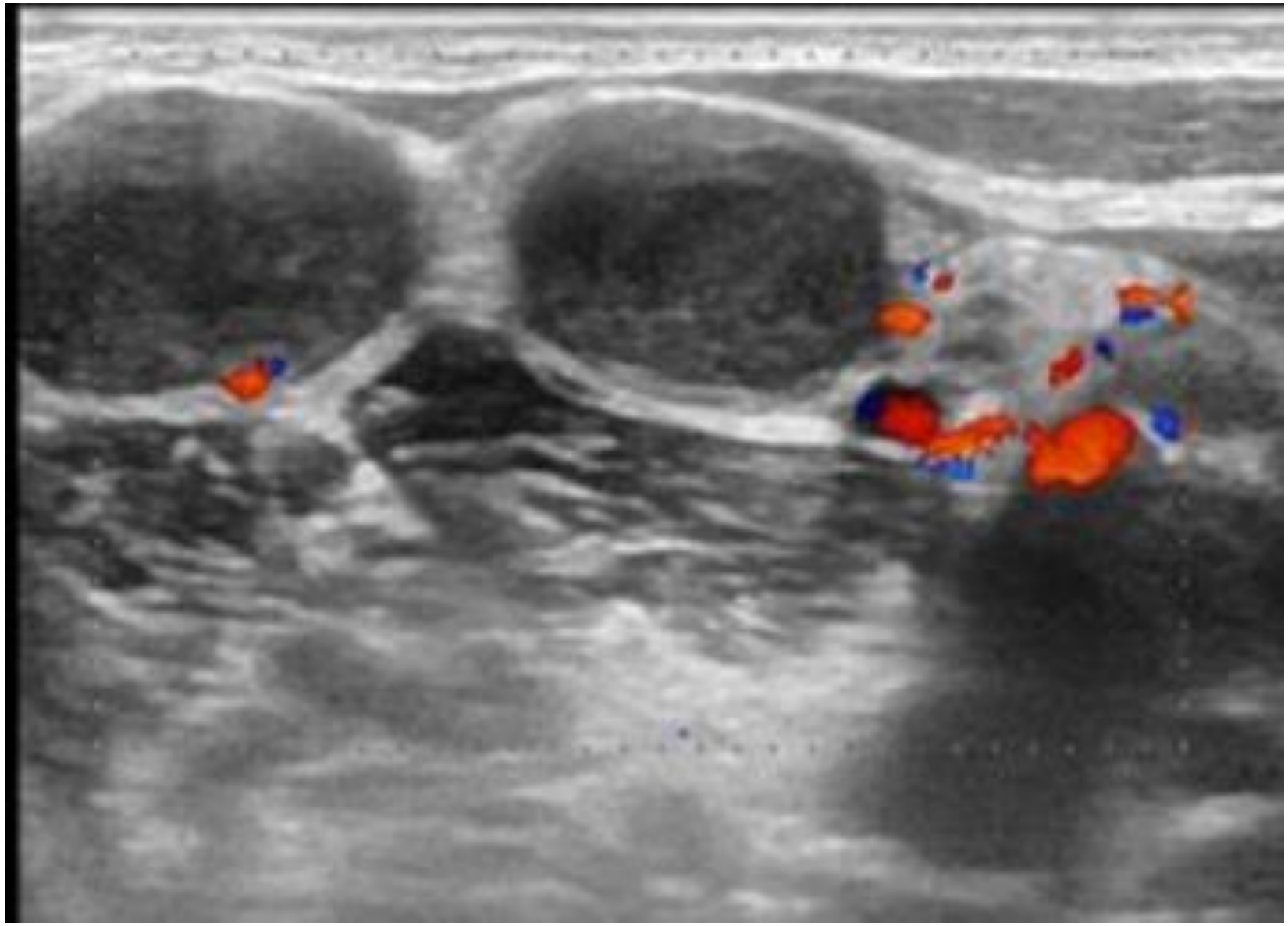
1. Clinical scenario presented from a LMIC-context
2. Ultrasound findings presented and discussed
3. Course ordered according to body regions, i.e. head/neck, chest, abdomen, etc.

Case 1:

- In Pakistan a patient comes to you with swollen neck nodes over the last three months. He has had mild weight loss, no fever, no night sweats. He states that the nodes started out as feeling rubbery and have progressed to being more firm. They are in the anterior cervical chain and are unilateral and nontender. He has no nodes elsewhere. No nausea, vomiting, diarrhea, cough, or shortness of breath.



https://i0.wp.com/post.healthline.com/wp-content/uploads/2022/02/cervical-lymphadenopathybody8.jpg?w=1155&h=1528



https://www.semanticscholar.org/paper/Tuberculous-cervical-lymphadenitis-(scrofula):-USG,-Phatak-Gupta/7c51aae693c667e57a94b22274ed8bb4935dd1ac

D/dx

- Reactive lymphoid hyperplasia - with viral or bacterial, nodes usually soft, mobile, tender and self-limited in 2-4 weeks
  - Mono (EBV/CMV)- patients are younger, typically bilaterally posterior with pharyngitis, fatigue and HSM
  - Toxoplasmosis – cat exposure or undercooked meat

- Bacterial lymphadenitis – staph or strep – nodes are warm, erythematous, sometimes fluctuant usually with identifiable source of infection

- Lymphoma – painless, firm, rubbery, rapidly growing, supraclavicular more common with lymphoma than tb.

- Metastatic carcinoma – nasopharyngeal

- Scrofula (tuberculous)

- Nontuberculous mycobacterial

Scrofula as extrapulmonary TB

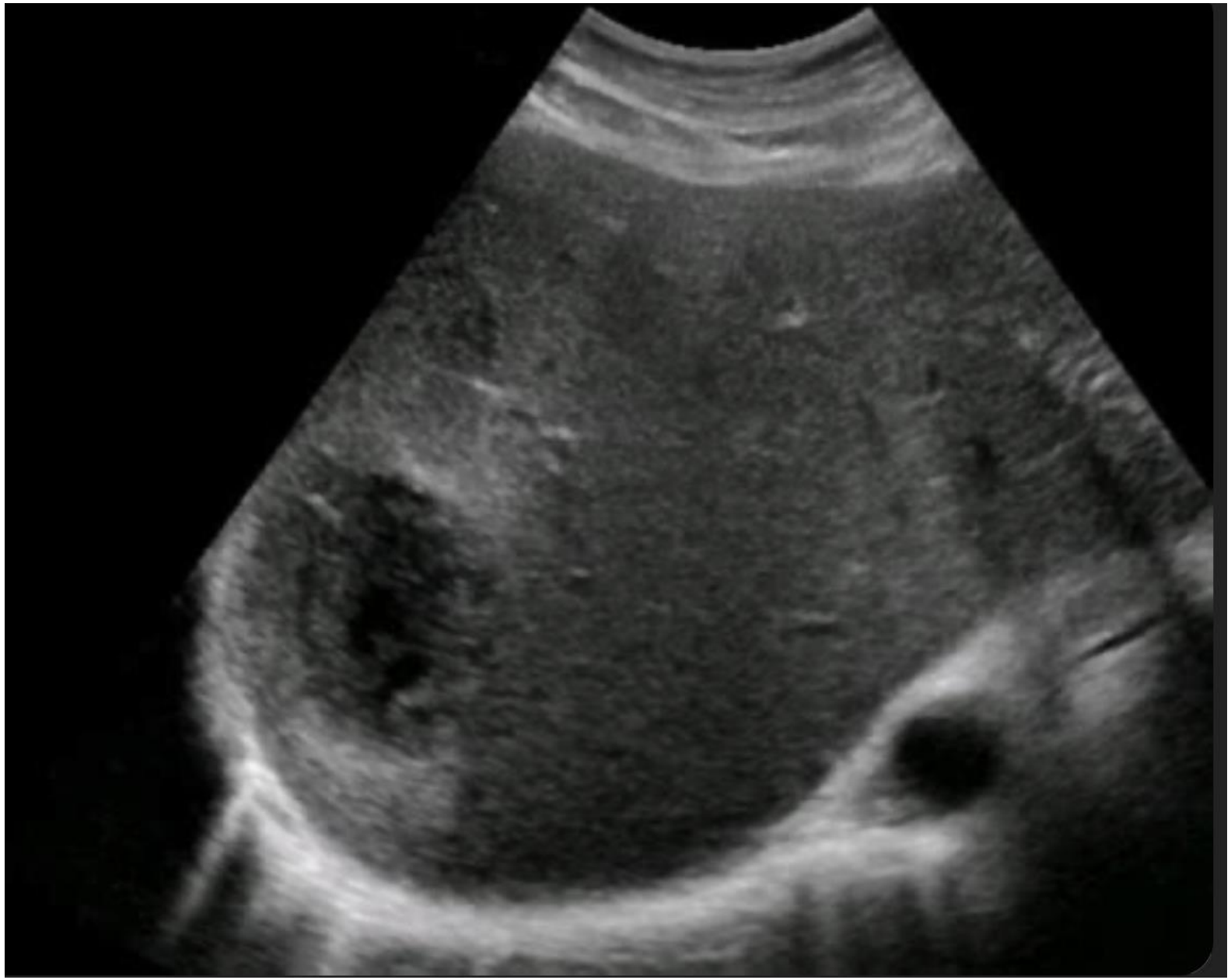
- Usually painless, initially firm, but may soften over time
- May form cold abscesses, sinus tracts and drain pus
- - Usually involves anterior cervical lymph nodes, but, in 20% of cases, lymph nodes are affected in posterior triangle due to involvement of adenoid. Indicates more systemic tb
- 50% of isolated anterior cervical LAD in Pakistan is scrofula [1]
- Second most common form of extra-pulmonary tb in Pakistan

-Residual lymph nodes can be seen in 15-30% of patients and may not necessarily indicate treatment failure so close monitoring is a cornerstone of the management as well as screening close contacts 2



Case 2:

In Zimbabwe, a 35 y.o. male who was previously healthy presents with two weeks of RUQ tenderness, fever, chills, weight loss, and anorexia. He has no n/v/d. He had no previous surgeries.



D/Dx of hepatic cyst-like structure

1. Benign simple cyst
2. Hemorrhagic cysts
3. Necrotic malignancy
4. Cystic echinococcus
5. Pyogenic Abscess
6. Amoebic abscess

D/Dx – simple cyst features:

a. incidental
b. asymptomatic
c. anechoic
d. unilocular
e. imperceptible walls
f. no septae
g. posterior acoustic enhancement



https://radiologykey.com/wp-content/uploads/2016/11/image08328.jpeg

D/Dx – hemorrhagic cyst

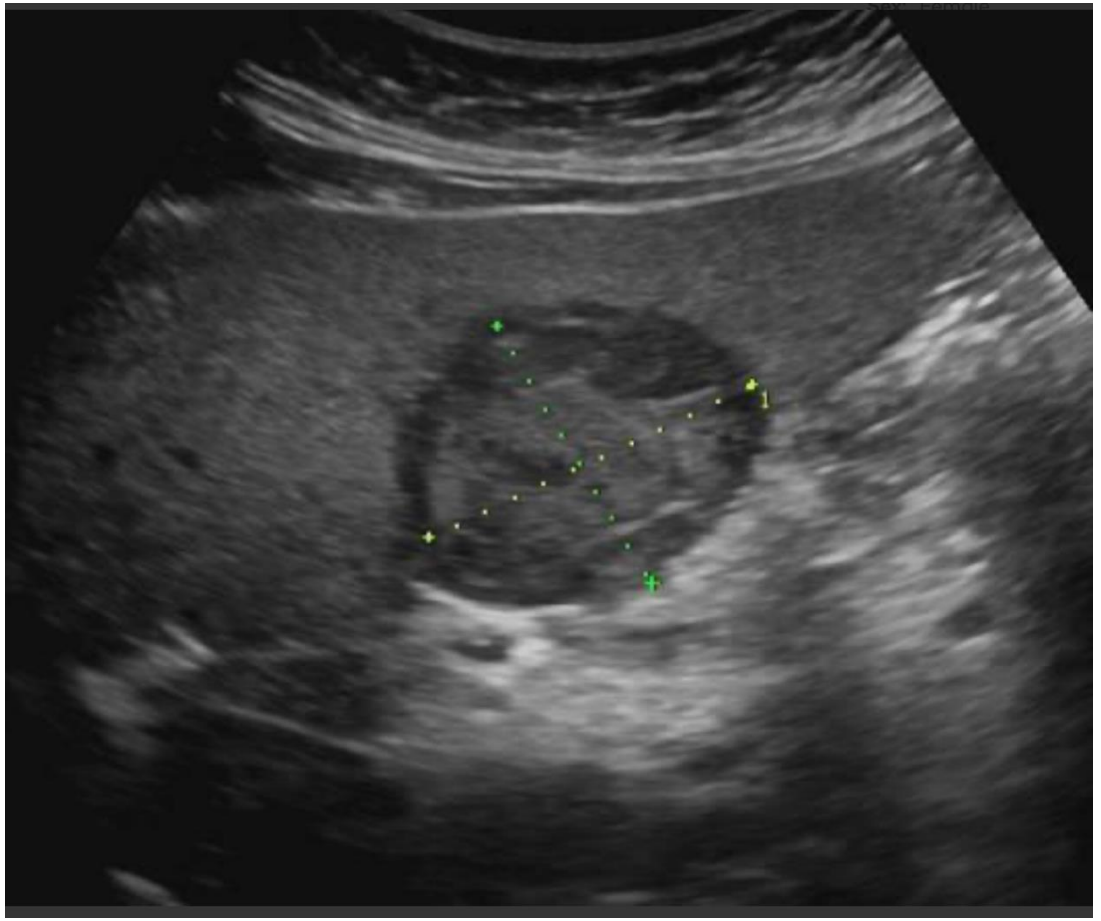
a. heterogenous internal content
b. debris
c. fluid level
d. wall thickening
e. elderly, large cysts, painful



https://dccdn.de/www.doccheck.com/data/ke/45/se/93/np/gs/eingeblutete-zyste-leber-sono_lg.jpg

D/Dx – necrotic malignancy

a. hepatocellulcar CA if hep B and C prevalent
b. solid component



https://www.ultrasoundcases.info/hepatocellular-carcinoma-7035/#gallery-2

D/Dx – echinococcal (hydatid) cyst

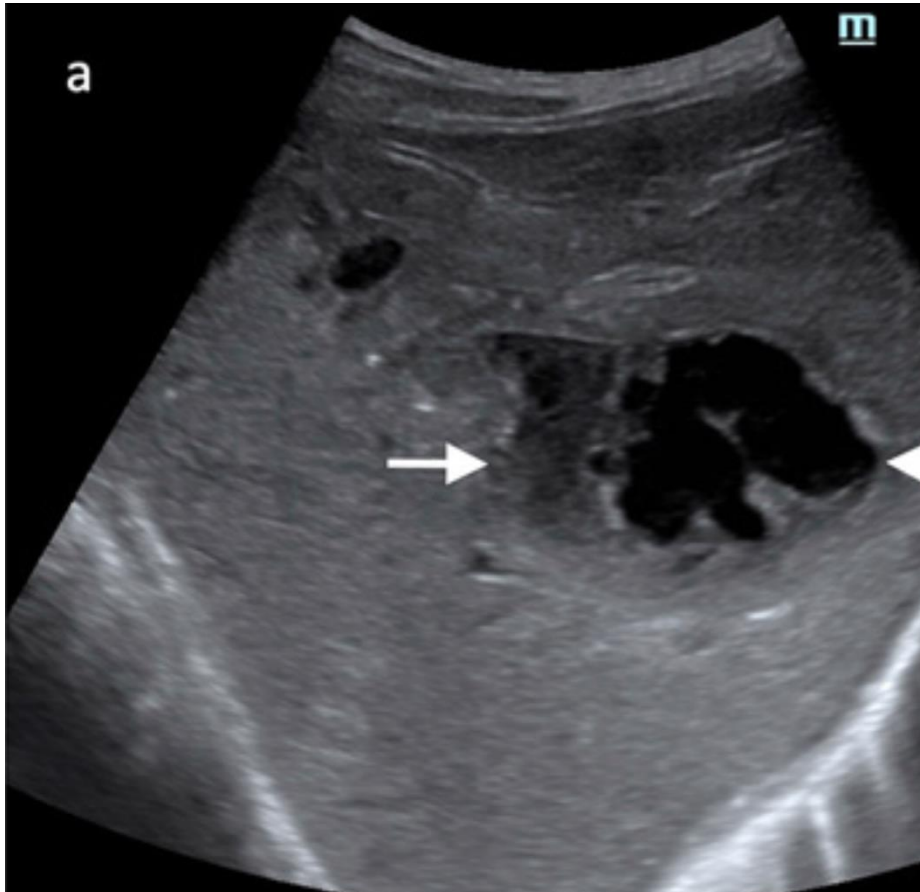
- staging from active to transitional to inactive



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D/Dx pyogenic abscess

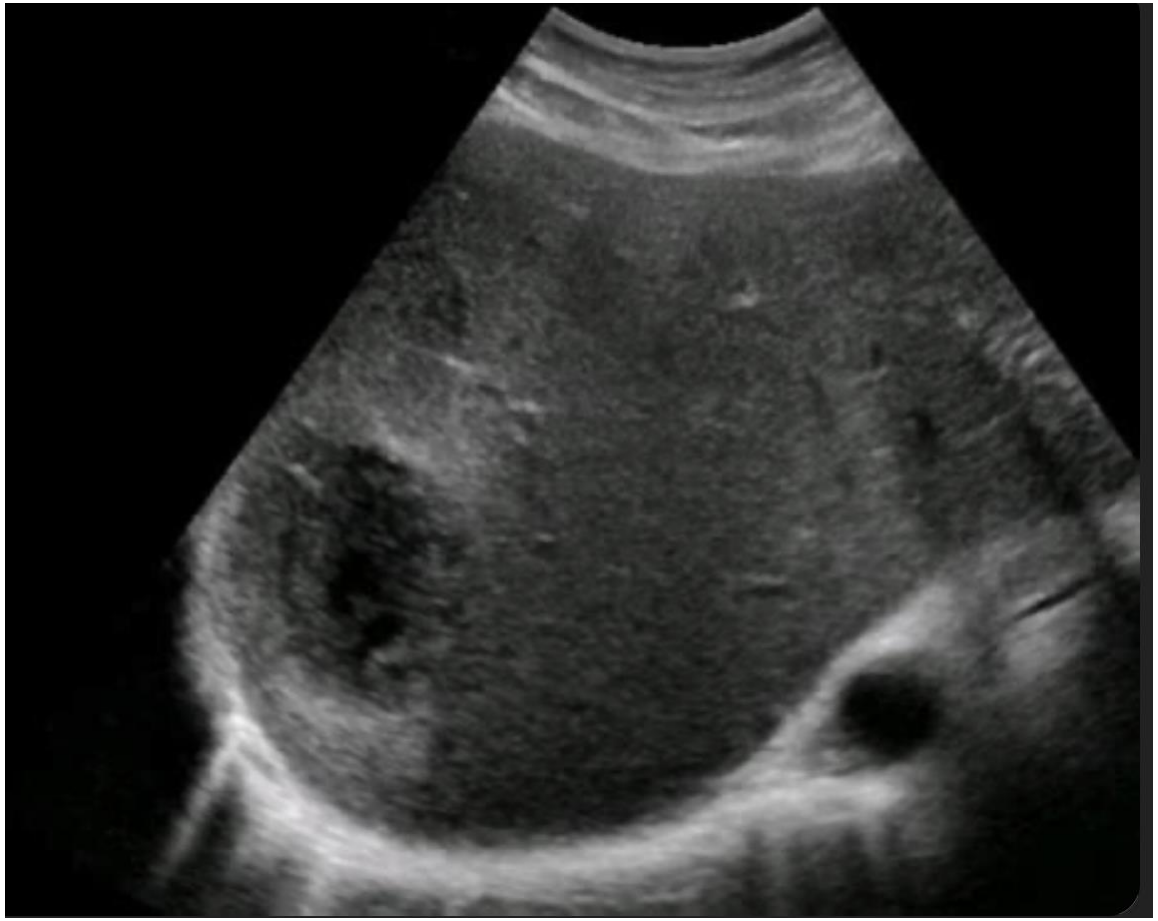
a. often multiloculated
b. thick-rimmed



https://www.explorationpub.com/uploads/Article/A100193/100193-g007.jpg

D/Dx – amoebic abscess

a. solitary
b. right lobe
c. hypoechoic
d. subcapsular
e. mild acoustic enhancement distally



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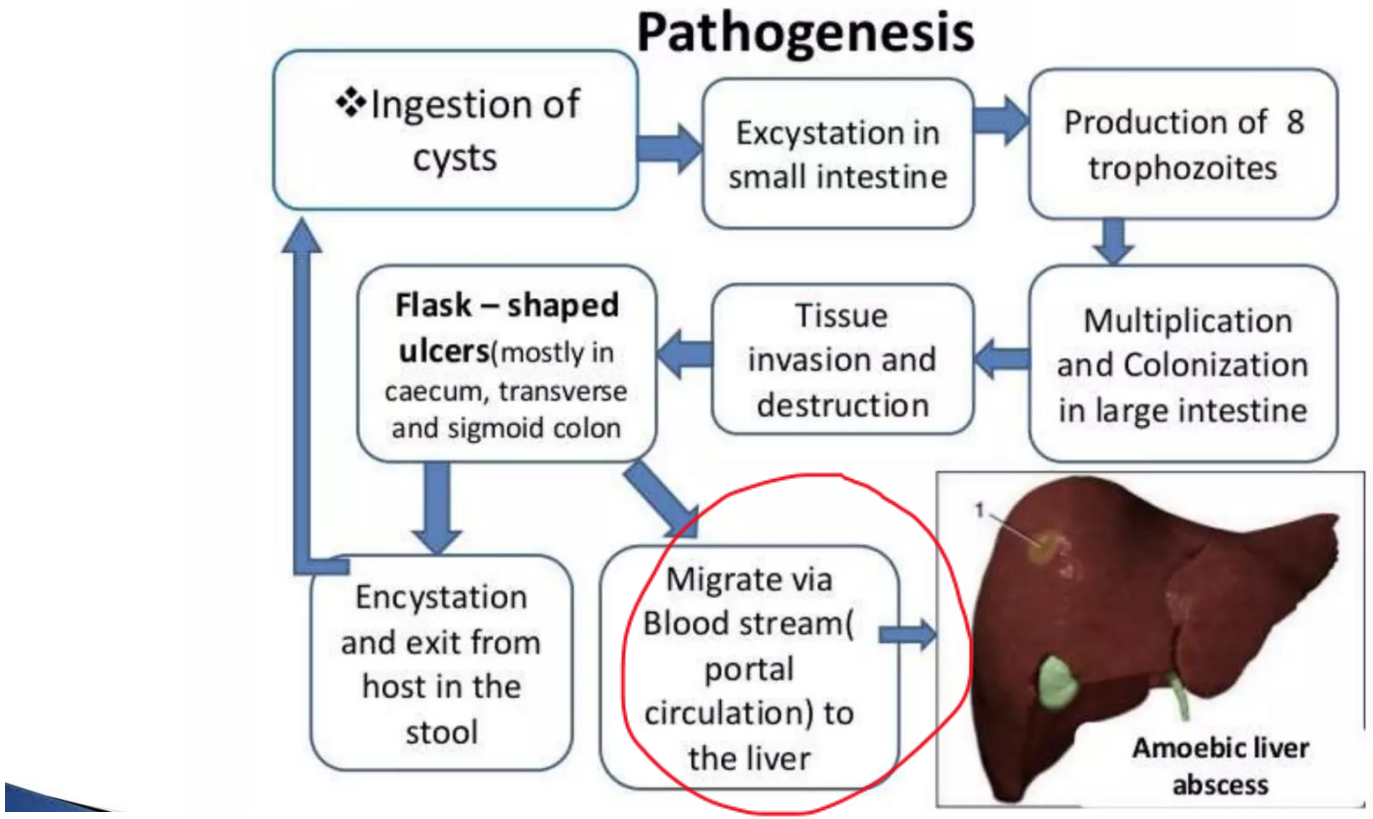
Amoebic Liver Abscesses - presentation

- Most common extraintestinal complication of amoeba, but only 8% of those with intestinal amoeba develop hepatic involvement
- 10:1 male predominance
- Fever/chills in 80%
- Tender hepatomegaly in 1/3 of patients
- Right pleuropulmonary symptoms/left sided rupture dangerous
- Concurrent GI symptoms in less than 1/3rd
- Jaundice uncommon

https://radiologykey.com/tropical-infections-of-the-liver/

Amoebic Liver Abscess

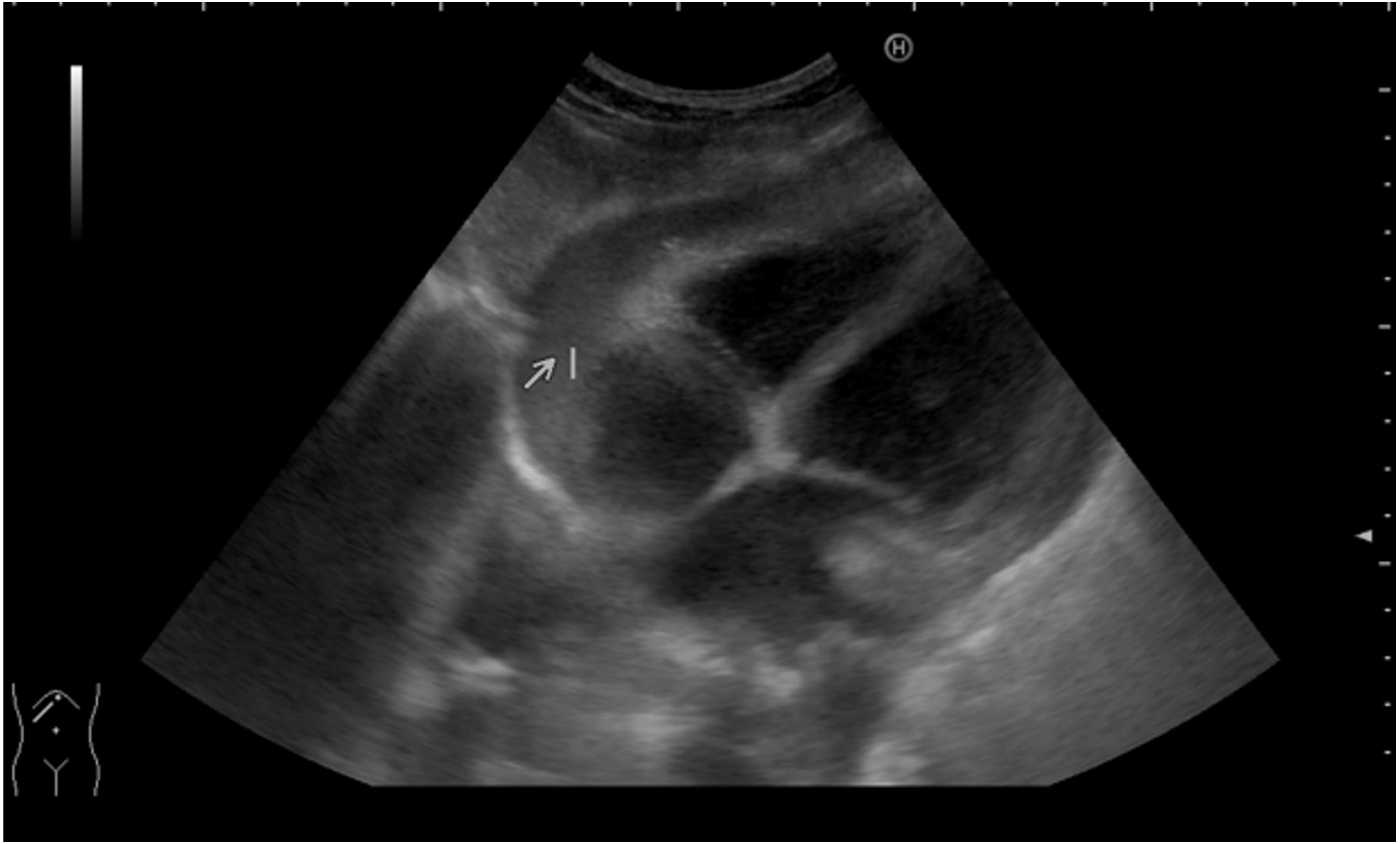
Pathogenesis of amoebic liver abscess



Case 3

A teenage girl in Bangladesh presented with wasting, weakness, fatigue, and mild dyspnea over the previous months. She had diminished heart sounds and was tachycardic. CXR and US were performed:





https://www.wikidoc.org/index.php/

DDX

-TB pericarditis - In subSaharan Africa accounts for 65-70% of effusions

-purulent bacterial pericarditis – S aureus, H flu, following pneumonia or empyema, osteo, sepsis

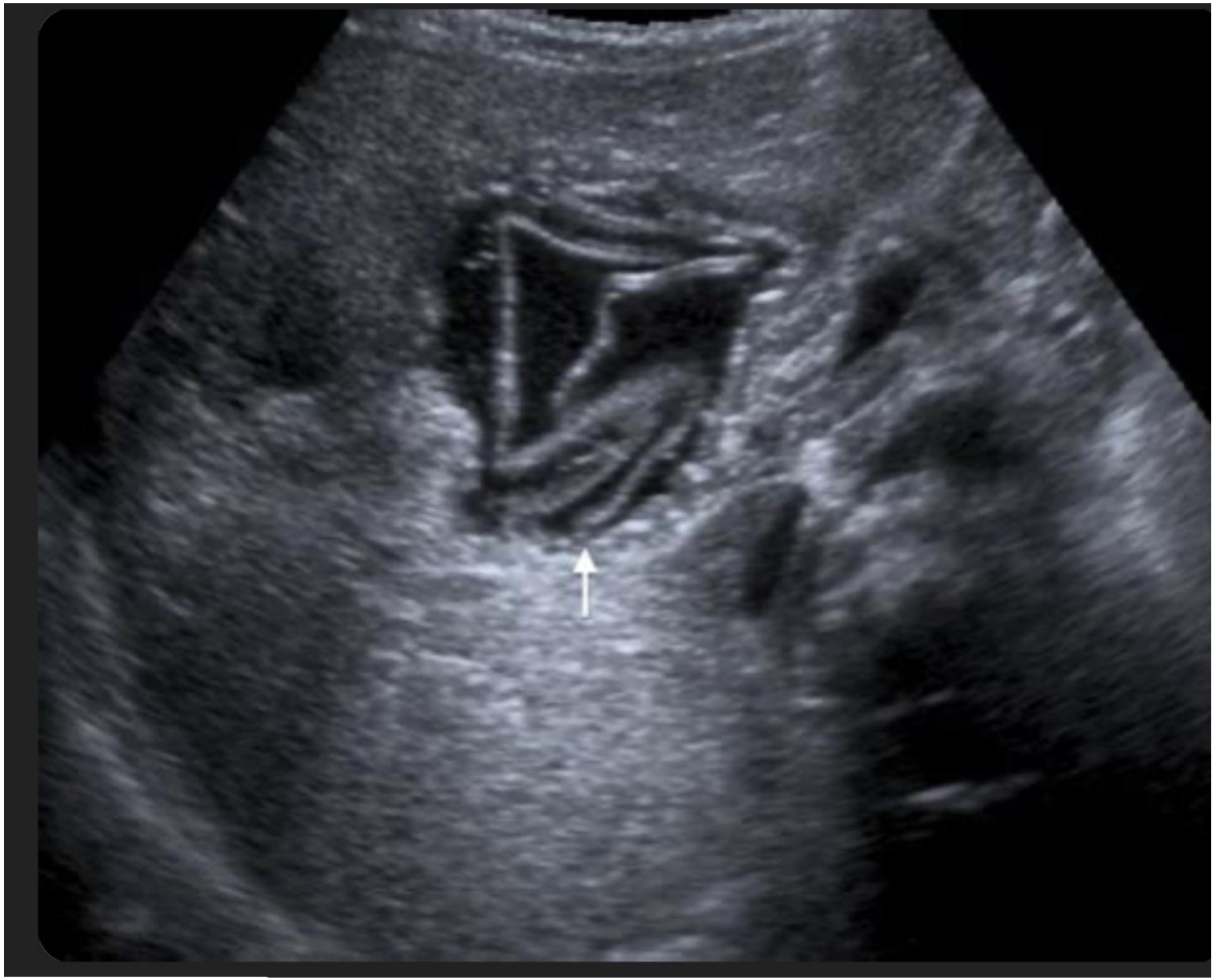
- Viral or idiopathic – enteroviruses, adenovirus, EBV, HIV
- Acute rheumatic fever
- Nephrotic syndrome if part of generalized edema
- Hypothyroidism
- Mediastinal mass – leukemia or lymphoma
- Amoebic liver abscess on left

TB pericarditis

- 2-5% of all tb patients
- Much higher if HIV is involved
- 33-66% of patients also have pulmonary tb

Case 4:

40 y.o. Pakistani male presents with RUQ abdominal discomfort and distention over a year. He has intermittent nausea but no vomiting. Over the last few weeks he developed jaundice. He herds sheep. On PE there is a palpable mass in the RUQ



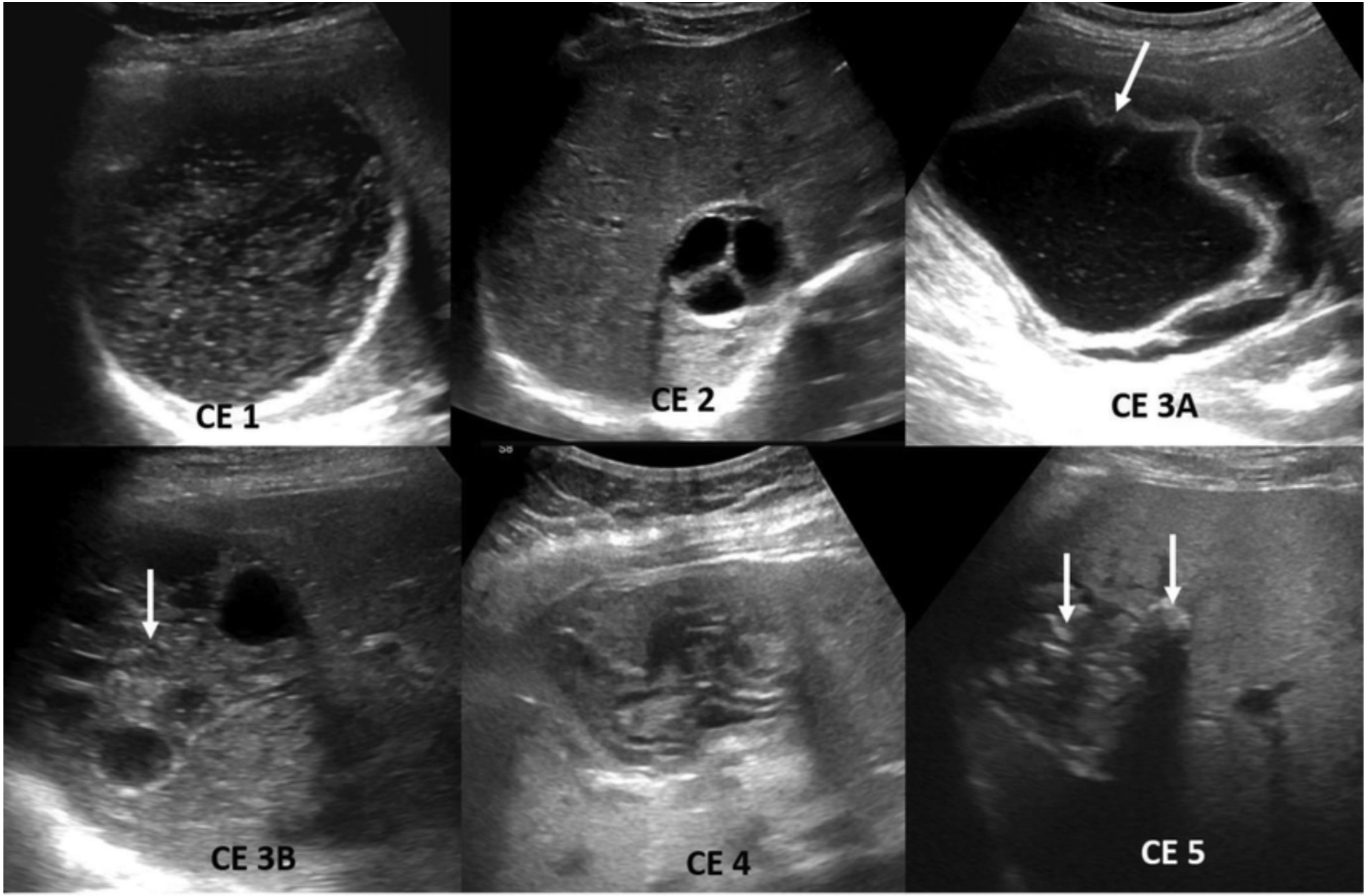
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DDx

1. pyogenic abscess
2. amoebic abscess
3. necrotic malignancy
4. hydatid cyst
5. complicated simple cyst (hemorrhagic or infected)
6. coalesced polycystic liver disease

Hydatid/Echinococcal cyst in stages on US

- Over years develops from a fluid-filled, fertile lesion to a solid calcified dead one
- Staging moves from active to transitional to inactive
- Staging determines the treatment whether medications, needle aspiration vs surgical removal or no treatment



ww.researchgate.net/figure/Hydatid-cyst-Ultrasound-Multiple-stages-of-hydatid-cyst-are-shown-Cystic_fig4_370117259

Hydatid cysts/echinococcal cysts

- Most often in the liver (80%) with 80% in the right lobe
- Next most often in the lungs (20%), then spleen
- Rarely in kidney, heart, brain, bone

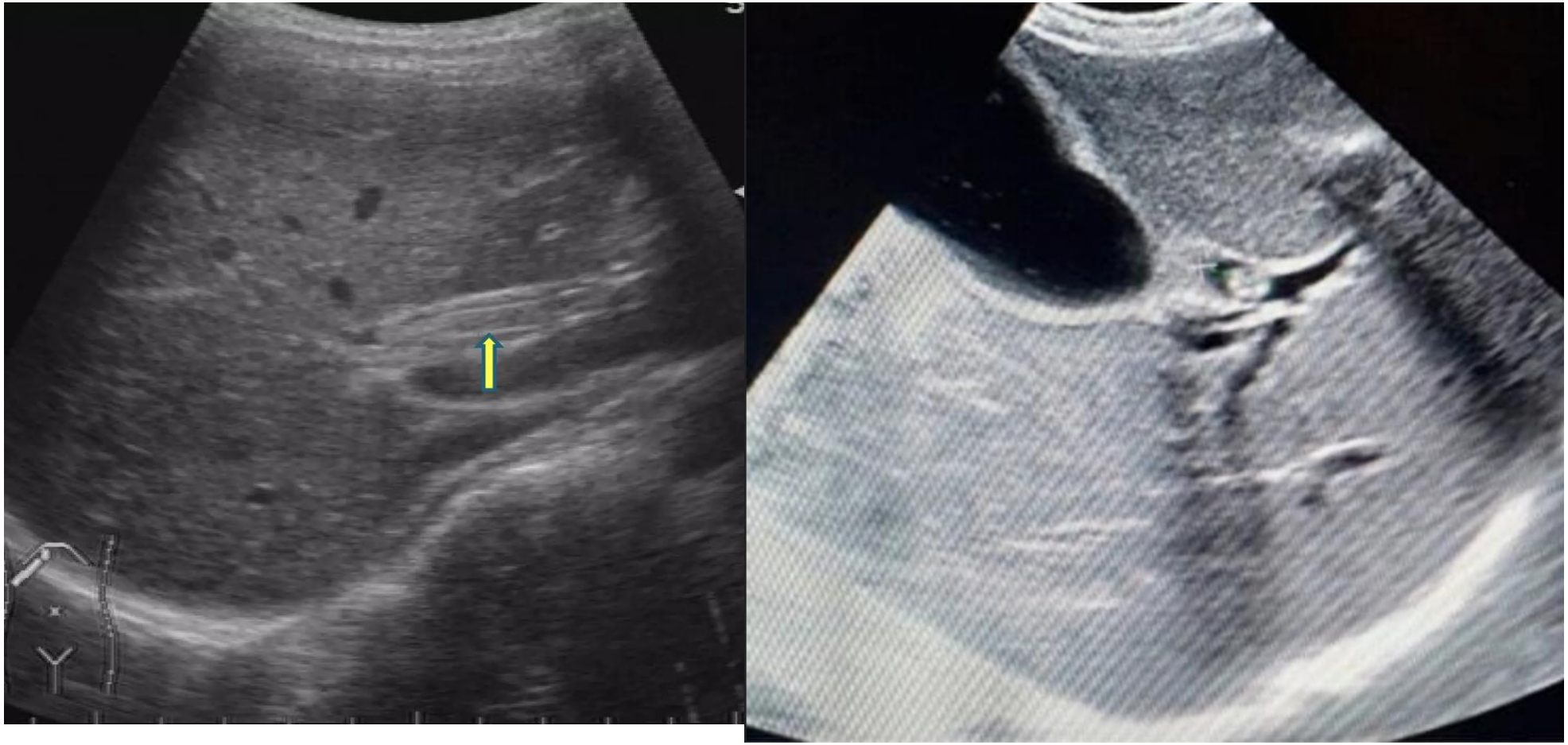
Case 5:

Middle-aged woman from Zimbabwe presents with five days of intermittent colicky pain in the RUQ. She has had fever and scleral icterus for the last two days. Some nausea and two episodes of vomiting. No weight loss, no GI bleeding. Previously well.

Ultrasound features: normal PV and CBD



https://duckduckgo.com/?q=portal+vein+and+CBD+normal+findings+ultrasound&ia=images&iax=images&iai=https%3A%2F%2Fwww.researchgate.net%2Fpublication%2F221923972%2Ffigure%2Ffig1%2FAS%3A671523761299484%401537115149693%2FNormal-presentation-of-CBD-Left-The-CBD-lies-just-anterior-to-the-portal-vein-in-porta.png

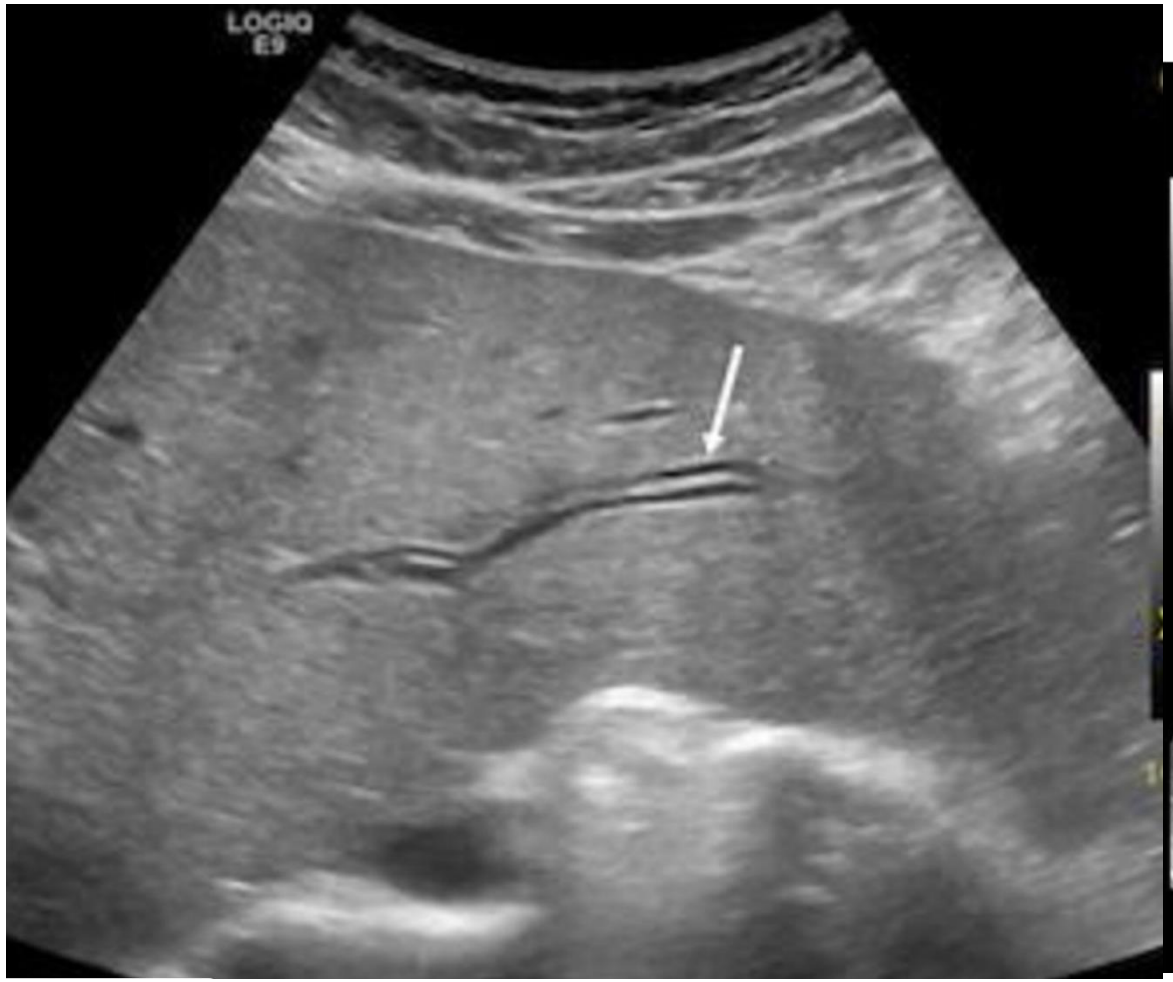


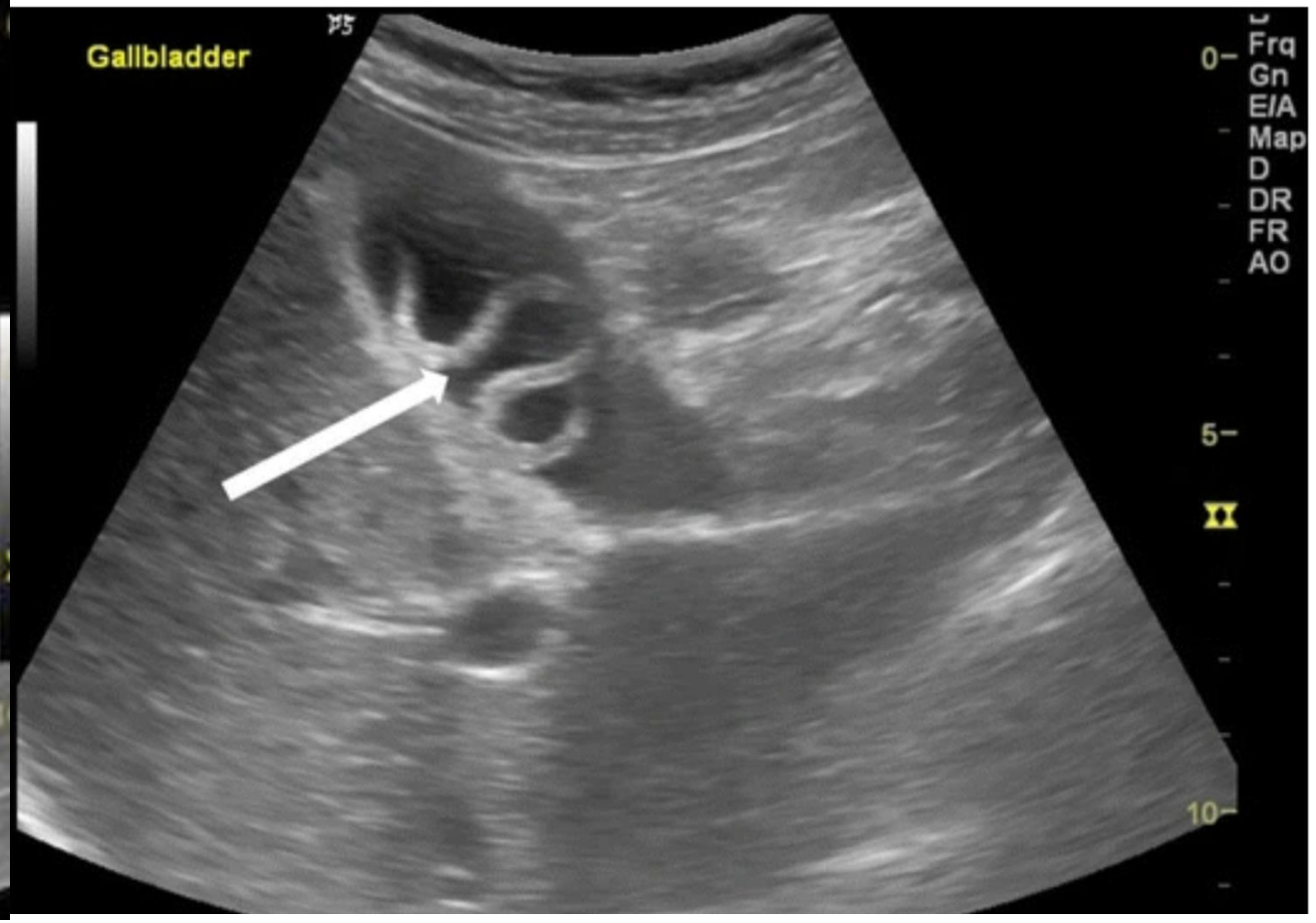
- https://www.slideshare.net/slideshow/ultrasound-of-cbd-at-medic-center/25162116#7

Ultrasound Findings

1. Parallel echogenic strips
2. Central anechoic tube representing digestive tract
3. Bull’s eye or target sign in the transverse section
4. May see mobility

Intrahepatic ducts and GB



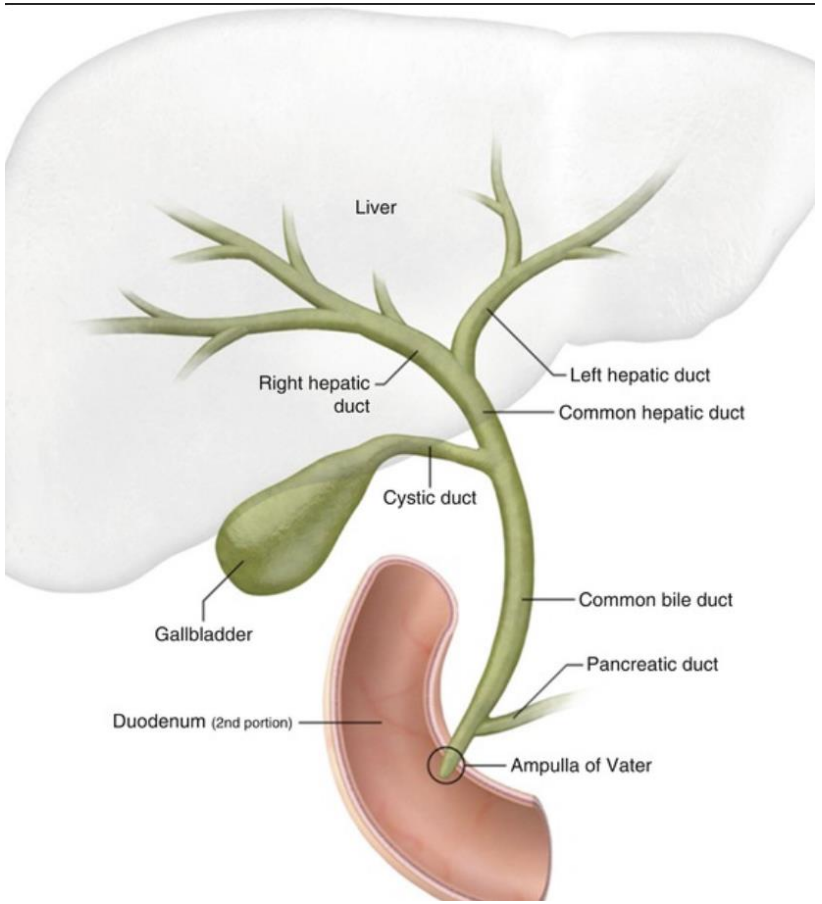


https://casereports.bmj.com/content/bmjcr/14/3/e239784/F1.large.jpg?width=800&height=600&carousel=1

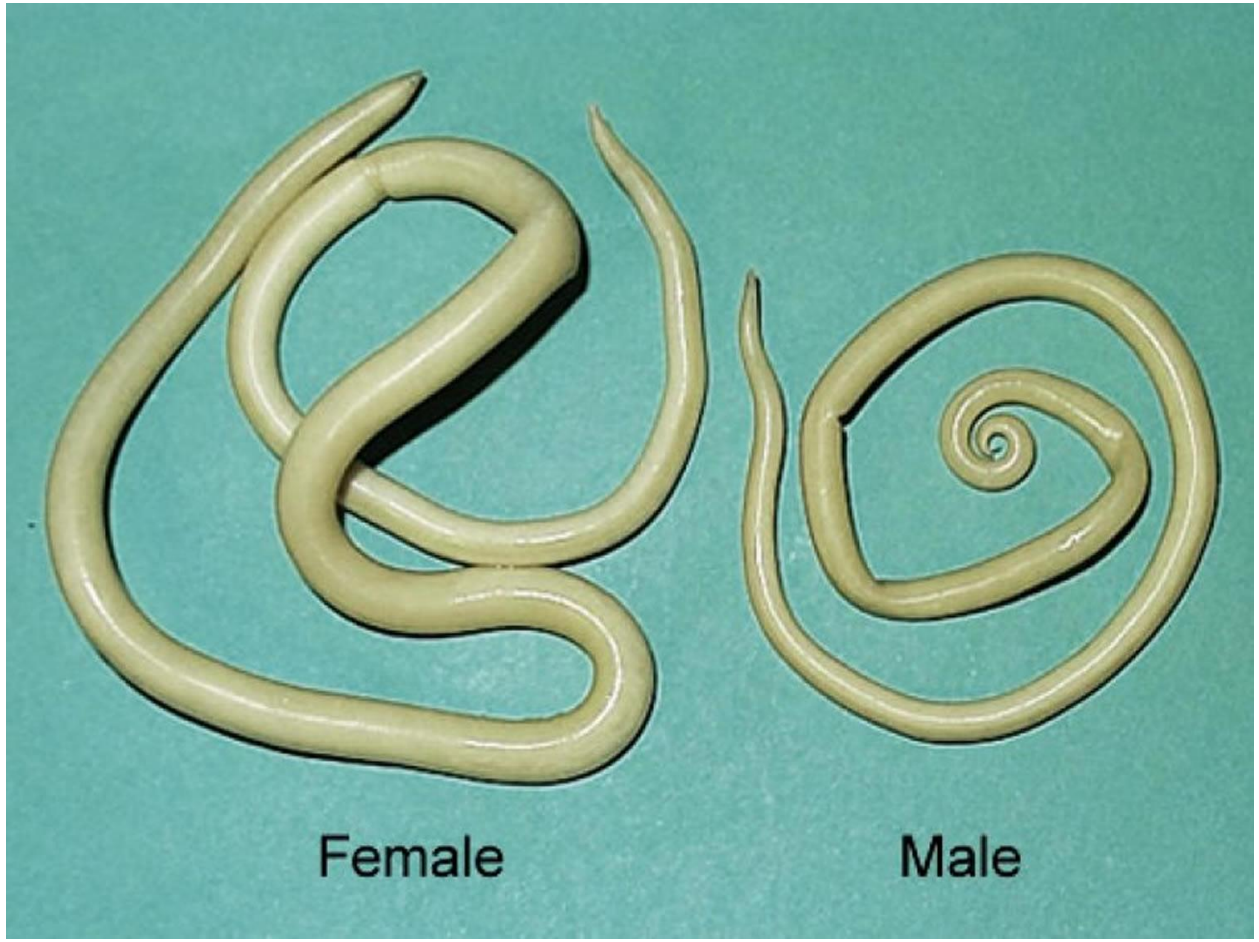


Ascariasis – hepatobiliary and pancreatic

- Into bile ducts, and sometimes into GB and pancreatic duct, causing:
  a. biliary colic
  b. cholangitis
  c. acute cholecystitis
  d. acute pancreatitis
  e. liver abscess
  f. if worm dies, a nidus for stones (hepatolithiasis)

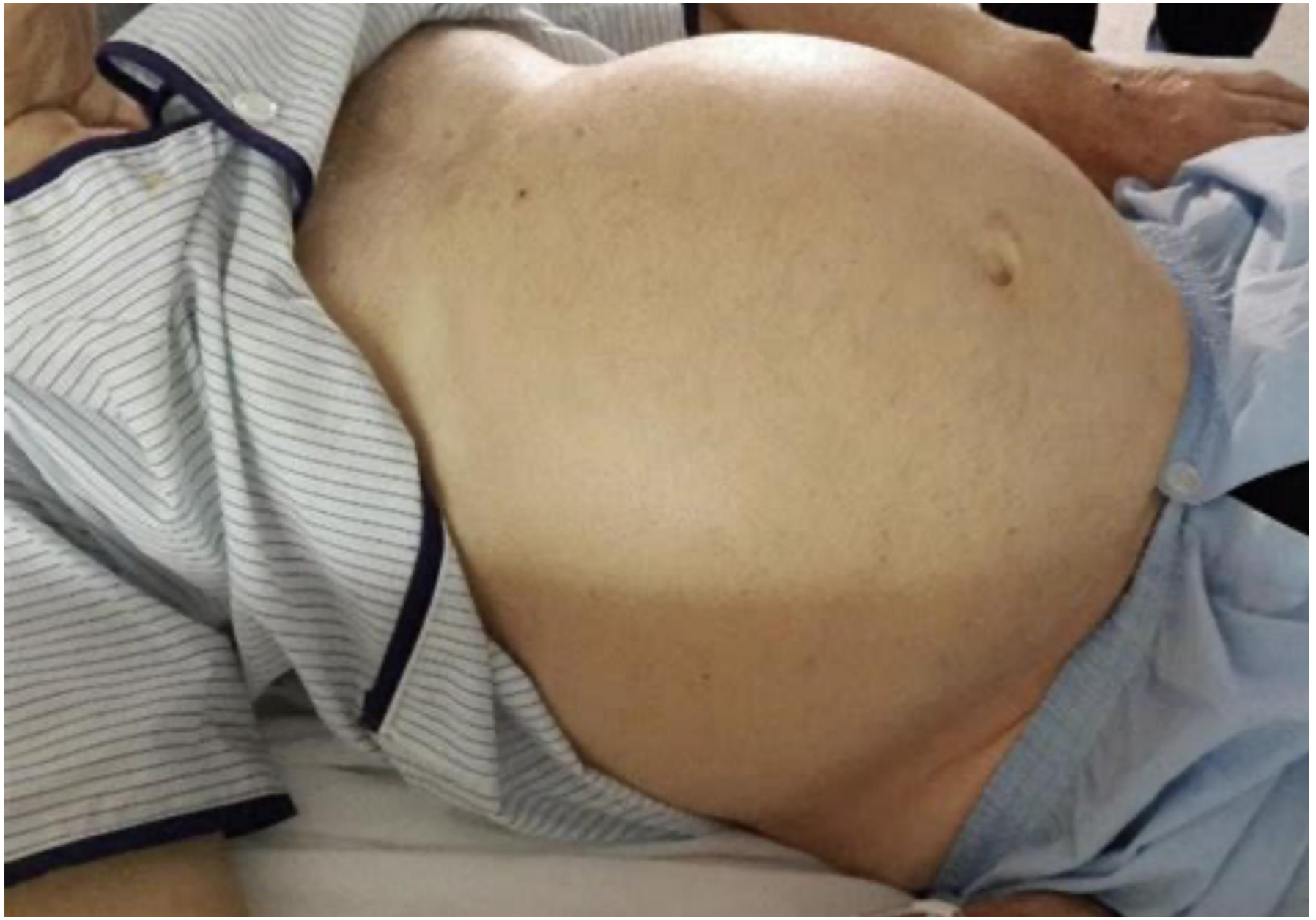


Via Biliary Tract - Ascariasis



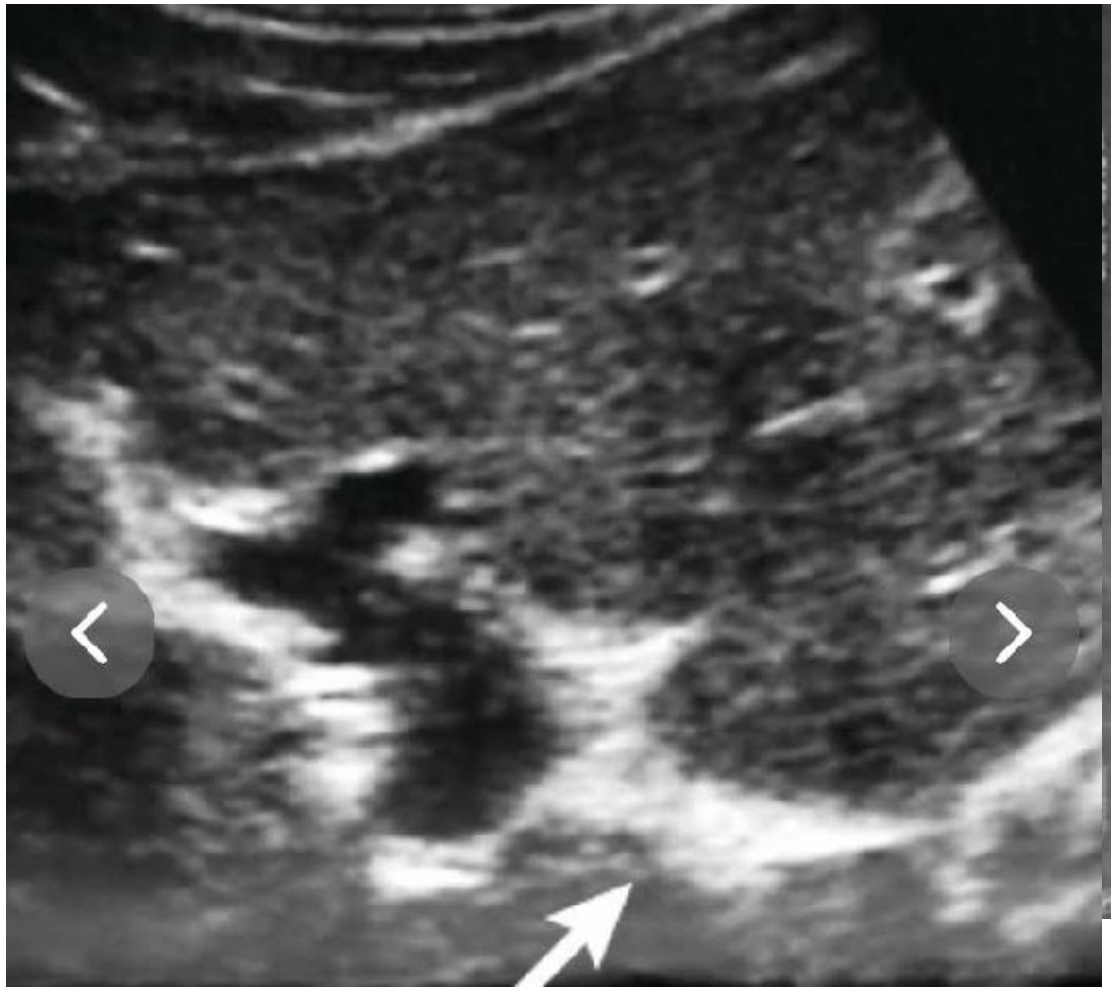
Case 6:

A 24 y.o. woman who resides in a rural area near Lake Victoria in Kenya has had longstanding abdominal distention



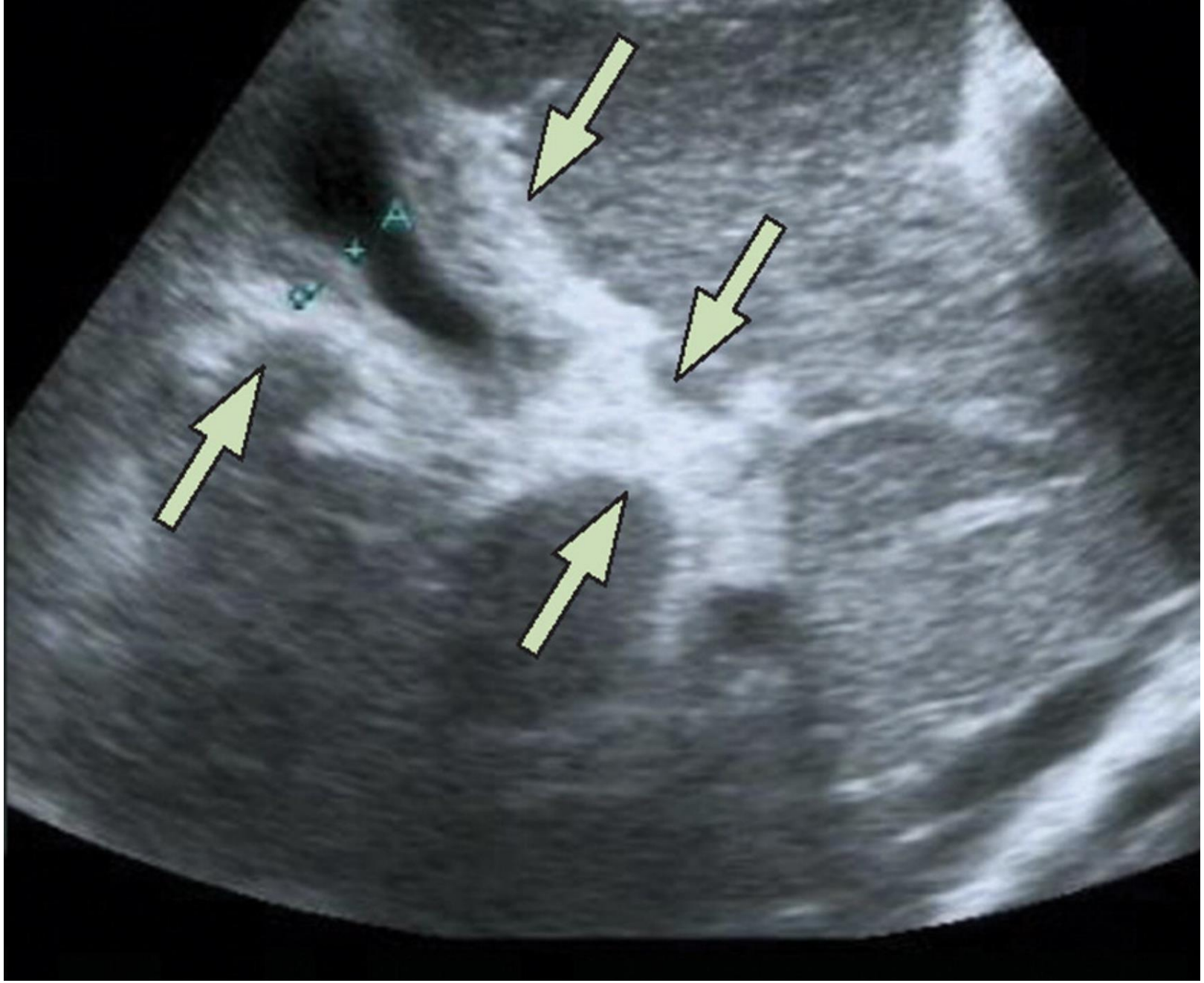
https://th.bing.com/th?id=OSAHI.F424BD31949B528D0DC7EE4757321E7B

Liver findings on ultrasound





https://www.cdc.gov/dpdx/index.html



https://www.thelancet.com/cms/10.1016/S1473-3099(15)70009-5/asset/83ac5d96-7921-4503-aa17-90d79ab12853/main.assets/gr1_lrg.jpg

Ultrasound Findings:

1. Periportal fibrosis (pipestem fibrosis, bull's eye in cross-section)
2. Fibrosis of the GB wall
3. Normal liver parenchymal echogenicity
4. Splenomegaly
5. Dilated portal and splenic vein

Schistosomiasis:

Mansoni: intestine, liver and lungs

-swimmer's itch – soon after exposure

-skin>venous circulation>right heart>lungs>left heart> arteries>mesentery>portal vein>liver and GB

-may progress to ascites and liver failure

- sub-Saharan Africa, Middle East, Caribbean, S. America

Hematobium:

- urogenital

- mostly sub-Saharan Africa, Middle East

Evaluation – block 3



References

- World Health Organization. *Manual of diagnostic ultrasound*. 2nd ed. Volume 2. Geneva: WHO; 2013. ISBN9789241548540.
- Khan R, et al. Cervical lymphadenopathy: scrofula revisited. J Laryngol Otol. 2009 Jul;123(7):e1-e3.
- Khuroo MS et al. Sonographic appearances in biliary ascariasis. Gastroenterology. 1987 Aug; 93(2):456-60.