

Haitian Radiation CT Scanning in the Poorest Country in the Western Hemisphere

Carl Kalbhen, MD

Haiti



Haiti



Haiti

Occupies western 1/3 of Hispanola island

Dominican Republic occupies eastern 2/3

Population of ~10,000,000

Most populous Caribbean country after Cuba

French influence

Former colony

1804 slave revolt culminated in independence

Official language

Haiti

Diagnostic imaging needs

Resources per 10,000,000 population

19 total Haitian radiologists

4 CT scanners

No MRI scanners

2010 earthquake

300,000+ dead

1,000,000+ homeless

Haiti



Haiti



Haiti

Opportunity

Medical and other volunteers on site for decades

2 hour plane ride from United States

Project Medishare (projectmedishare.org)

Assisting medical needs in Haiti since 1994

ACR

Became formally involved in assisting Haiti in 2003

Haiti

Action

Hospital Bernard Mevs

Built in Port-au-Prince after 2010 earthquake

Haiti's only critical care and trauma hospital

Part of Project Medishare

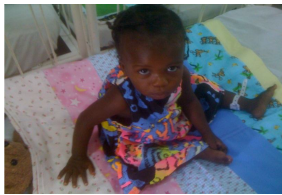
CT scanner (Haiti's 4th) installed in 2011

Read remotely.....in the Chicago suburbs

Haiti

Training Radiologists in the Caribbean

Brad Short
November 8, 2013



Post-Meeting Follow-Up

- Reviewed survey results—want more programs
- Provided participants with electronic access to further training materials
- Working with Bernard Mevs, Drs. Ankur and Zivin and RAD-AID to expand training to new residents at HUEH with focus on CT
- Working on plans for new radiology departments for GCH and HUEH
- Provided radiology library materials to programs we met with during the visit



Stephen Zivin, MD

Northwest Community Hospital

Involved remotely and on site

Spearheaded local telerad program

Also provides training in Haiti

Would totally object to this slide

Please don't tell him!

Haiti

Medweb Project Medishare

[Radiologist] /medweb tele-medicine Intranet software - Version 7.0.7 - Last updated 2013-03-15 [Reboot in 4 min]

On Call Preferences Save settings View Changes Manuals Support

Get Latest Plugins

Your license has 106 days remaining.
Your Medweb Server manager can update the license.

Limit: 50 Status: (any) Find: Where: (any) Modality: (any) In last: Layout: Site/Station Query: Local

Search Advanced Current Clear User: xray Drive status: 254708M available for studies
0 images left to send 0 images left to compress

View only pre-selected annotated images

Name	ID	Type	Imgs	Date	Time	Mgmt
Site: LightSpeed 16 Station name: ct01 Modality: CT Compression: Low						
Champagne Hugues	240814.01 TR	HEAD W/O	66	2014-08-24	09:08:33	[Icons]
Delatour Xavier	23/08/14 2CLO	HEAD WO	66	2014-08-23	16:49:27	[Icons]
Brunette Elijah	23/08/14 2 ER	HEAD WO	66	2014-08-23	13:29:24	[Icons]
LOUIS-JUSTE SAINT -EAN	23/08/14 1 ICU	HEAD WO	62	2014-08-23	10:18:08	[Icons]
Yanick Aply	082214.07 ER	HEAD, C-SPINES W/O	496	2014-08-22	22:31:59	[Icons]
Estiverne Innocent	22.08.14.6OP	ABDO-PELV W 100 ML	98	2014-08-22	16:50:46	[Icons]
Joseph Wilna	22.08.14.5OP	HEAD W/O	62	2014-08-22	16:16:28	[Icons]
Estinvil Jean Thery	22.08.14.04 HY	HEAD W/O	78	2014-08-22	14:39:07	[Icons]
Florestal Christlenskyn	22.08.14.3HY	HEAD W/O	50	2014-08-22	14:33:23	[Icons]
Leger Alyssa	22.08.14.2OP	HEAD W/O	62	2014-08-22	12:25:28	[Icons]
Dessource Legetor	22.08.14.1OP	HEAD W/O	217	2014-08-22	11:54:28	[Icons]
St Jean Louis Juste	21.08.14.12ER	HEAD W/O	66	2014-08-21	18:30:24	[Icons]
Jeudi Nicole	21.08.14.11OP	HEAD W/O	291	2014-08-21	16:50:03	[Icons]
Pascal Stanley	21.08.14.10OP	FACIAL BONES W/O	237	2014-08-21	13:53:13	[Icons]
Andre Cadichon	21.08.14.9OP	HEAD + C-SPINE W/O	341	2014-08-21	13:23:47	[Icons]
Gilles Duval	21.08.14.8OP	ABDO-PELV W 100 ML	89	2014-08-21	12:27:57	[Icons]
Octeus Lifaite	21.08.14.7CLO	HEAD W/O	66	2014-08-21	12:14:32	[Icons]
Jean Nixon	21.08.14.6CLO	HEAD W/O	173	2014-08-21	12:07:08	[Icons]
Athimy Dorvil Rolande	21.08.14.4ER	HEAD W 100 ML	233	2014-08-21	10:16:55	[Icons]
Toussaint Marie France	21.08.14.3OP	HEAD W/O	58	2014-08-21	10:08:47	[Icons]
Blanc Matarielle	21.08.14.2	ABDO-PELV W 100 ML	272	2014-08-21	09:50:39	[Icons]
Beauzile Hasein	2120814.02 OP	HEAD W/O	62	2014-08-21	09:02:19	[Icons]
Beaucicot Jacqueline	210814.01 CLO	HEAD W/O	62	2014-08-21	08:02:23	[Icons]
Clerge Francois	20/08/14 13 TR	HEAD WO	62	2014-08-20	20:32:42	[Icons]

Haiti

Medweb

Fill: No Enhance

HP: 888x458


Repts: 1

AC: 1
KVP: 120
Exp: 25
Exp (ms): 2570
Exp (ma): 10
SO: SCOUT MODE
TH: 136.199997
RD: CW
BODY FILTER: 1200
Th: 250.000
Sp: 0.545/0.597
Pos: 0.000/265.000/0.000

W: 500 L: 500 Z: 31% 1:5 Lossy S: 500000001088831:1


LightSpeed 16
c01
Louis-Juste Saint-Ean
Acc: A086803478
076Y M 23/08/14 1 ICU
Date: 2014-08-23
10:18:28

HEAD WO
Se: 1
Im: 1
Slice Location: 0.0



LightSpeed 16
c01
Louis-Juste Saint-Ean
Acc: A086803478
076Y M 23/08/14 1 ICU
Date: 2014-08-23
10:18:28

HEAD WITHOUT
Se: 2
Im: 31
Slice Location: -95.8




AC: 8
KVP: 120
Exp: 75
Exp (ms): 1000
Exp (ma): 300
SO: AXIAL MODE
TH: 136.199997
RD: CW
HEAD FILTER: 36000
Th: 2500
Sp: 0.488/0.488
Pos: -125.000/-125.000/-95.750

W: 80 L: 40 Z: 66% 1:10 Lossy S: 500000002087391:31

LightSpeed 16
c01
Louis-Juste Saint-Ean
Acc: A086803478
076Y M 23/08/14 1 ICU
Date: 2014-08-23
10:19:15

HEAD WITHOUT
Se: 2
Im: 31
Slice Location: -95.8



AC: 8
KVP: 120
Exp: 75
Exp (ms): 1000
Exp (ma): 300
SO: AXIAL MODE
TH: 136.199997
RD: CW
HEAD FILTER: 36000
Th: 2500
Sp: 0.488/0.488
Pos: -125.000/-125.000/-95.750

W: 80 L: 40 Z: 66% 1:10 Lossy S: 500000002087391:31

W: 500 L: 500 Z: 31% 1:5 Lossy S: 500000099125791:1

LightSpeed 16
c01
Louis-Juste Saint-Ean
Acc: A086803478
076Y M 23/08/14 1 ICU
Date: 2014-08-23
10:18:08

HEAD WO
Se: 999
Im: 1
Slice Location: 0.0

512x512

Patient Name: LOUIS-JUSTE SAINT -CAN Exam no: 8743
Accession Number: Aug 23 2014
Patient ID: 23/08/14 1 ICU LightSpeed16
Exam Description: HEAD WO

Dose Report

Series	Type	Scan Range (mm)	CT DIval (mAs)	DLP (mAs)-cm	Phantom cm
1	Scout	-	-	-	-
2	Axial	1176.750-123.250	69.89	1648.40	Head 16
			Total Exam DLP: 1648.40		

1, 1

Imgs: 1
W: 512 L: 512



Medweb Viewer v 0.6.249 Copyright © 1996-2013 Nexsys Electronics Inc. US patents and pats pending.

Haiti



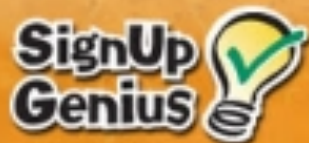
Haiti Rad CT AT HOSPITAL BERNARD MEVS

CREATED BY: Stephen Zivin [CONTACT](#)

[I need to change my sign up](#)

Date	Available Slot	
8/20/2014 (Wed.)	Body Neuro	<ul style="list-style-type: none"> ✓ Stephen Zivin ✓ Stephen Zivin
8/21/2014 (Thu.)	Body Neuro	<ul style="list-style-type: none"> ✓ Peter Cormier ✓ Peter Cormier
8/22/2014 (Fri.)	Body Neuro	<ul style="list-style-type: none"> ✓ Stephen Zivin ✓ Stephen Zivin
8/23/2014 (Sat.)	Body Neuro	<ul style="list-style-type: none"> ✓ allan malmed ✓ Carl Kalbhen
8/25/2014 (Mon.)	Body Neuro	<p>Sign Up <input type="checkbox"/></p> <ul style="list-style-type: none"> ✓ Cliff Wolf
8/26/2014 (Tue.)	Body Neuro	<p>Sign Up <input type="checkbox"/></p> <ul style="list-style-type: none"> ✓ Cliff Wolf
8/27/2014 (Wed.)	Body Neuro	<ul style="list-style-type: none"> ✓ David DuBois ✓ allan malmed
8/28/2014 (Thu.)	Body Neuro	<p>Sign Up <input type="checkbox"/></p> <p>Sign Up <input type="checkbox"/></p>

Haiti



FREE online sign ups for groups? That's genius!

Dear Carl Kalbhen,

This email is to remind you that you are signed up for the following slot on "CT at Hospital Bernard Mevs":

Sat, 8/23/14
-- Neuro

To view the SignUpGenius form, go to:

www.SignUpGenius.com/go/10C0845AFA62FA13-ctathospital/17349004

To update your notification preferences, login to SignUpGenius.com/MyAccount

[Visit SignUpGenius.com](http://www.SignUpGenius.com) | [Report an Email Problem](#)

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Haiti

Why?

Altruism

The/a reason we all became doctors in the first place

Intellectual stimulation

Disease processes

Do not come to attention promptly

More fully experience naturally history

Common chronic diseases (eg, HTN) not treated

Often different than what we see in US

Infections predominate over malignancies

Radiologist gets as much as s/he gives

Haiti

“Peculiarities”

No licensing

No medicolegal concerns

No HIPAA

Nothing is truly STAT

Relatively low number of normal examinations

Only the truly sick get imaged.....and not promptly

Limited follow-up

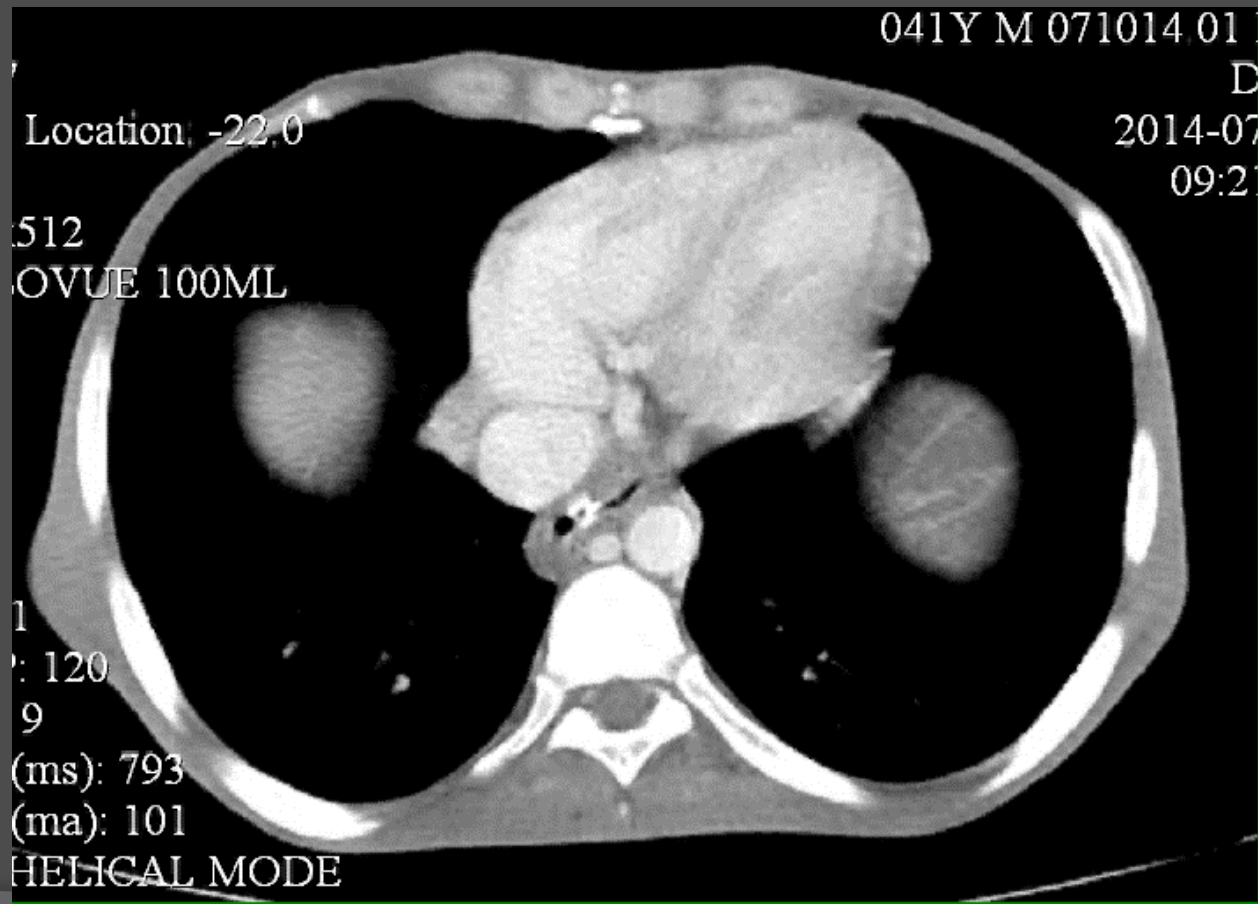
Diagnoses often/usually not proven

41-year-old male with abdominal pain and jaundice

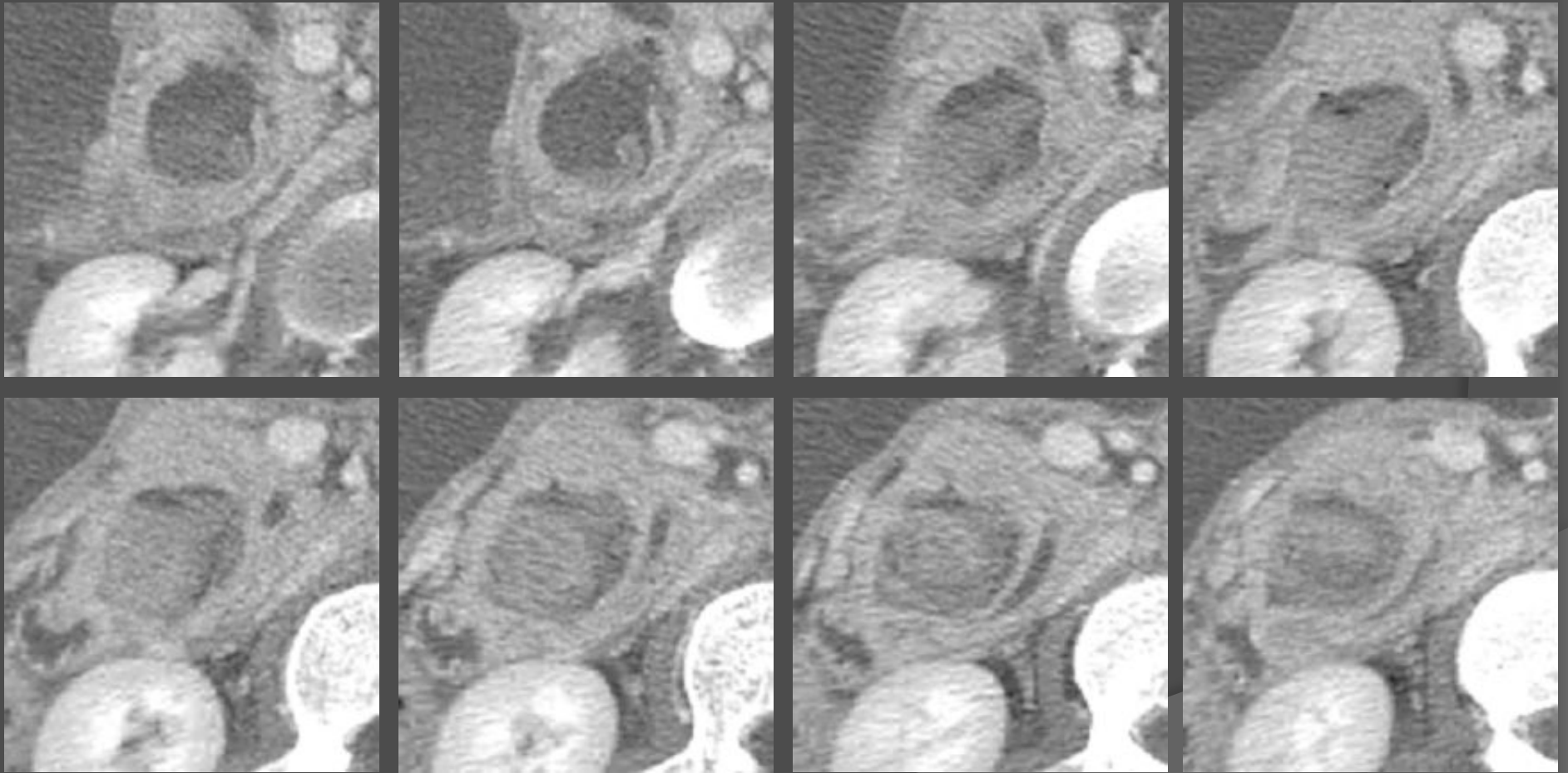
First day for me

41-year-old male with abdominal pain and jaundice

Premier jour pour moi



41-year-old male with abdominal pain and jaundice



41-year-old male
with abdominal pain and jaundice

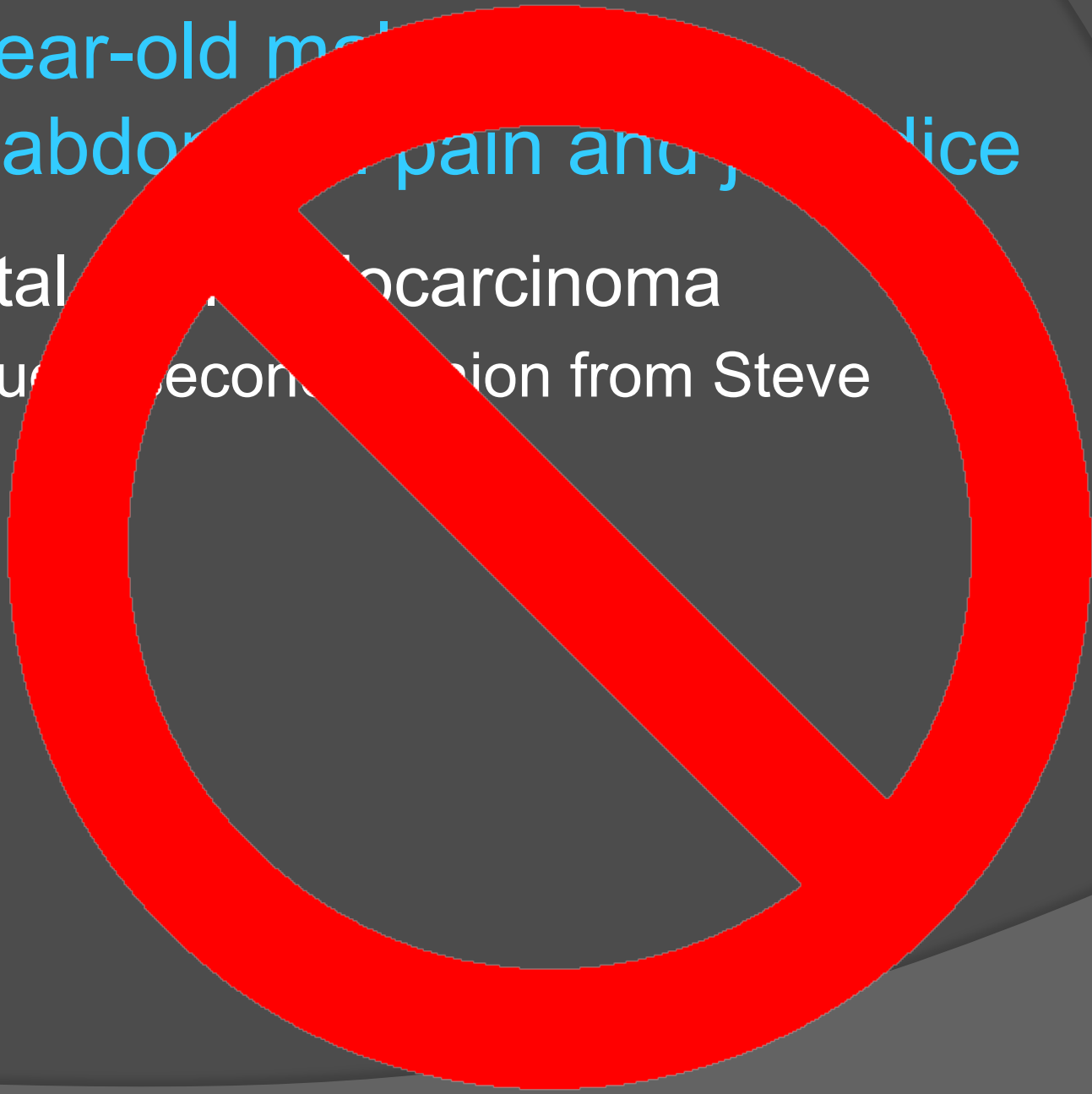
?Distal cholangiocarcinoma

Sought second opinion from Steve

41-year-old male
with abdominal pain and weight loss

?Distal small bowel adenocarcinoma

Source: recommendation from Steve



41-year-old male
with abdominal pain and jaundice

Um.....how about ascariasis???

Less challenging when you can see the
worms

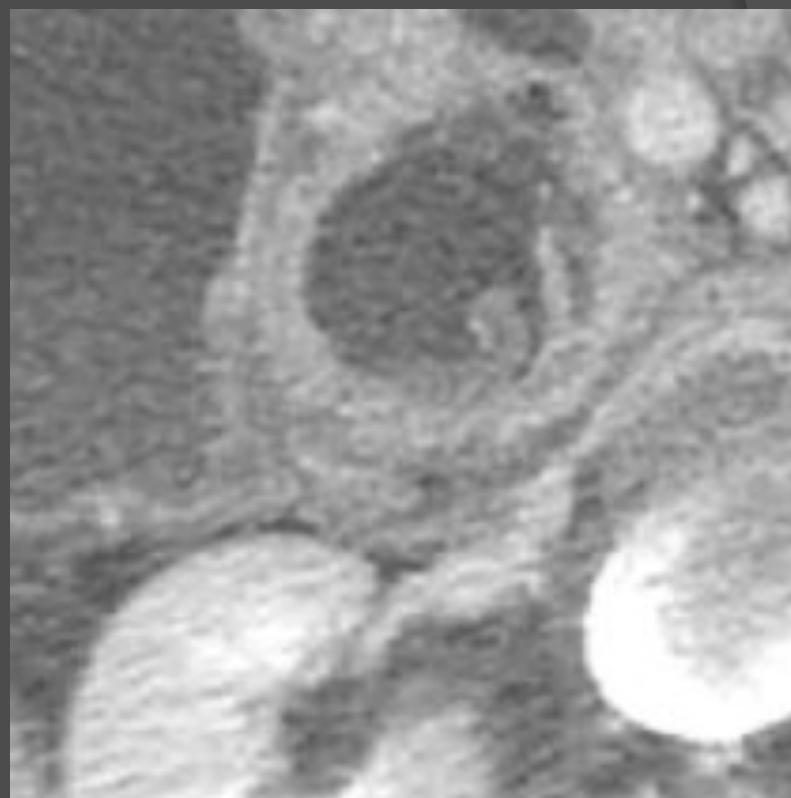
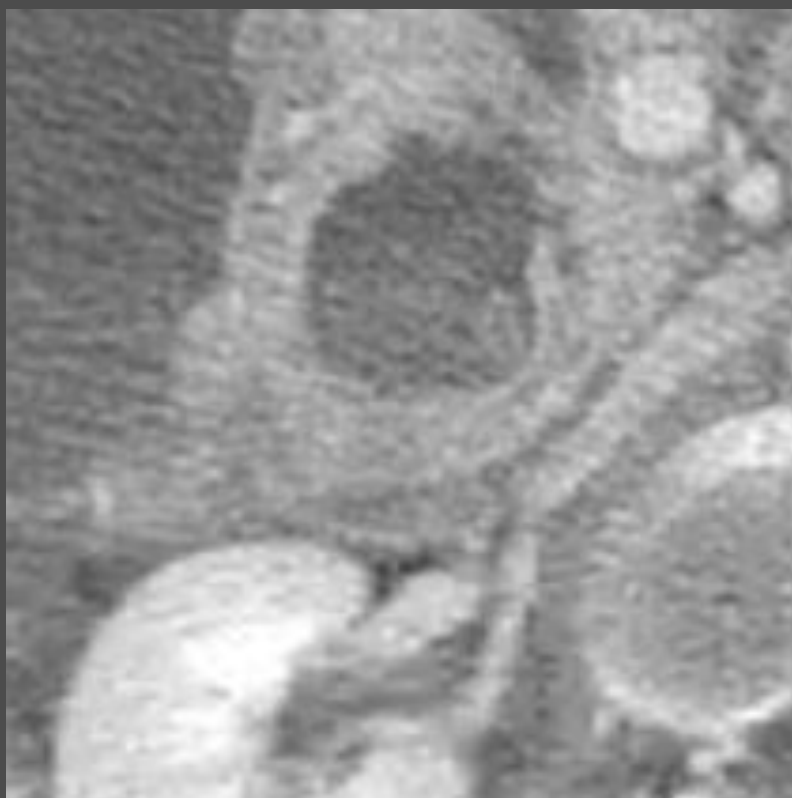
41-year-old male with abdominal pain and jaundice



41-year-old male with abdominal pain and jaundice



41-year-old male with abdominal pain and jaundice



41-year-old male with abdominal pain and jaundice

Ascariasis

Caused by roundworm *Ascaris lumbricoides*

15-35 cm long

Produce 200,000 eggs daily

Most common parasitic infection worldwide

Typically tropical areas

27.3% prevalence in school-aged Haitians

41-year-old male with abdominal pain and jaundice

Ascariasis

Life cycle of *Ascaris lumbricoides*

Ingestion of soil contaminated with eggs

Hatch in duodenum

Larvae penetrate into venules/lymphatics

Migrate to lungs

Larvae swallowed

Mature (usually in jejunum) over 2-3 months

41-year-old male with abdominal pain and jaundice

Initial symptoms

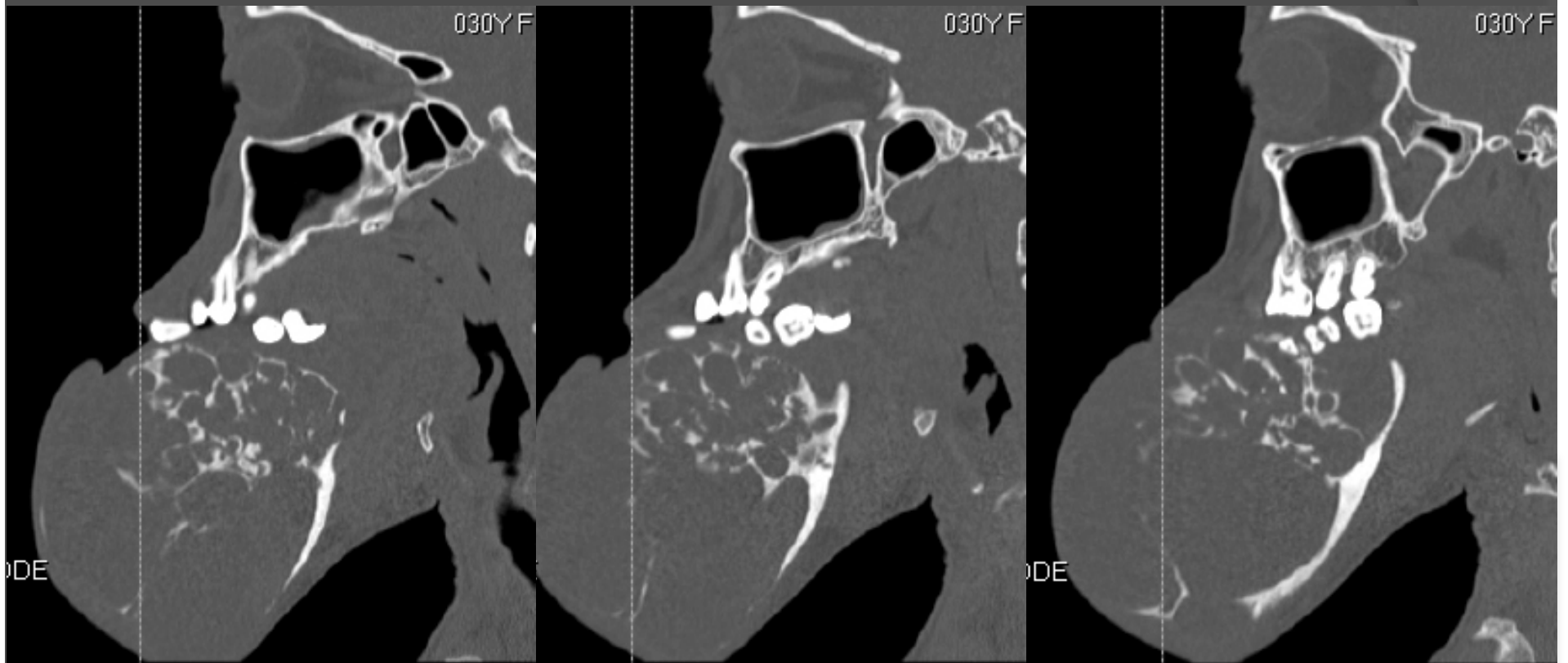
Typically respiratory and may be absent

Secondary symptoms

Abdominal pain, nausea, vomiting,
diarrhea, fatigue and weight loss

Jaundice if biliary involvement

30-year-old female with facial mass



30-year-old female with facial mass

DDx “jaw” lesions

Well-circumscribed radiolucent	Poorly-circumscribed radiolucent	Radiopaque	Mixed density
<ul style="list-style-type: none">• Periapical cyst• Dentigerous cyst• Odontogenic keratocyst• Ameloblastoma• Incisive canal cyst• Simple bone cyst• Central giant cell granuloma	<ul style="list-style-type: none">• Acute osteomyelitis• Primary bone neoplasm• Direct tumor extension• Lytic metastasis	<ul style="list-style-type: none">• Odontoma• Torus• Osteoma• Osteochondroma• Cementoblastoma• Fibrous dysplasia (late)	<ul style="list-style-type: none">• Fibrous dysplasia• Ossifying fibroma• Cemento-osseous dysplasia• Chronic osteomyelitis• Osteosarcoma• Metastasis

30-year-old female with facial mass

Ameloblastoma

Benign

Less than 1% have malignant potential

Location

80% ramus/proximal body of mandible

30-year-old female with facial mass

Ameloblastoma

Multicystic (85%)

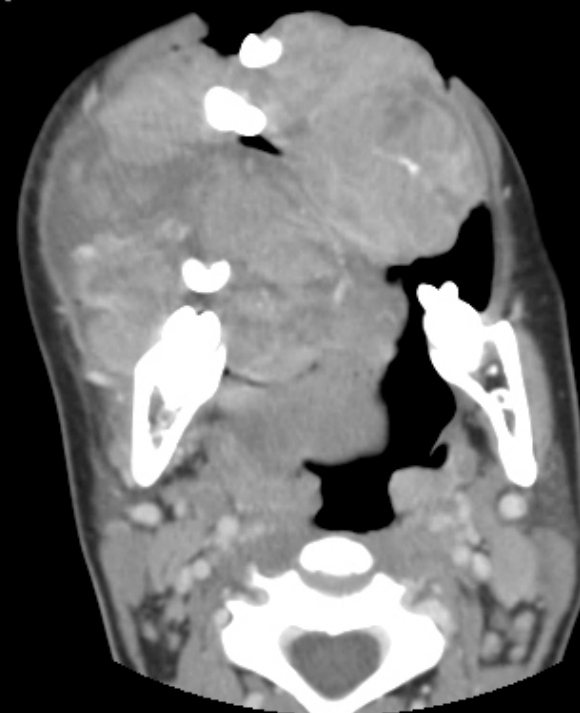
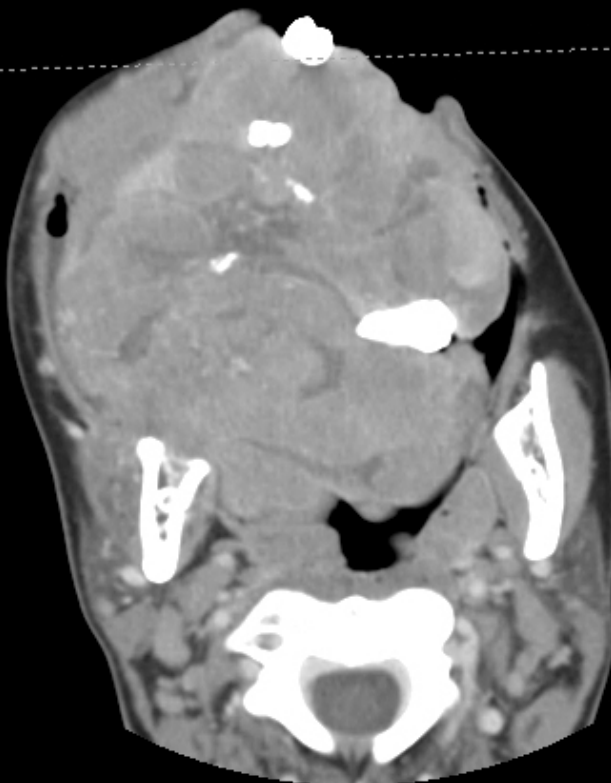
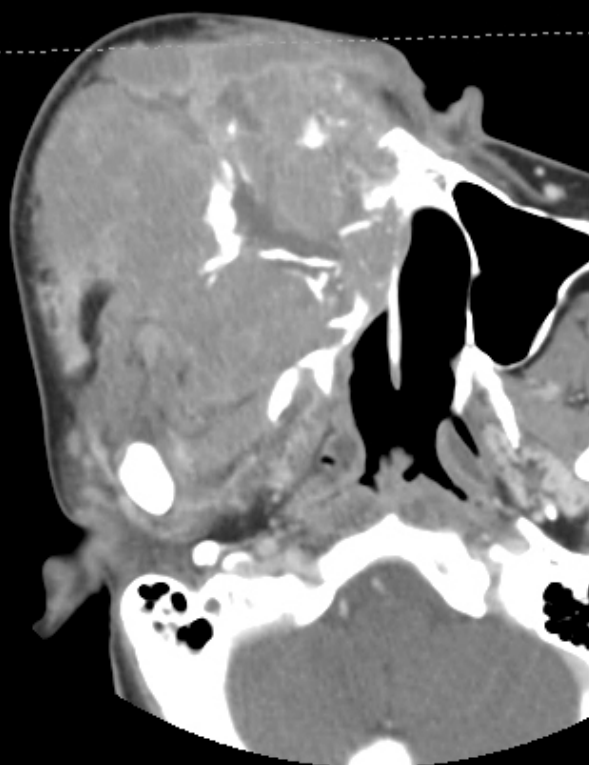
Occur in the third to seventh decades of life

Unicystic (15%)

Occur in younger age group

Tend to be non-invasive

34-year-old female with facial mass



34-year-old female with facial mass

Not a benign jaw lesion

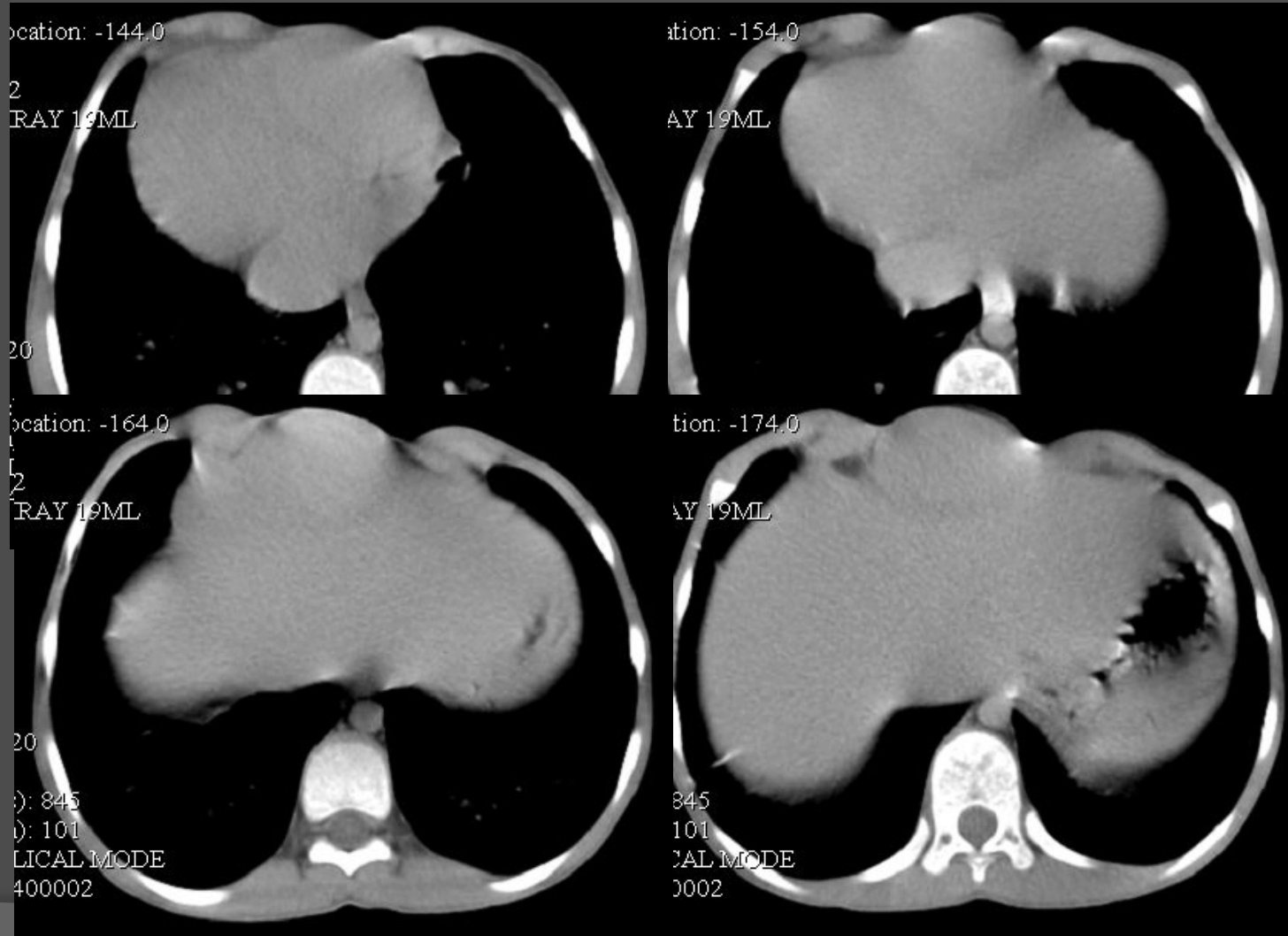
Overwhelmingly malignant

Regional invasion of.....everything

Probably oropharyngeal carcinoma

No available pathology

8-year-old male with pulsatile upper abdominal mass



8-year-old male with pulsatile upper abdominal mass

Ectopia cordis

Exceedingly rare congenital anomaly

5-7 per one million live births

High mortality rate

Heart partially or totally outside of thorax

Spectrum including neck, chest and abdomen

Most often protrudes through a split sternum

Usually diagnosed in utero.....but not in Haiti

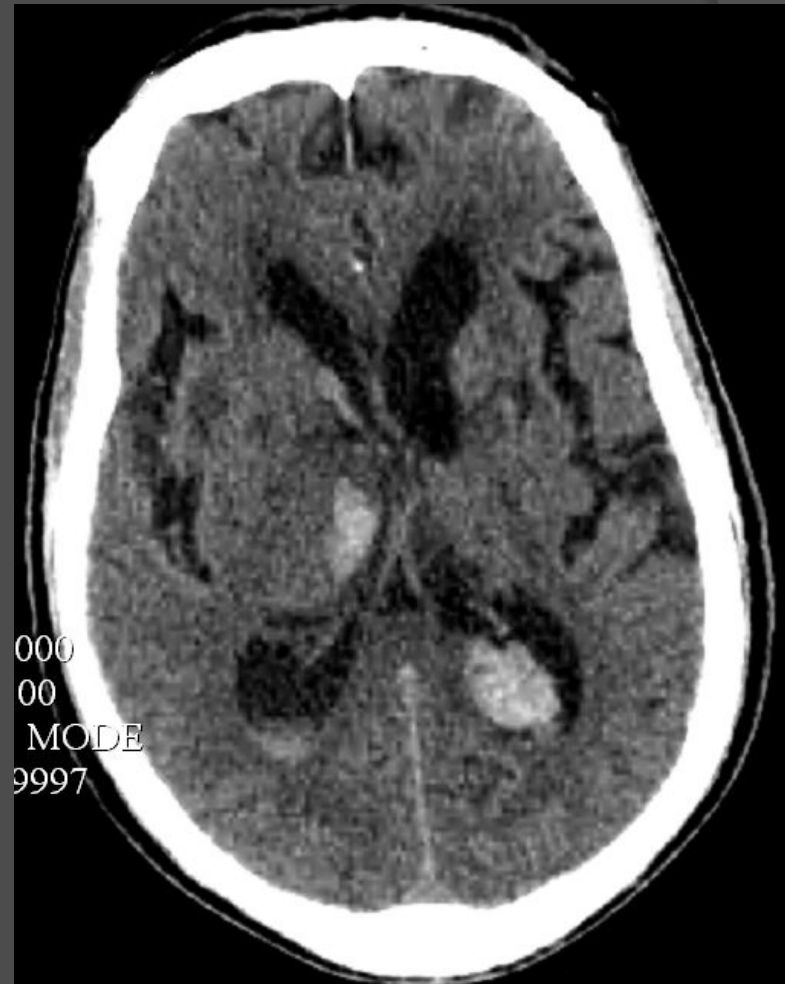
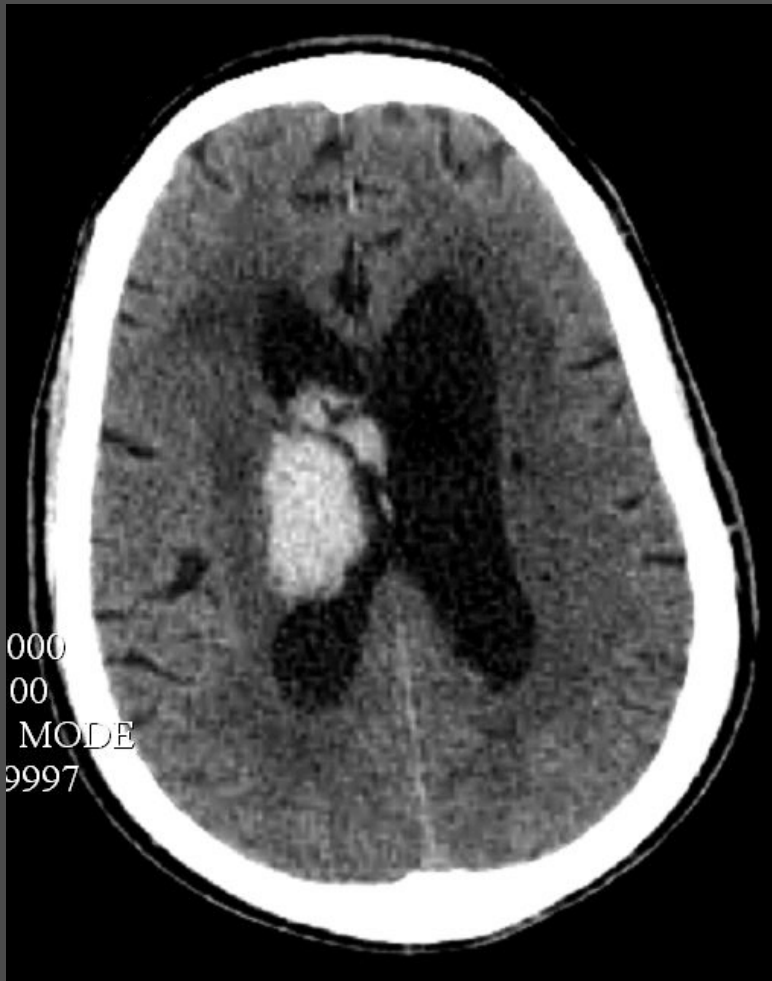
8-year-old male with pulsatile upper abdominal mass



53-year-old female with suspected stroke



64-year-old male with suspected stroke



53-year-old female and 64-year-old male with suspected strokes

Anecdotally, the proportion of strokes in Haiti that are hemorrhagic seems far higher than those in the northwest suburbs of Chicago

Why?

Best explained by the natural history of uncontrolled HTN

53-year-old female and 64-year-old male with suspected strokes

Uncontrolled HTN

Increases overall stroke risk 4-6x

Directly related to blood pressure

Effects on arteries

Diffuse atherosclerosis

Weakening of smaller blood vessels

Hemorrhage

53-year-old female and 64-year-old male with suspected strokes

Common causes of hemorrhagic stroke

HTN

Ruptured aneurysms

2-year-old male with abdominal pain



2-year-old male with abdominal pain



2-year-old male with abdominal pain

Minimal ascites and minimal
mesenteric/omental infiltration

Patient not all that “sick”

2-year-old male with abdominal pain

Peritoneal tuberculosis (TB)

TB in Haiti

Highest rate in Latin America and Caribbean

Greatest infectious cause of mortality after HIV

3-month-old male with history of prematurity



3-month-old male with history of prematurity

Limited in Haiti

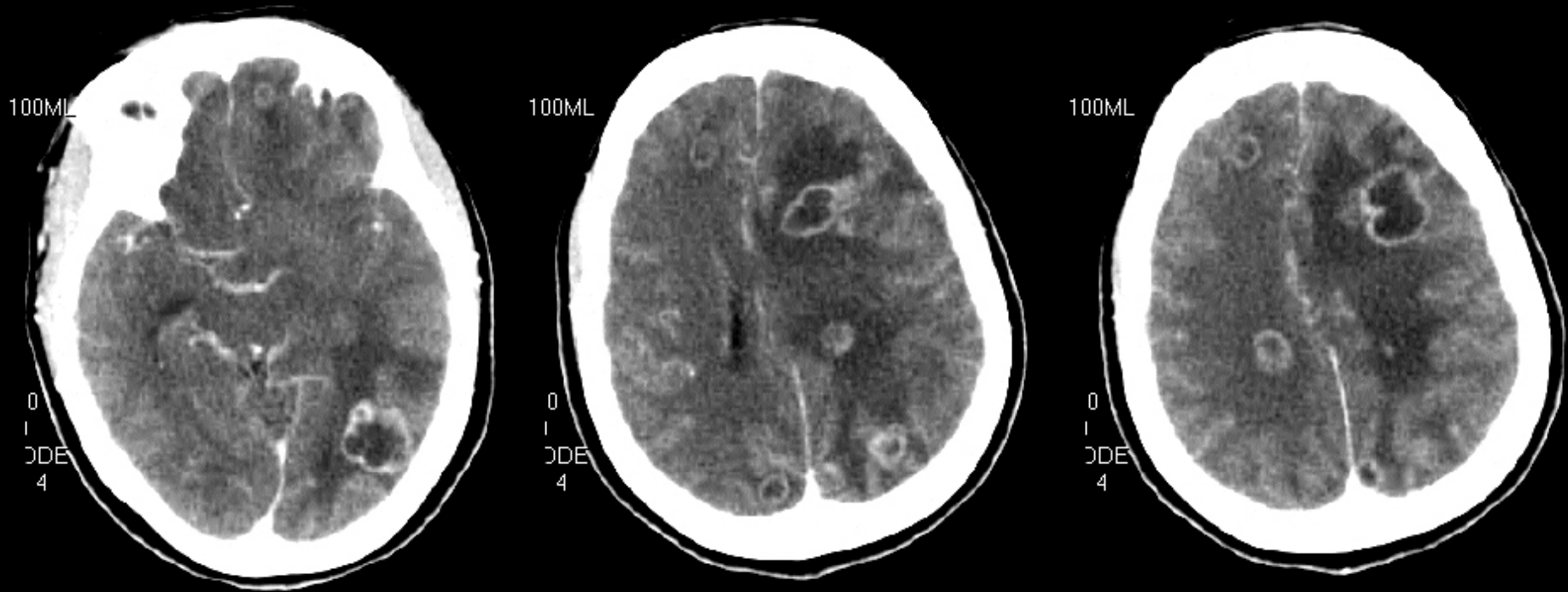
Prenatal care

Use of neonatal head sonography

Treatment of IVH sequela

Not much shunting

56-year-old female with right-sided hemiparesis



56-year-old female with right-sided hemiparesis

Neurocysticercosis

Yet another worm infestation

Taenia solium: the pork tapeworm

Colloidal stage

Meningoencephalitis resulting from scolex breakdown

Ring-enhancing lesion with edema at imaging

56-year-old female with right-sided hemiparesis

Neurocysticercosis

Stages

Larval tissue invasion

Vesicular

Colloidal

Nodular granular

Calcified

56-year-old female with right-sided hemiparesis

Neurocysticercosis

Life cycle of *Taenia solium*

Ingestion

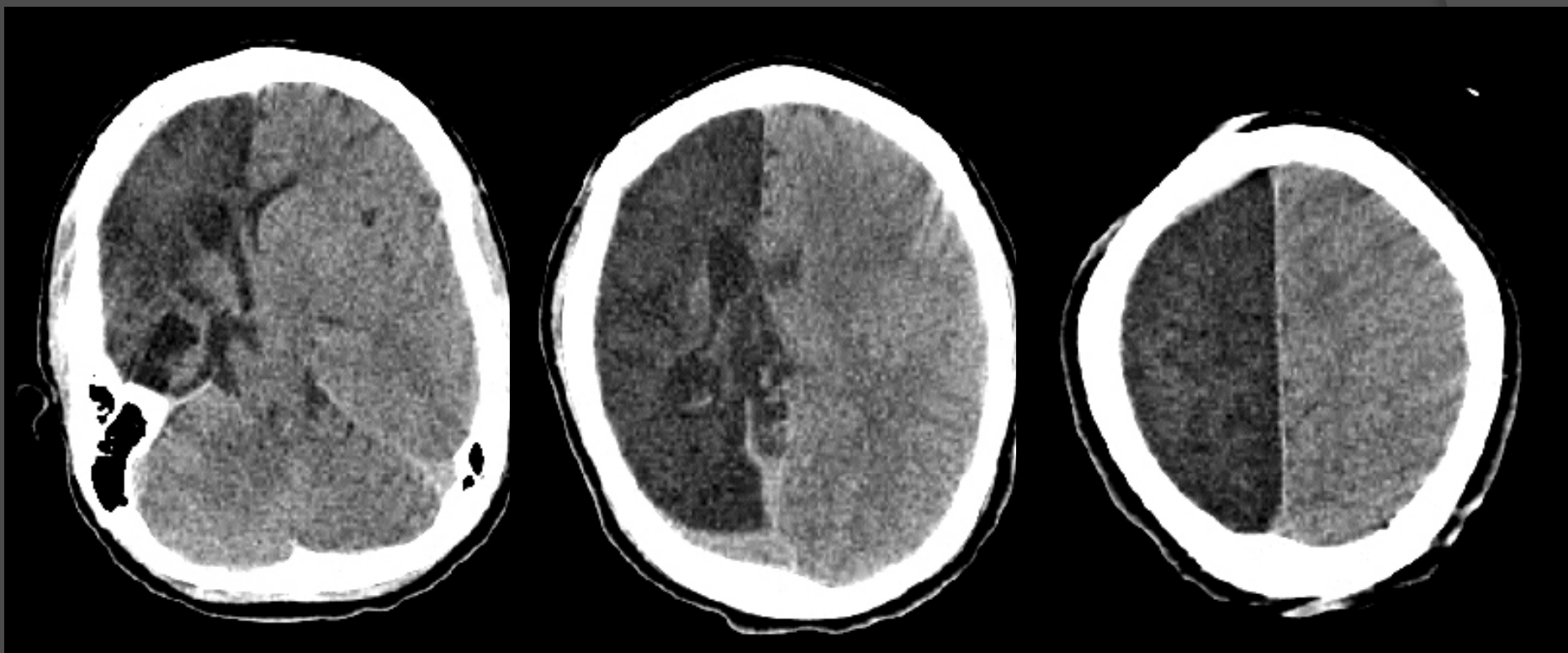
Contaminated food and/or water containing ova

Undercooked pork containing cysticerci

Embryos invade intestinal wall and disseminate

CNS involvement in up to 90%

10-year-old female with left-sided hemiplegia



10-year-old female with left-sided hemiplegia

Dyke-Davidoff-Masson Syndrome

Atrophy or hypoplasia of one cerebral hemisphere

Presumed to be caused by vascular insult in early childhood or in utero

10-year-old female with left-sided hemiplegia

Dyke-Davidoff-Masson Syndrome

Symptoms

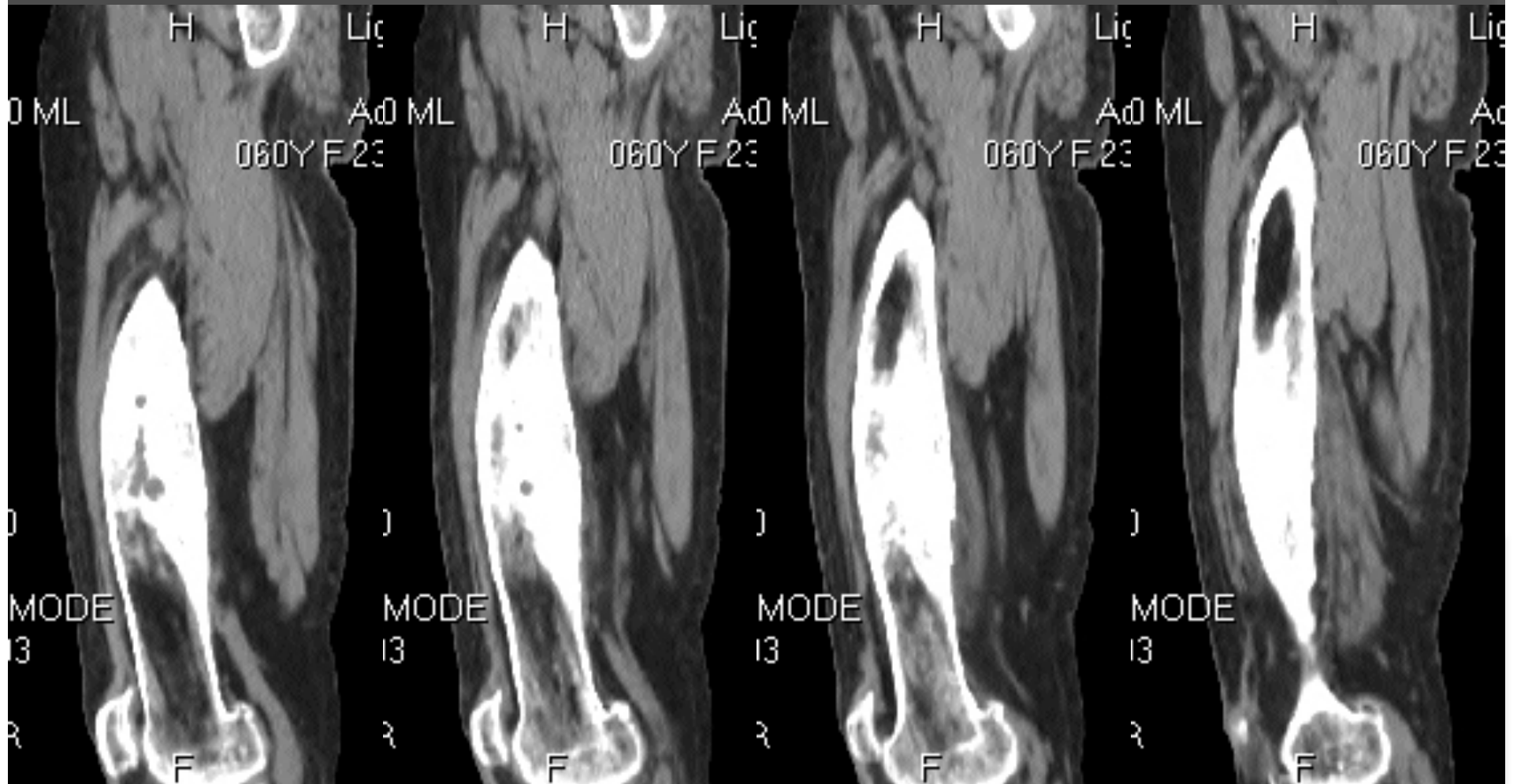
Seizures

Facial asymmetry

Contralateral hemiplegia

Cognitive delay

60-year-old female with femoral mass



60-year-old female with femoral mass

Chronic osteomyelitis

Typical features

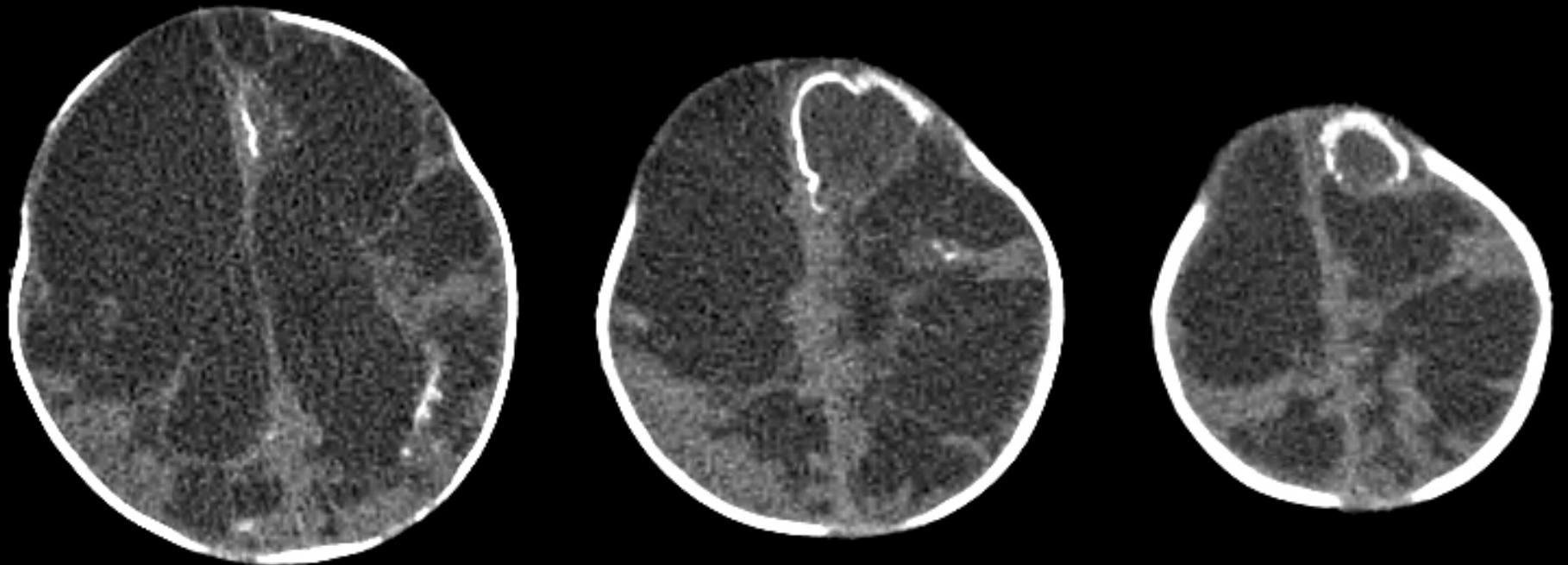
- Thick irregular sclerotic bone

- Areas of radiolucency

- Elevated periosteum

- Draining sinus

1-month-old male with failure to thrive



1-month-old male with failure to thrive

TORCH syndrome

Acquired

In utero

During birth

Lesions destroy brain

Encephalomalacia

Calcifications

1-month-old male with failure to thrive

TORCH syndrome

Toxoplasmosis

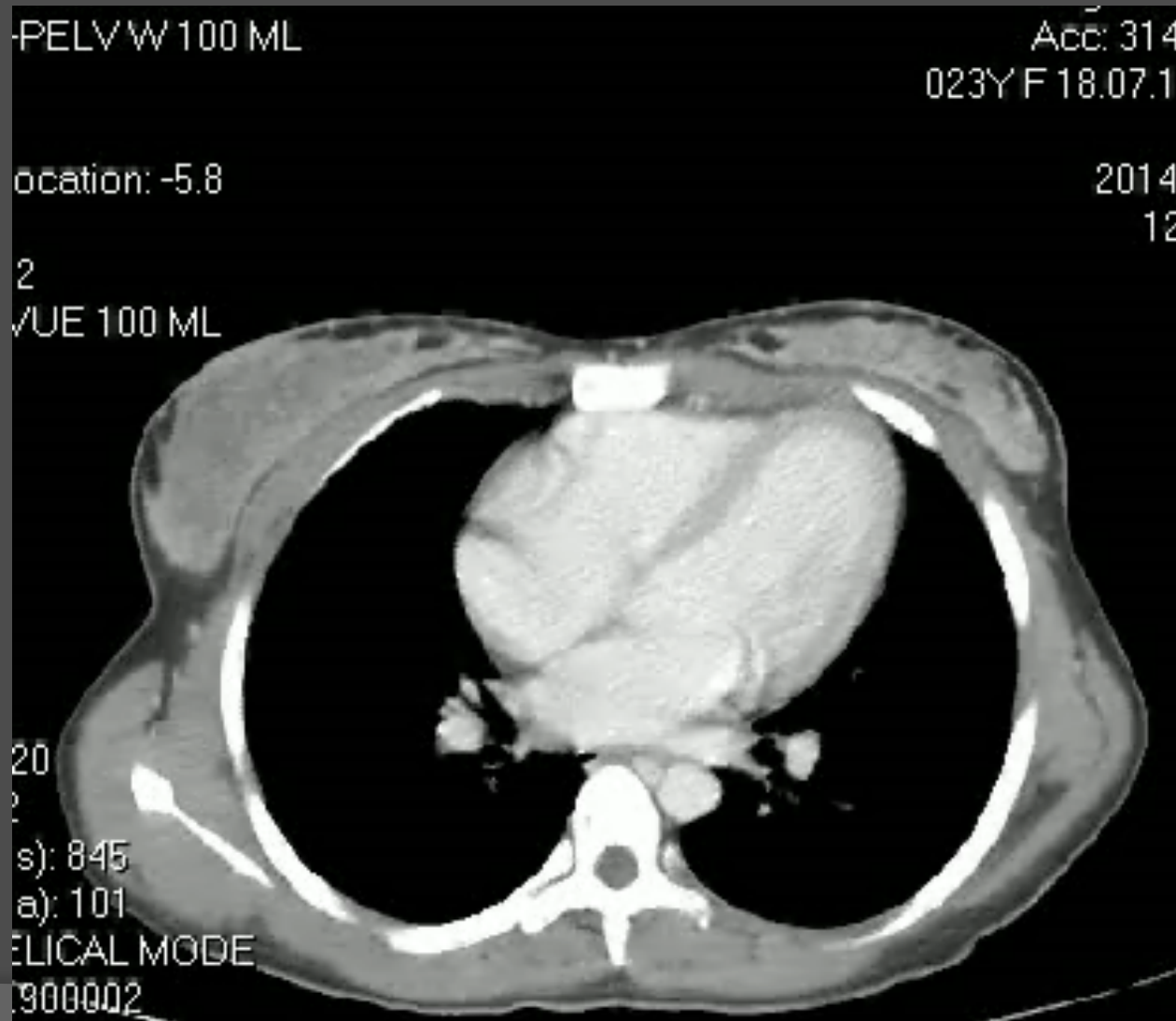
Other (syphilis, varicella zoster, HIV, more)

Rubella

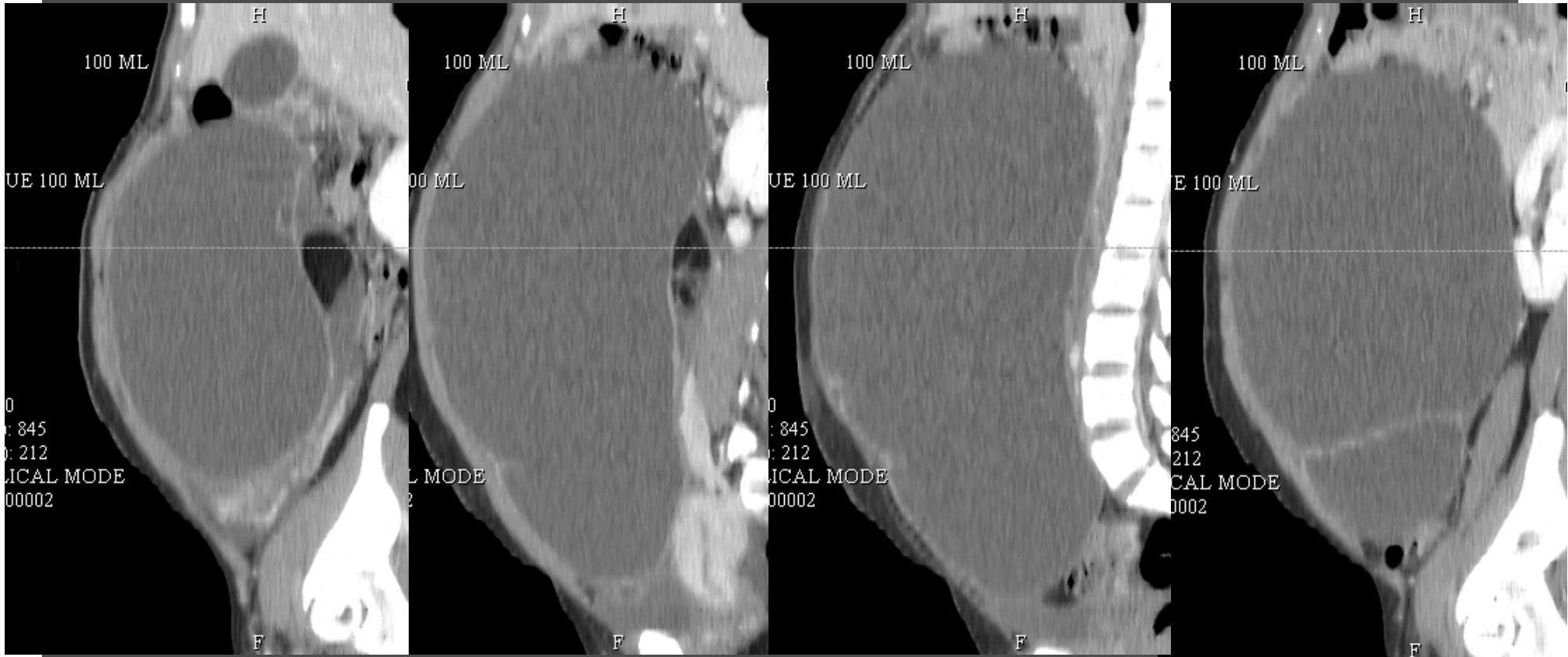
Cytomegalovirus (CMV)

Herpes simplex

23-year-old female with pelvic mass



23-year-old female with pelvic mass



23-year-old female with pelvic mass

Ovarian dermoid tumor

Supersized

Mature cystic teratoma

Benign tumor

Contains all three germ cell layers

Predominance of ectoderm

Imaging (ie, CT and MR)

Generally fluid and fat

Calcification in more than half



Fin