OneShot 4.0
Radiology

DBMCI one

RADIOLOGY

Never Give up.
Today is hard ,
Tomorrow will be worse, but the day after tomorrow will be sunshine.

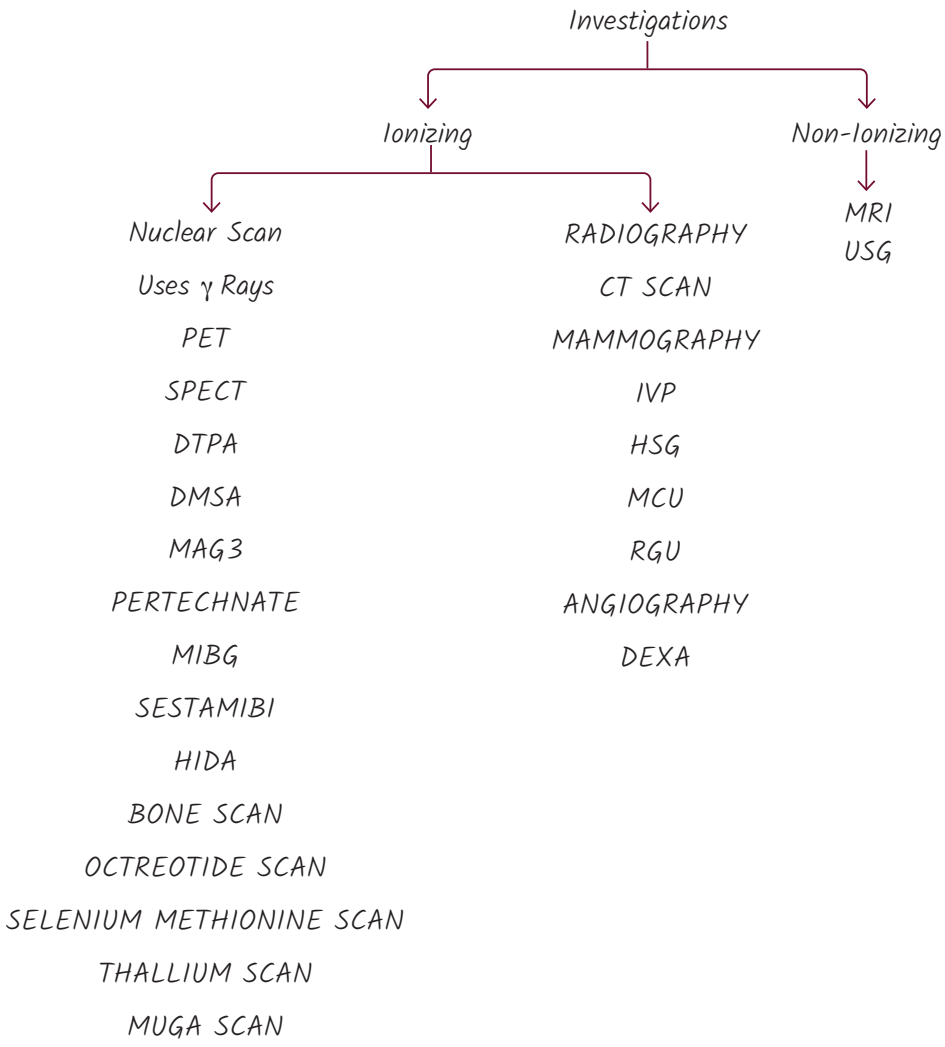
- Dr. Rajat Jain

RADIOLOGY

1. 1 question on identify the name of the investigation?
2. 2-4 questions on diagnosis on the basis of Image.
3. 1 question from Nuclear scans.
4. 1 question from radiotherapy.
5. 2 questions on preferred radiological investigation.
6. 8-10 Qs on radiological image with management of patient.
7. 6-8 questions where radiology will be a part of question.

Important Topics

• Ankylosing Spondylitis	• Abdominal trauma
• Barium Studies	• Radiosensitivity
• IVP	• PNS
• Chest Xray	• Shape of vertebrae
• PET scan	• Shape of heart
• Renal masses	• Shape of skull
• MCU	• Brain tumors
• RGU	• Intussusception
• HSG	• Mediastinal mass
• Head Trauma	• Pregnancy USG
• Pneumoperitoneum	• Stroke
• Intestinal obstruction	• Aortic dissection
• AVN	• Pulmonary embolism
• Anatomy	• Pulmonary edema
• ERCP/MRCP	


Investigations
Ionizing
Non-Ionizing
Nuclear Scan
Uses γ Rays
PET
SPECT
DTPA
DMSA
MAG3
PERTECHNATE
MIBG
SESTAMIBI
HIDA
BONE SCAN
OCTREOTIDE SCAN
SELENIUM METHIONINE SCAN
THALLIUM SCAN
MUGA SCAN
RADIOGRAPHY
CT SCAN
MAMMOGRAPHY
IVP
HSG
MCU
RGU
ANGIOGRAPHY
DEXA
MRI
USG

MIBG ⟶ Pheochromocytoma

Sesta MIBI ⟶ Parathyroid adenona.

HIDA ⟶ Biliary atresia

MDP ⟶ Bone Scan- osteoblastic Activity

Selenium Methionine ⟶ Pancreatic Imaging

Octreotide Scan ⟶ NET (Carcinoid)
(SRS)

Cardiac MRI

FDG - PET

Most Accurate test
Cardiac MRI

Thallium scan ⟶ Myocardial viability
Reversibility of myocardial ischemia

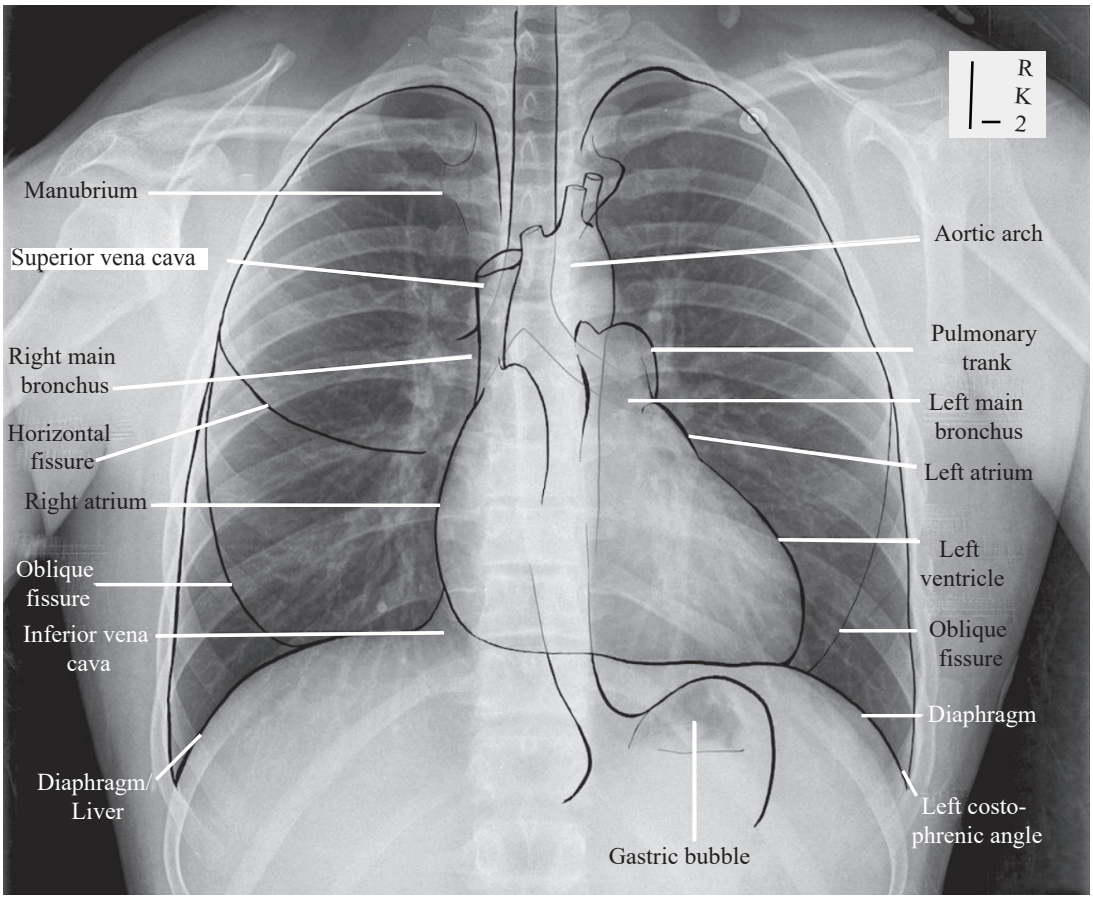
MUGA Scan ⟶ Ventricular function

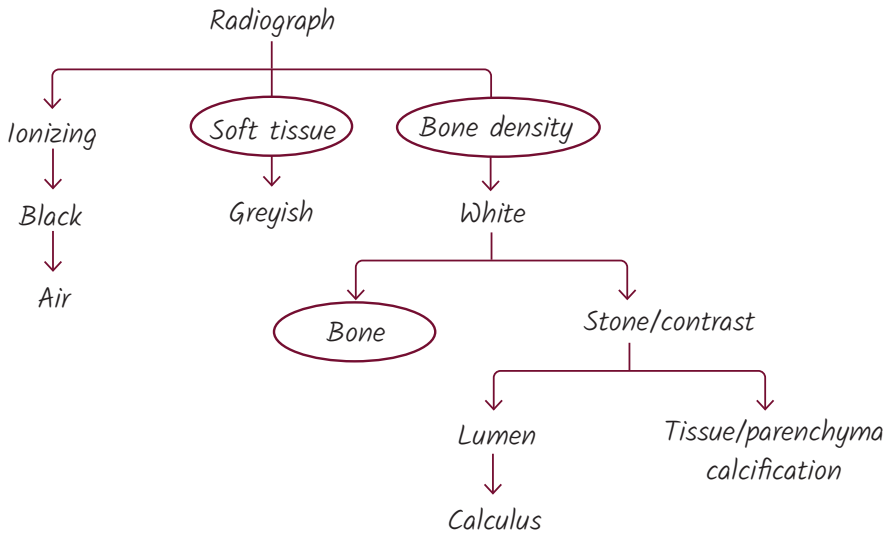
How to decide any investigation?

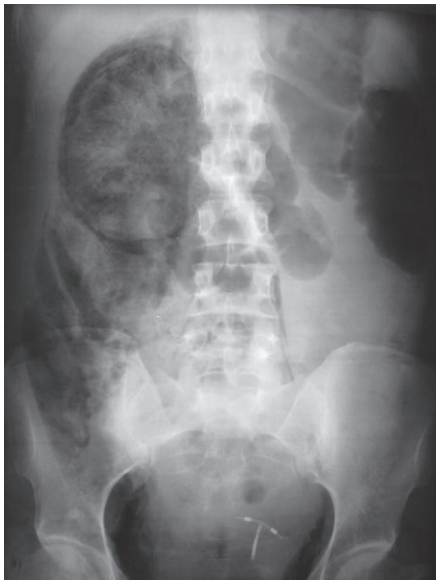
- Bone
  - Cortical Bone ⟶ CT
  - Marrow ⟶ MRI
- Air
- Acute Hematoma
- Calculi/calcification

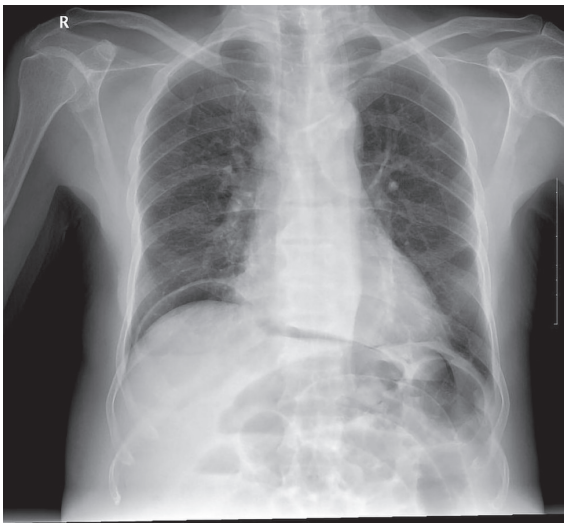
  } CT
- Neural Tissue
- Ligaments/tendons/cartilage/
- Fibrous tissue/Muscles

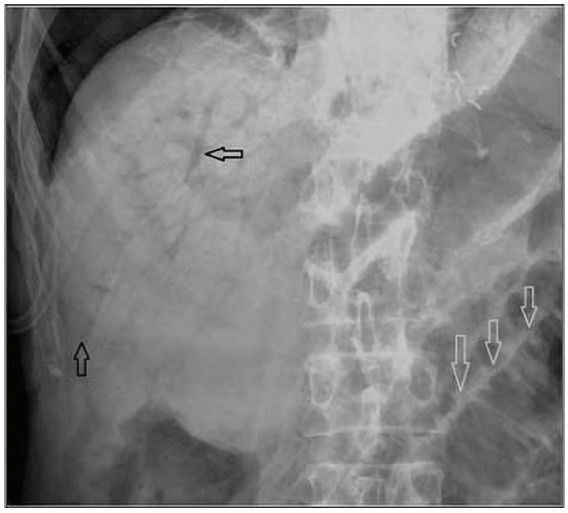
  } MRI
- Fluid ⟶ USG

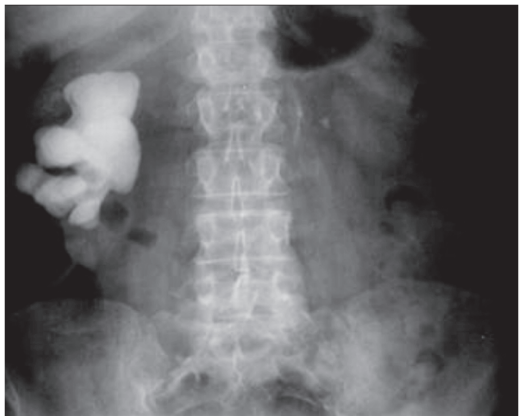

R
K
2
Manubrium
Superior vena cava
Right main bronchus
Horizontal fissure
Right atrium
Oblique fissure
Inferior vena cava
Diaphragm/ Liver
Aortic arch
Pulmonary trank
Left main bronchus
Left atrium
Left ventricle
Oblique fissure
Diaphragm
Left costo-phrenic angle
Gastric bubble

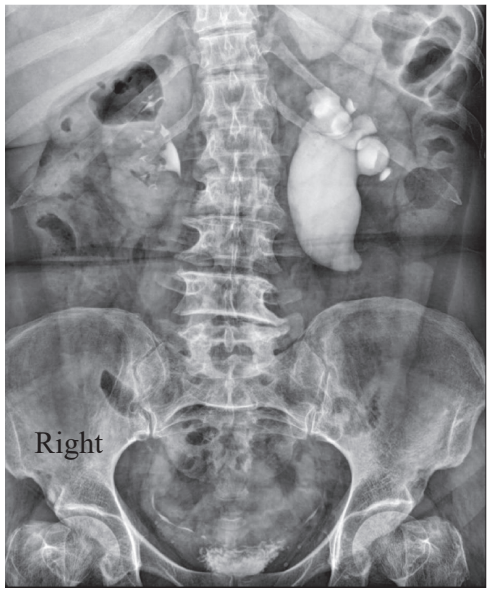

Radiograph
Ionizing
Soft tissue
Bone density
Black
Greyish
White
Air
Bone
Stone/contrast
Lumen
Tissue/parenchyma calcification
Calculus

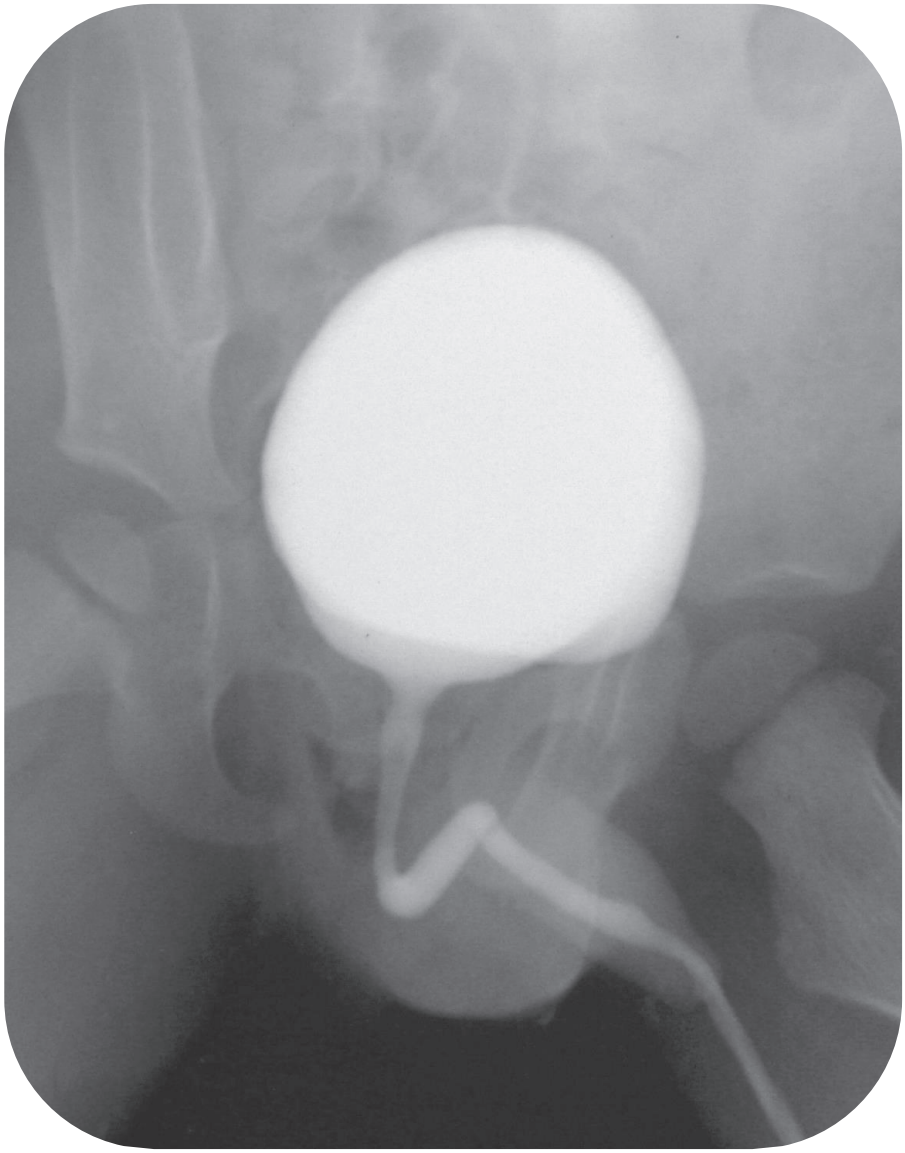


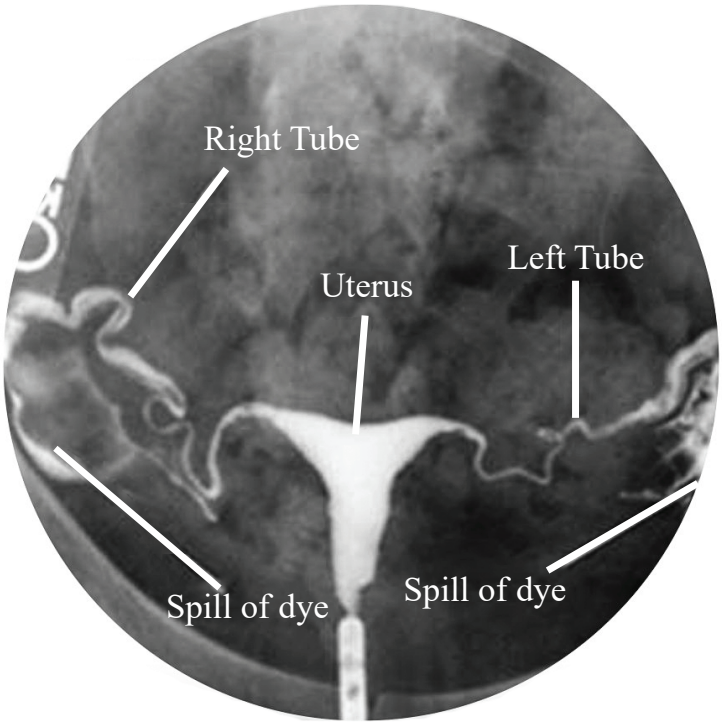

R

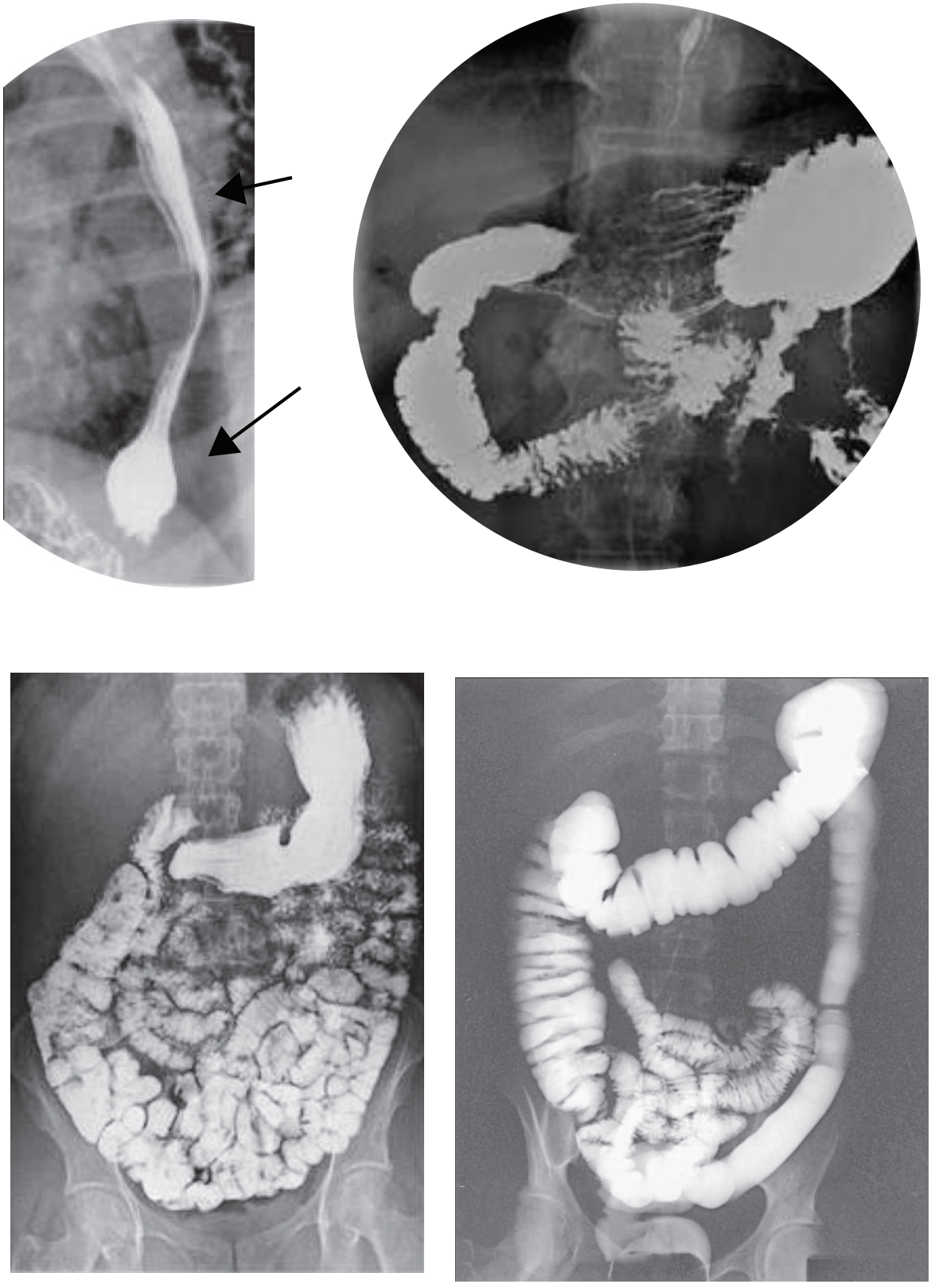




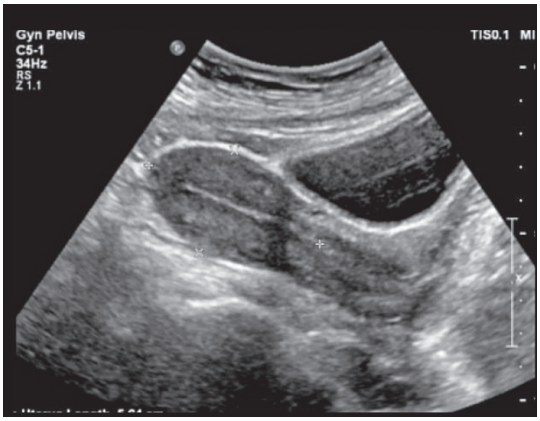

Right



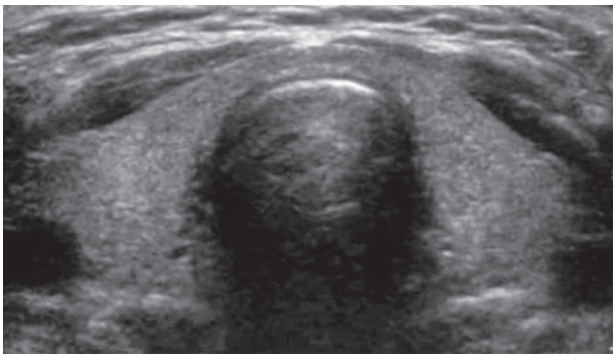

Right Tube
Uterus
Left Tube
Spill of dye
Spill of dye



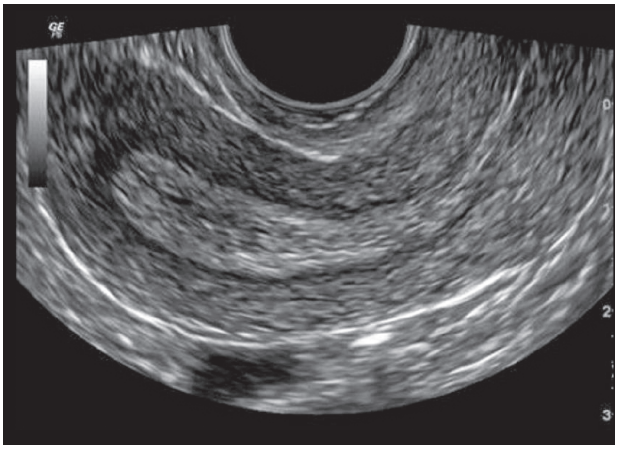

Convex

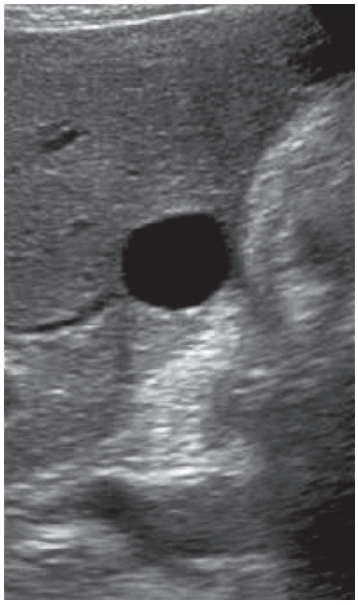

Gyn Pelvis
C5-1
34Hz
RS
Z 1.1
TIS0.1

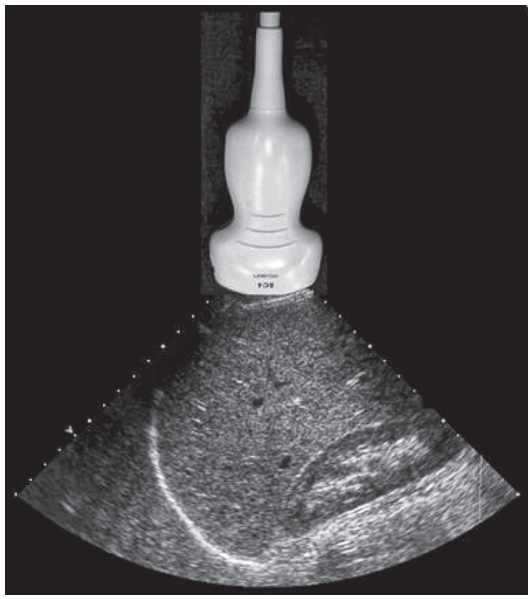

Linear

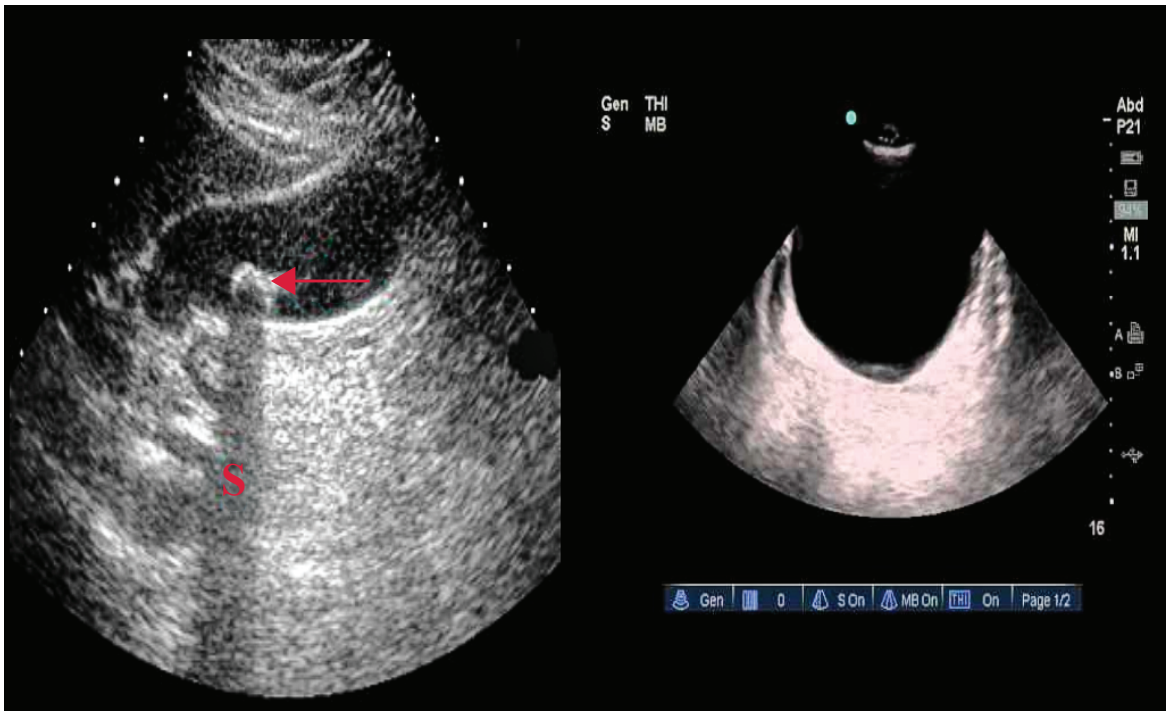


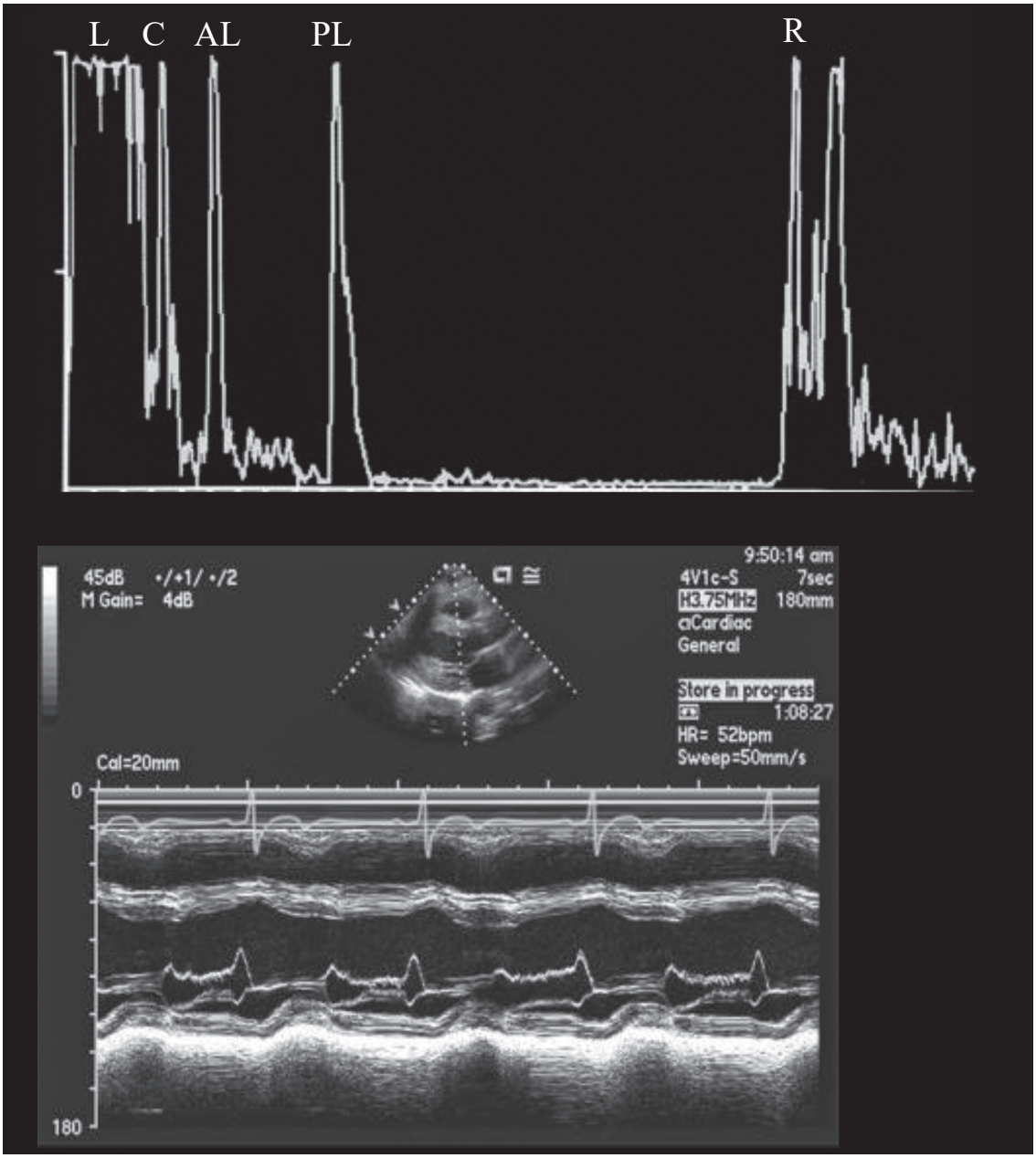

Endocavitary

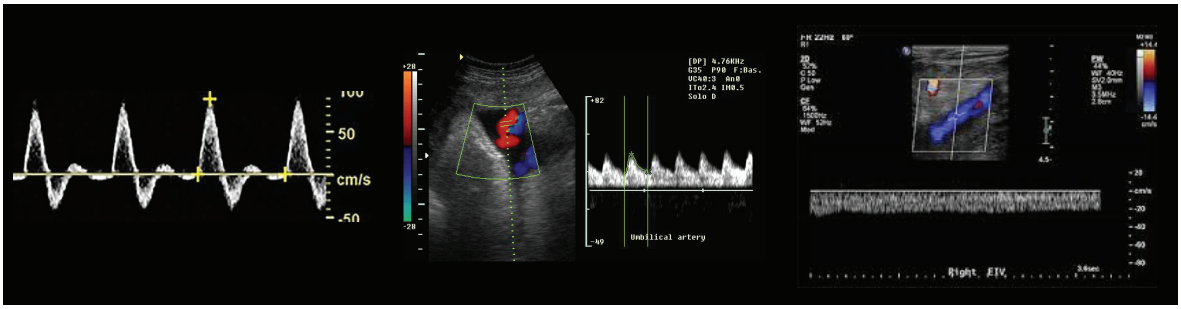




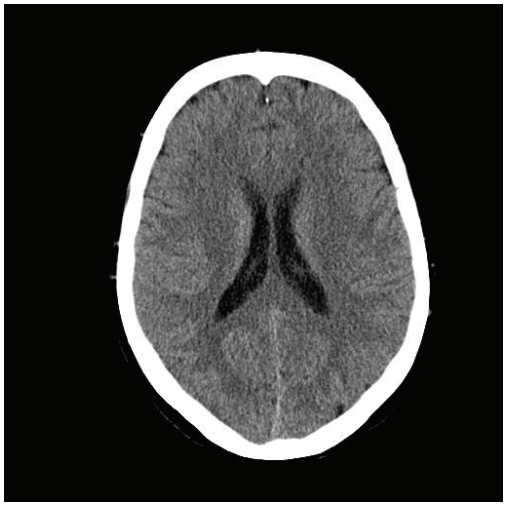


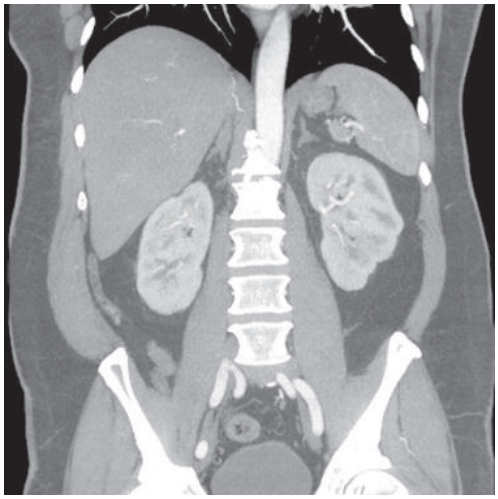

Gen THI
S MB
Abd
P21
MI
1.1
S
16
Gen
0
S On
MB On
On
Page 1/2

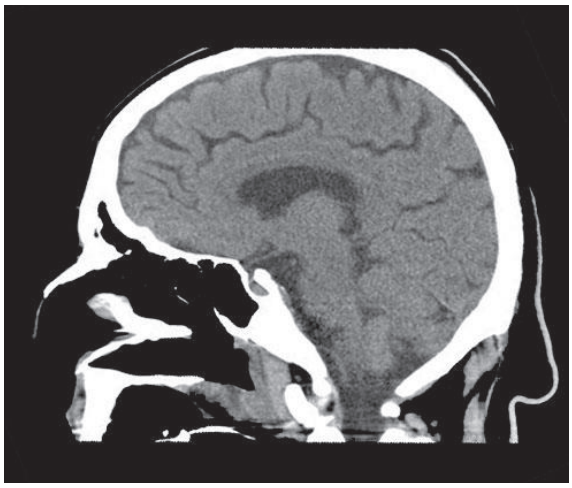

L C AL PL R
45dB •/+1/ •/2
M Gain= 4dB
9:50:14 am
4V1c-S 7sec
H3.75MHz 180mm
aCardiac
General
Store in progress
1:08:27
HR= 52bpm
Sweep=50mm/s
Cal=20mm
0
180

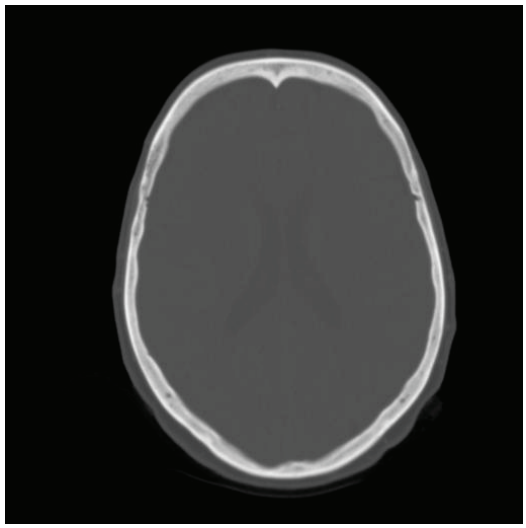

100
50
cm/s
-50
Umbilical artery
Right ATV

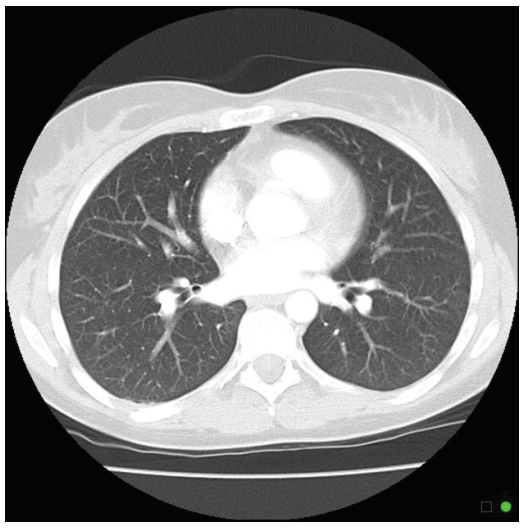

Revolution

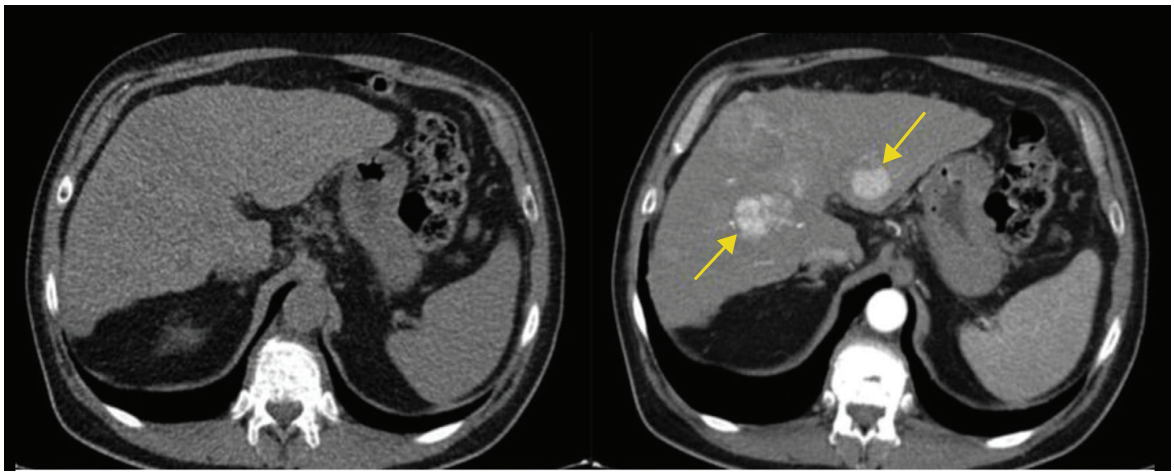


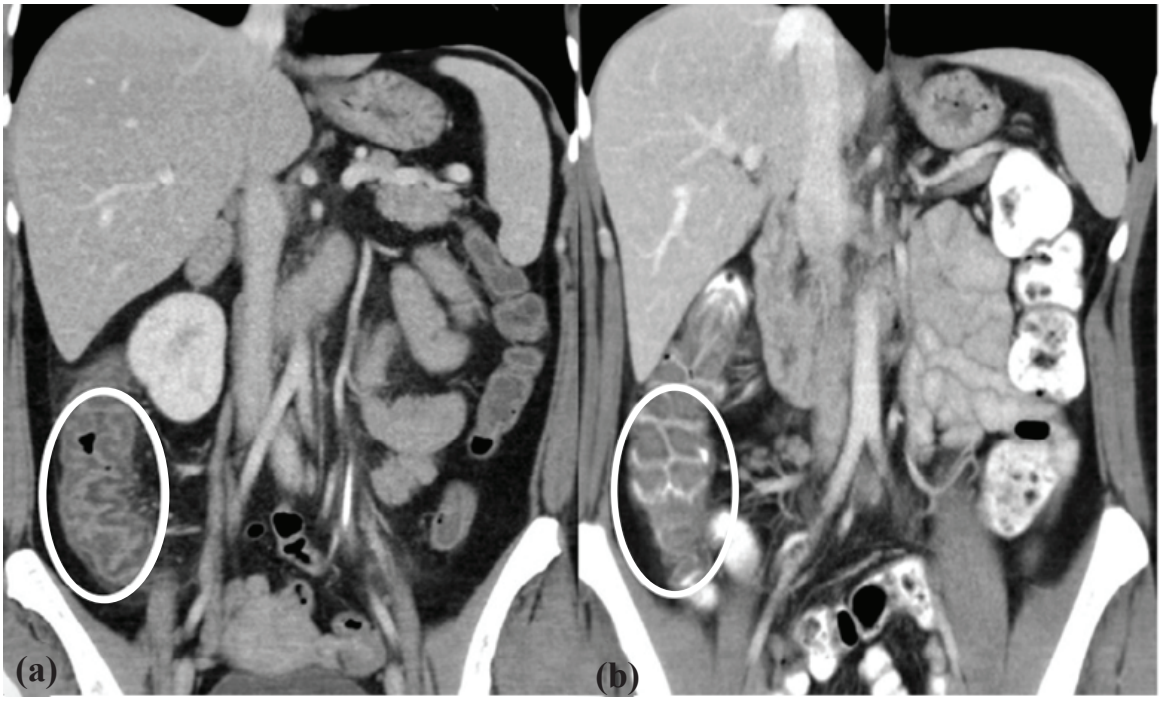











(a)
(b)

Contraindications of MRI

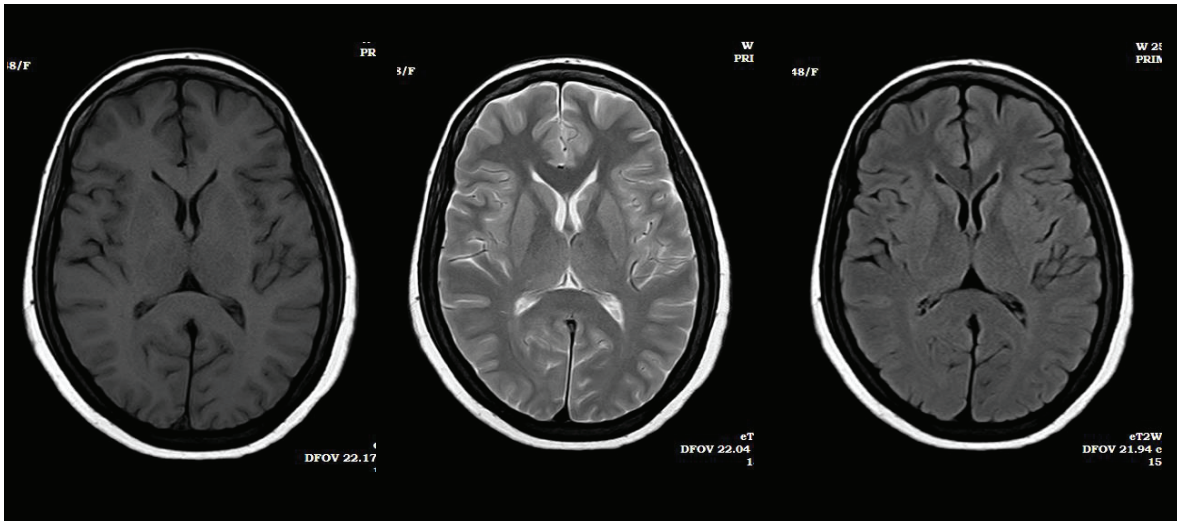
1. Free lying ferromagnetic foreign body inside the body
   - Fe foreign body inside the eye [Chisel & Hammer injury]
   - Retained Bullet

"Not orthopedic Implant"

2. Cardiac Pacemaker
3. Aneurysmal clips
4. Cochlear Implant
5. Metallic Cardiac Valve
6. Any Magnetic Device

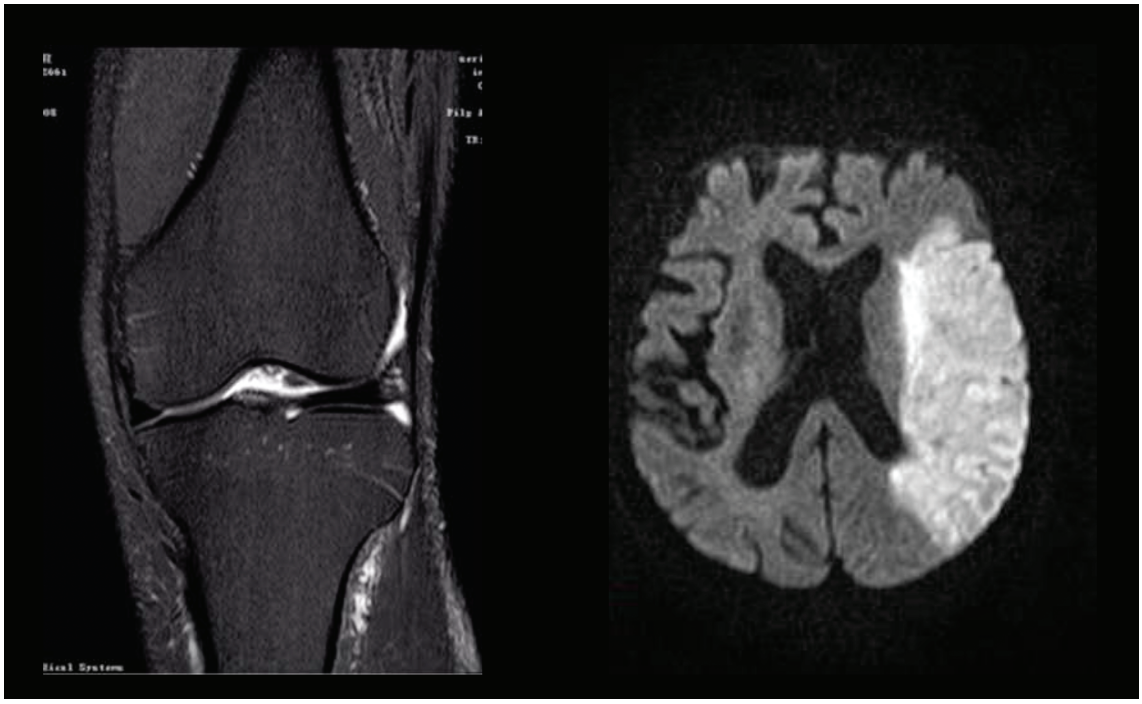
Relative C/I

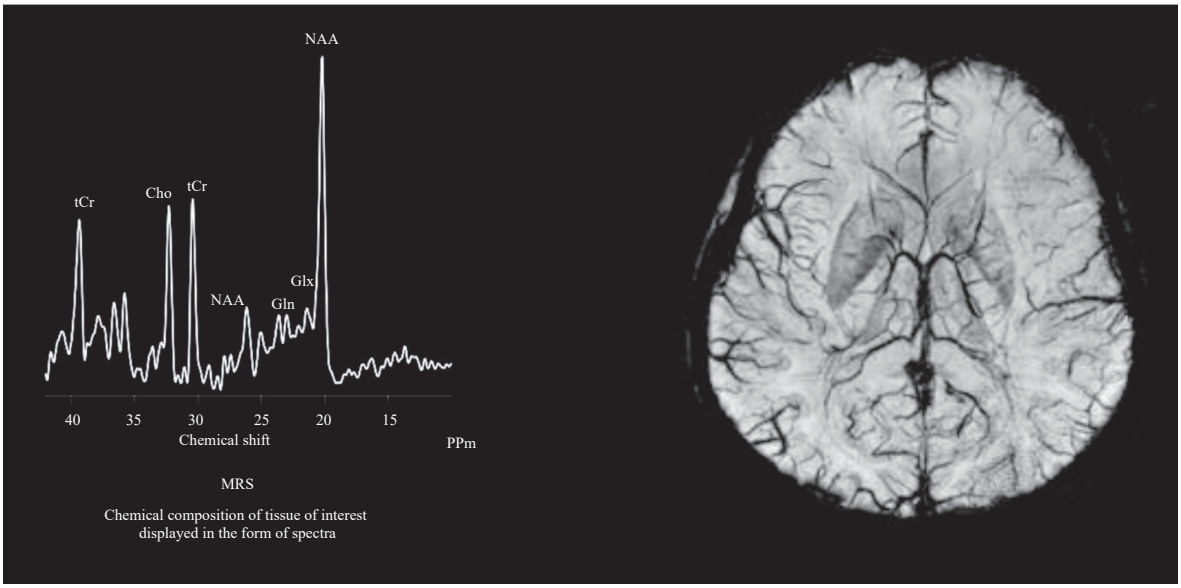
1. Claustrophobia
2. 1st trimester of pregnancy

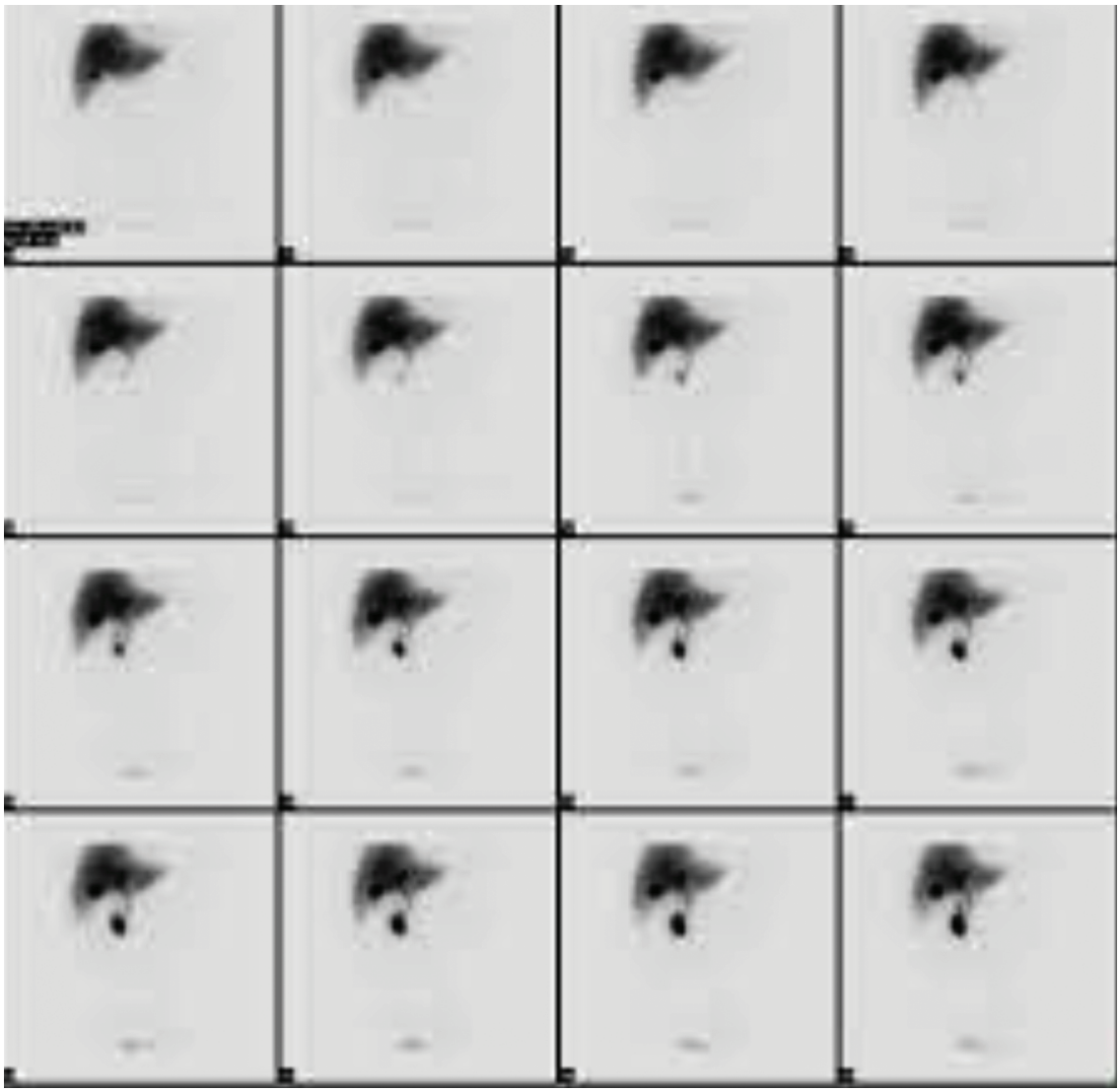


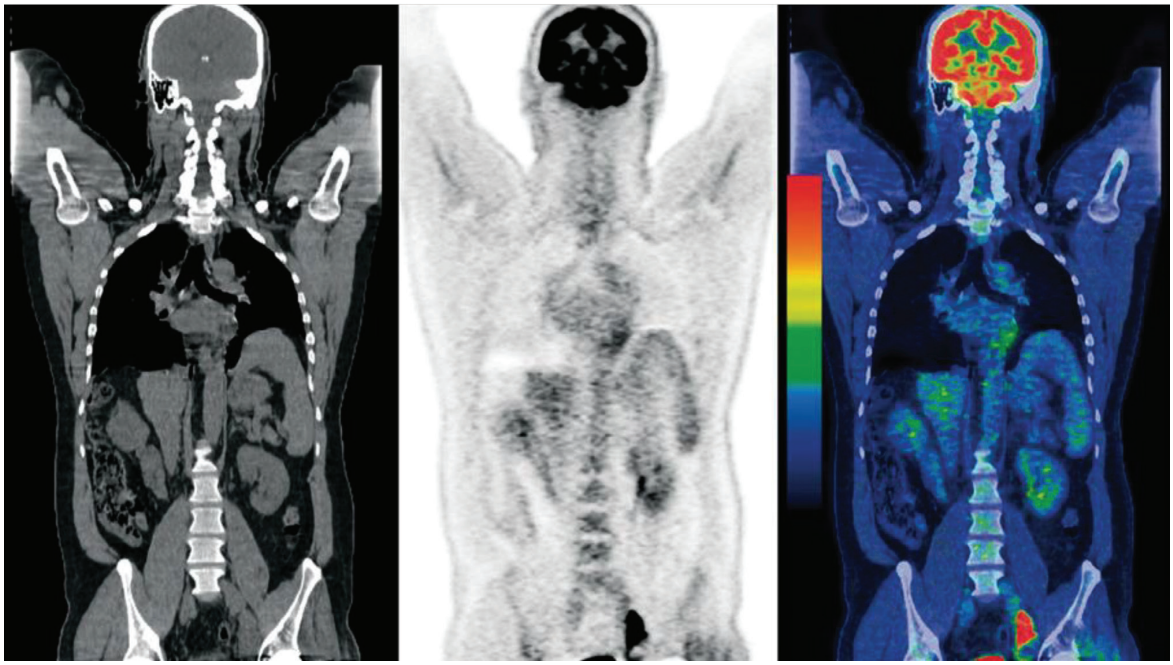
T1, W	T2, W
Depends on longitudinal time	Depends on transverse time
More T_1 relaxation time ↓ Image is more black	More T_2 relaxation time ↓ Image is more white
Anatomy	Pathology
Black on T_1	WW2
Grey – grey White – white	Grey – white White – grey
Pathologies - Hypointense	Pathologies - Hyperintense

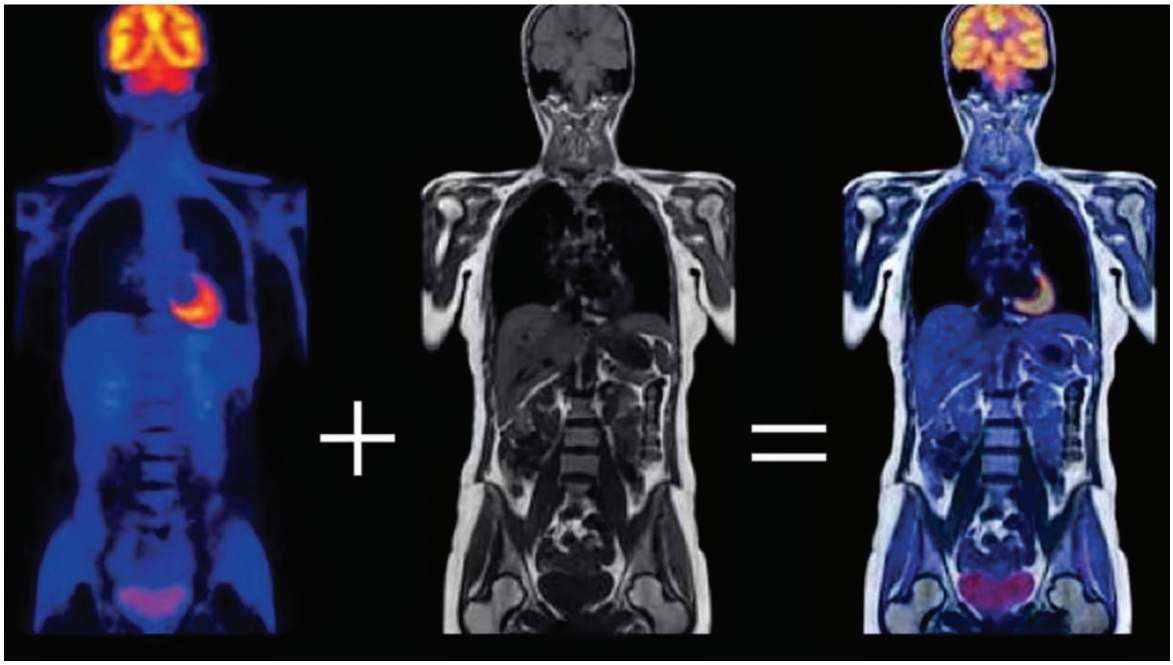
Hyperintense on T1	Hypointense on T1 and T2
• Fat • Subacute blood products • Proteinaceous substances • Melanin • Paramagnetic substances (Gadolinium)	• Cortical bone • Air • Flowing blood in a vessel (Signal void) • Calculi / Ca^{++} • Ligaments, Tendons • Dense fibrous tissues • Hemosiderin (Chronic blood hematoma)

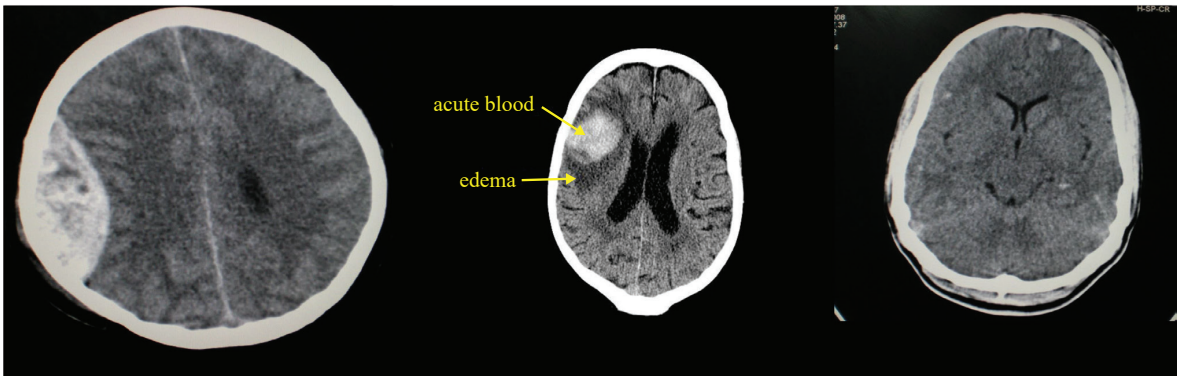



NAA
tCr
Cho
tCr
NAA
Gln
Glx
40
35
30
25
20
15
Chemical shift
PPm
MRS
Chemical composition of tissue of interest
displayed in the form of spectra

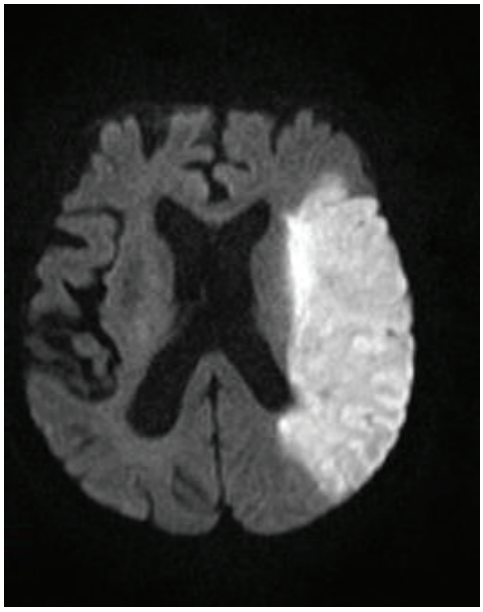


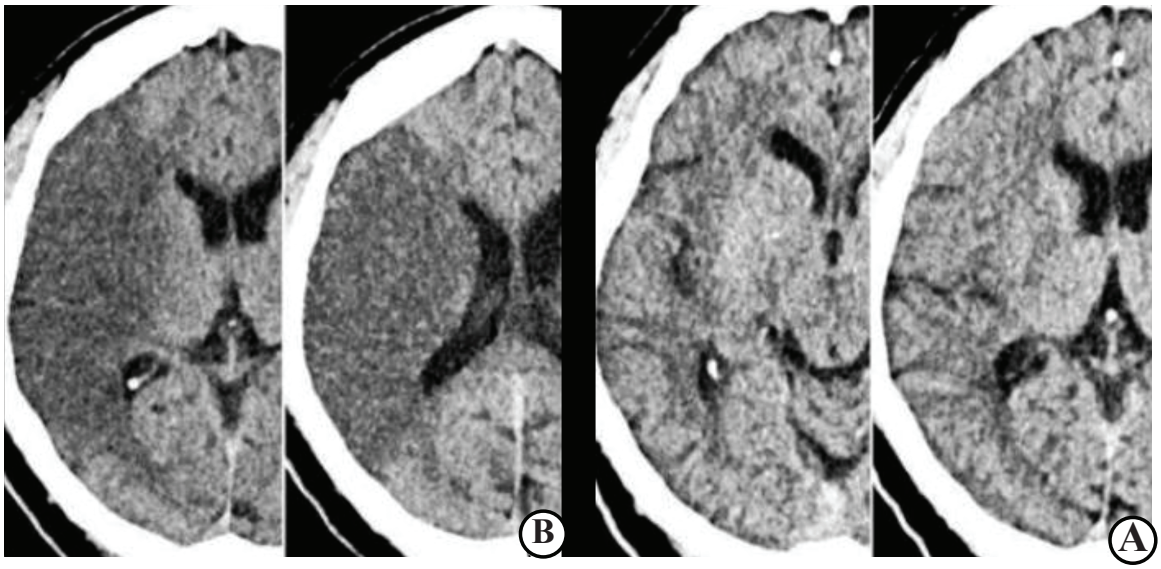


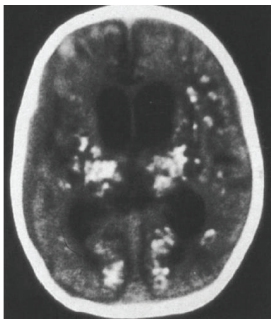


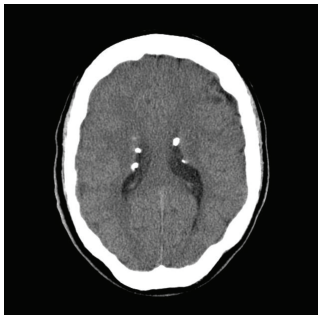

acute blood
edema

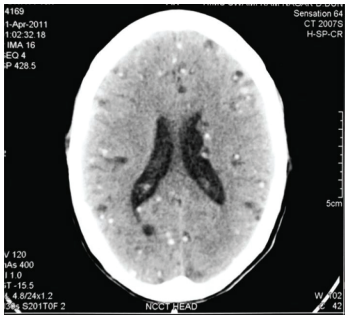

12-May-2008
15:16:24.32
SEQ 4
SP -594.8
H-SP-CR
R
kV 120
mAs 380
TI 1.0
GT -23.5
SL 7.2/1.2
17-FEB-2006
16:49:50.51
SEQ 10
H-SP-CR
R
CECT

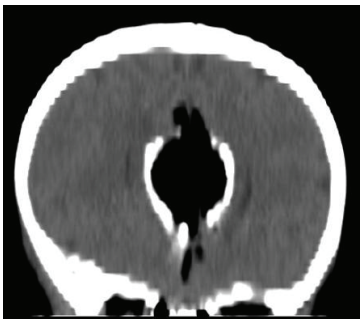


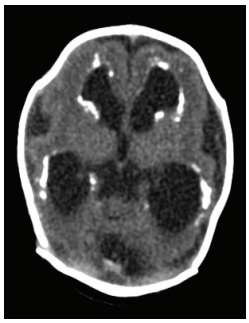

B
A

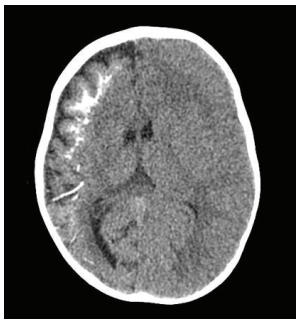


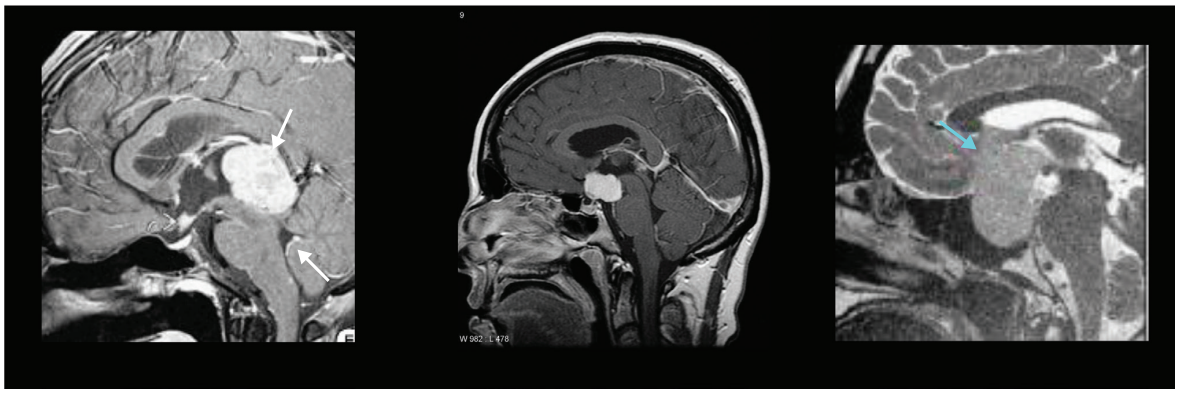


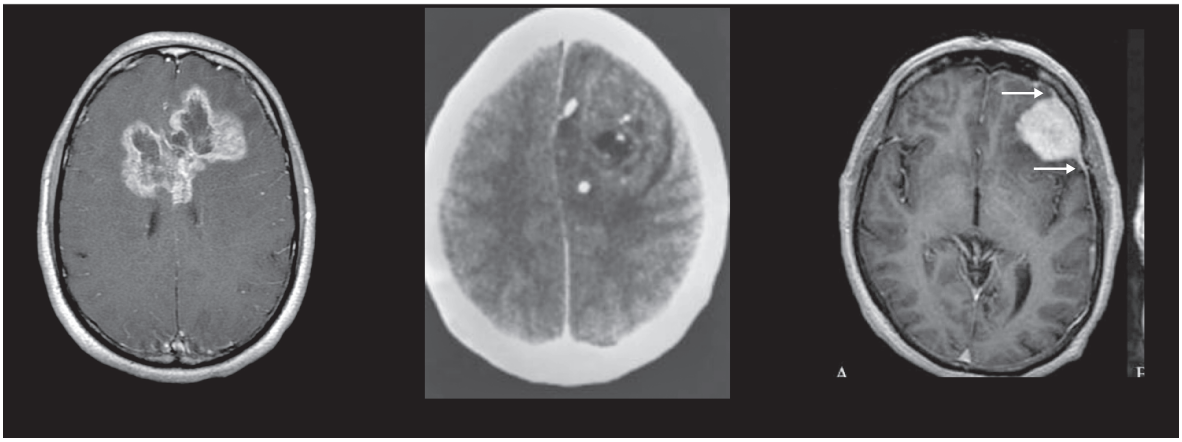

4169
1-Apr-2011
1:02:32.18
IMA 16
EQ 4
P 428.5
Sensation 64
CT 2007S
H-SP-CR
5cm
V 120
As 400
I 1.0
T -15.5
4.8/24x1.2
S20170F 2
NCCT HEAD

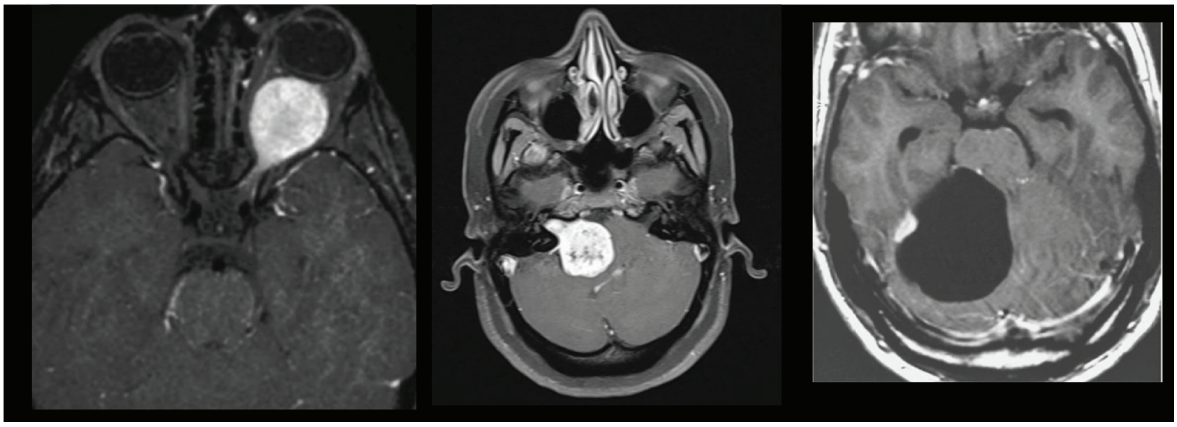


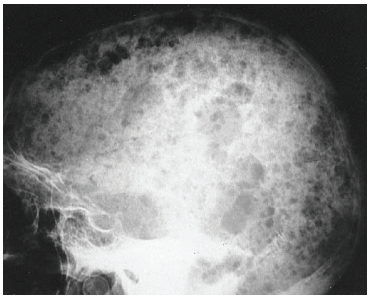


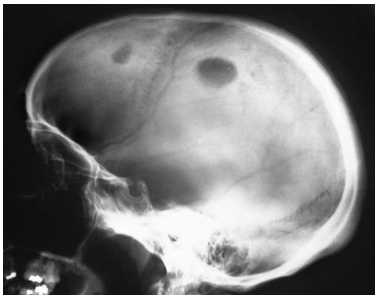


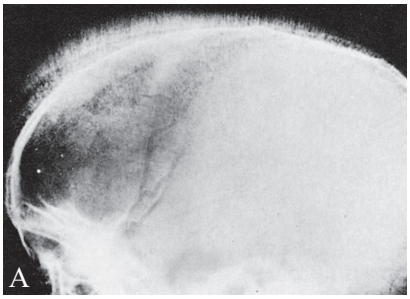








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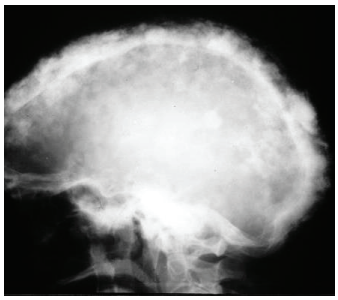
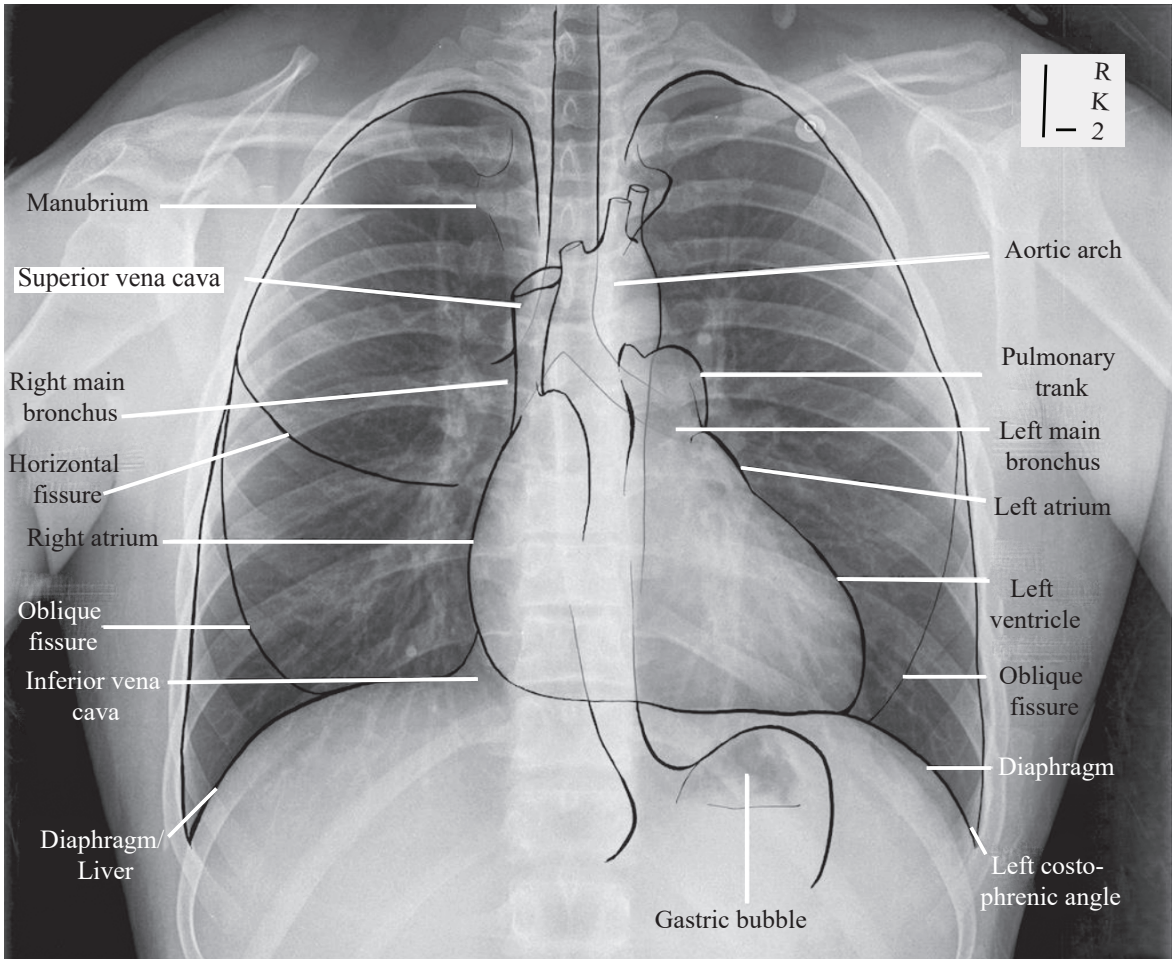
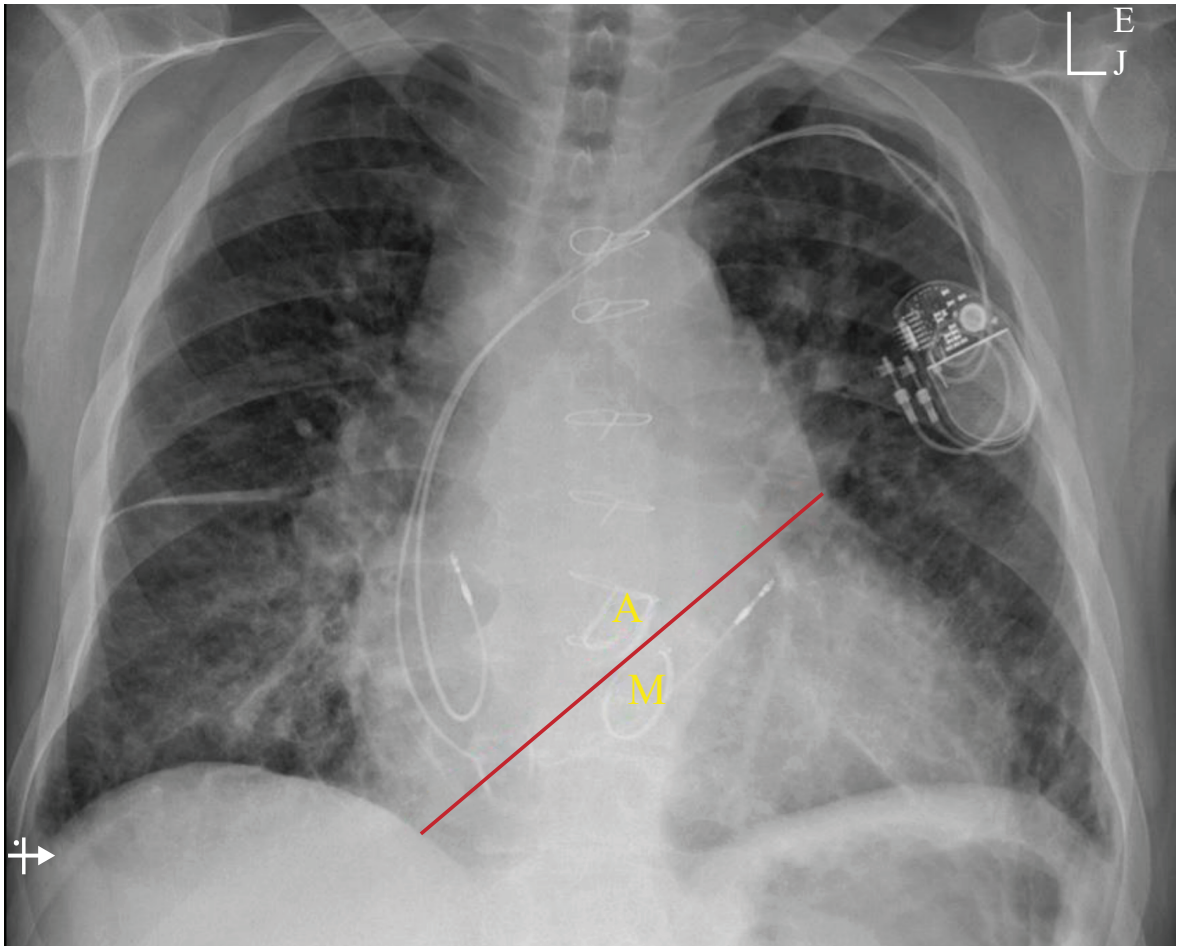
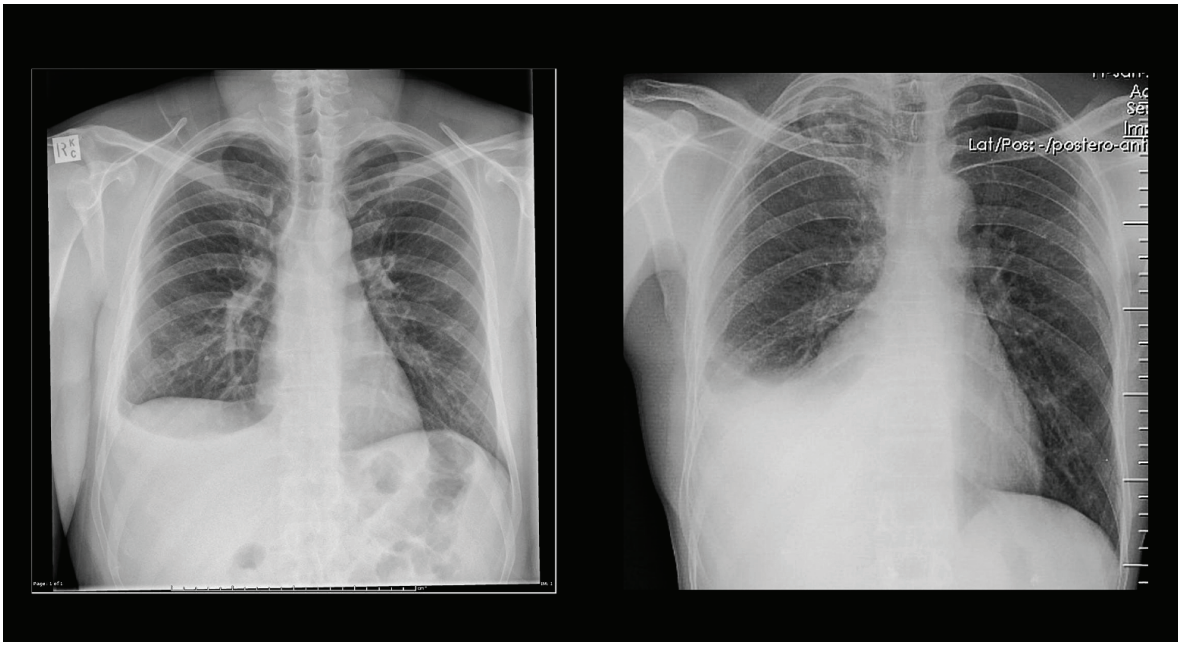
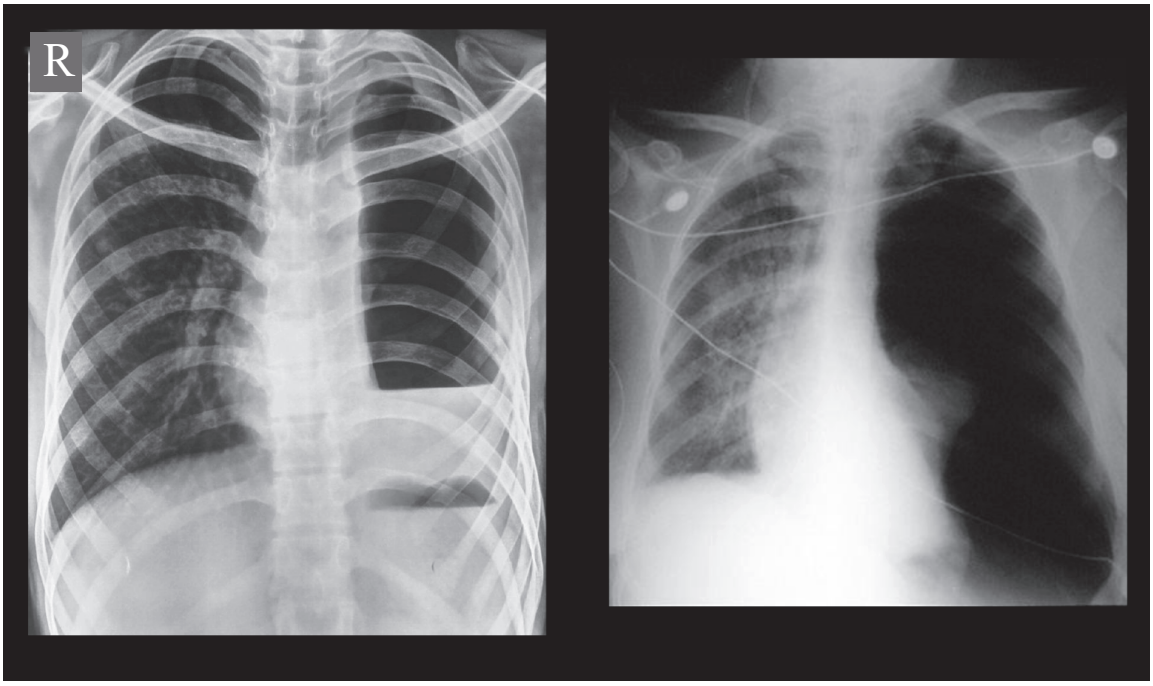


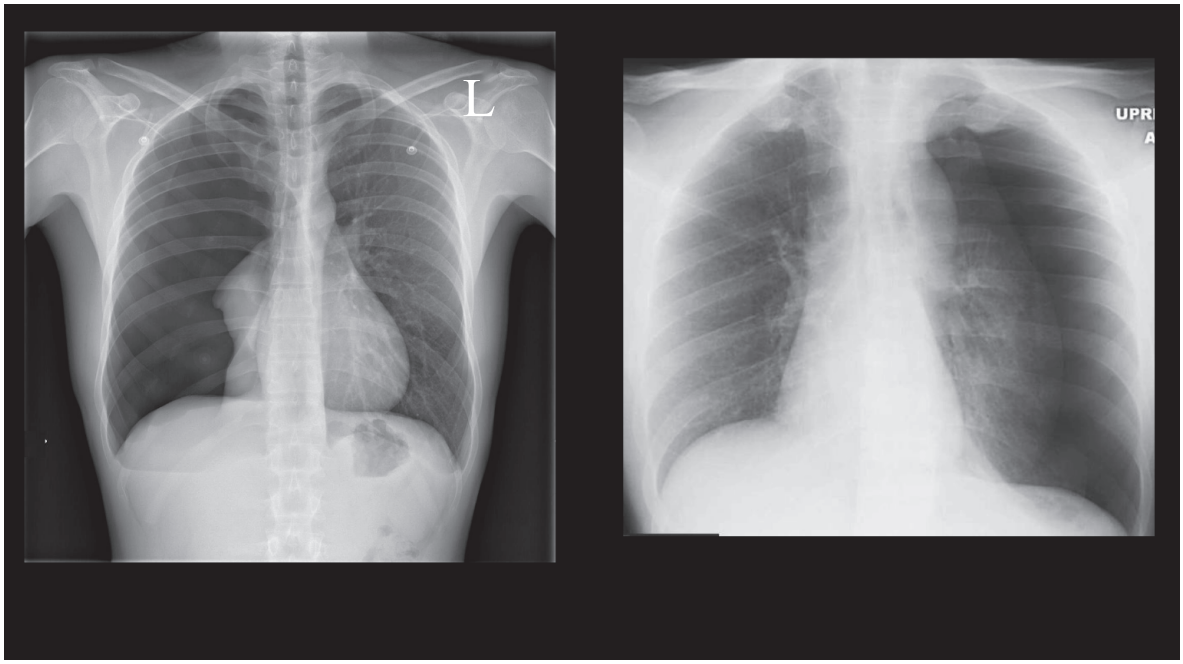

R
K
2
Manubrium
Superior vena cava
Right main bronchus
Horizontal fissure
Right atrium
Oblique fissure
Inferior vena cava
Diaphragm/ Liver
Aortic arch
Pulmonary trank
Left main bronchus
Left atrium
Left ventricle
Oblique fissure
Diaphragm
Left costo-phrenic angle
Gastric bubble

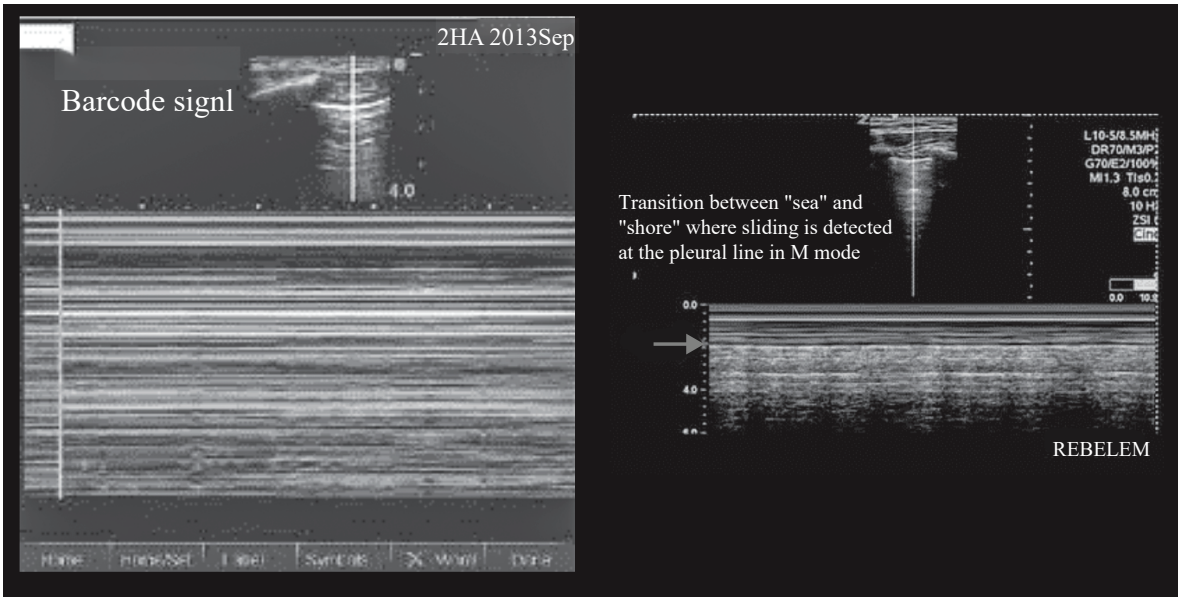

E
J
A
M

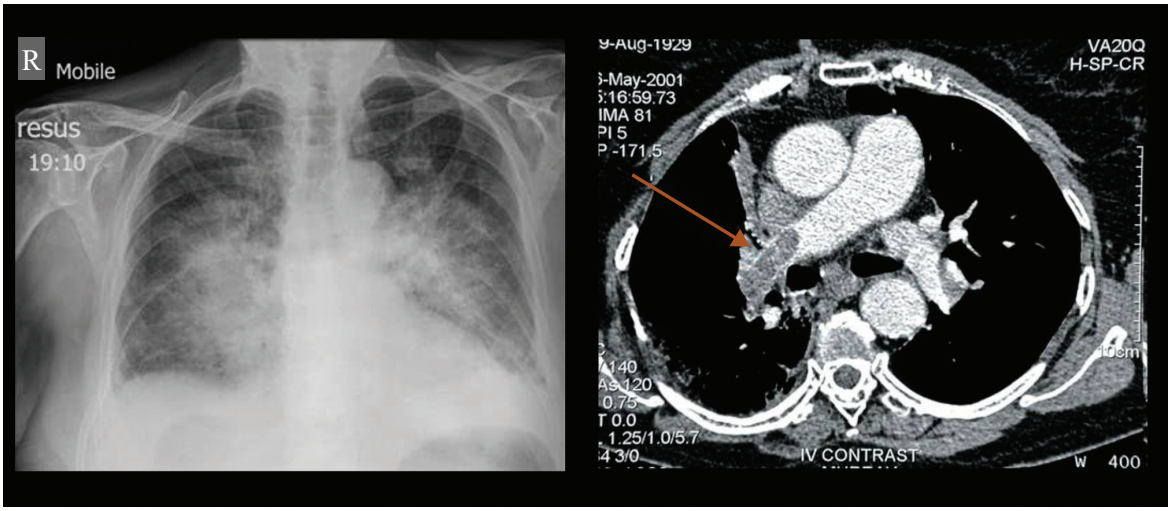

Z57
R
L

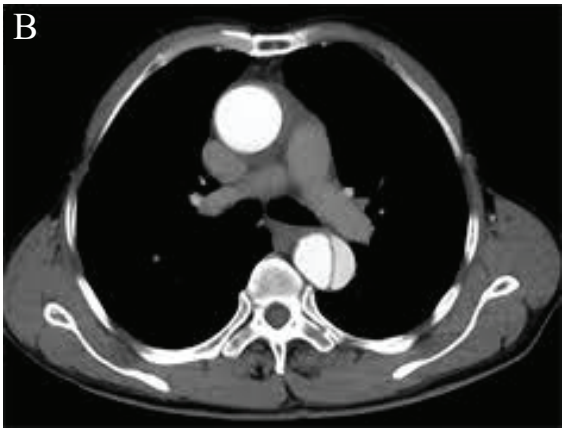

Lat/Pos: -/postero-ant

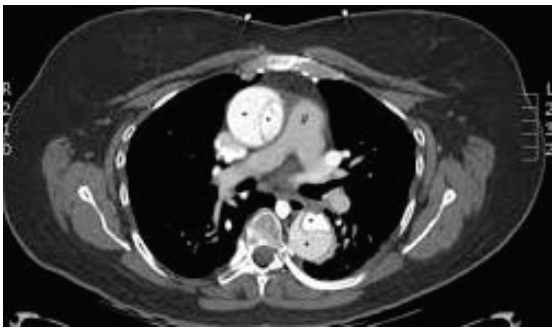

R

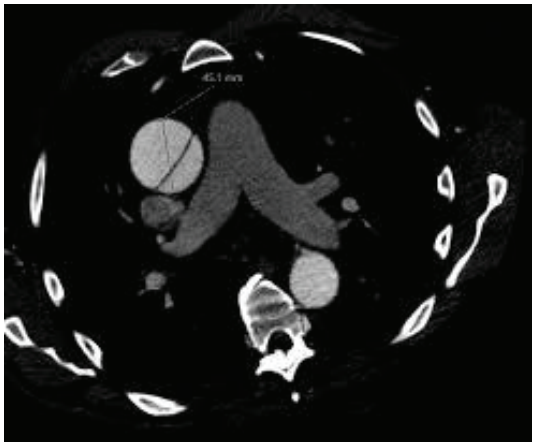

L

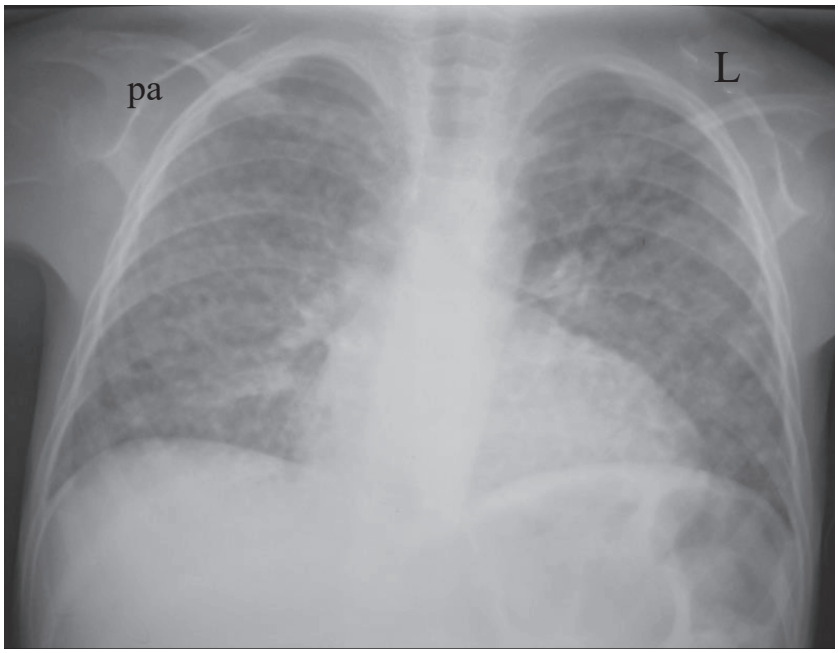

2HA 2013Sep
Barcode signl
4.0
Transition between "sea" and
"shore" where sliding is detected
at the pleural line in M mode
REBELEM

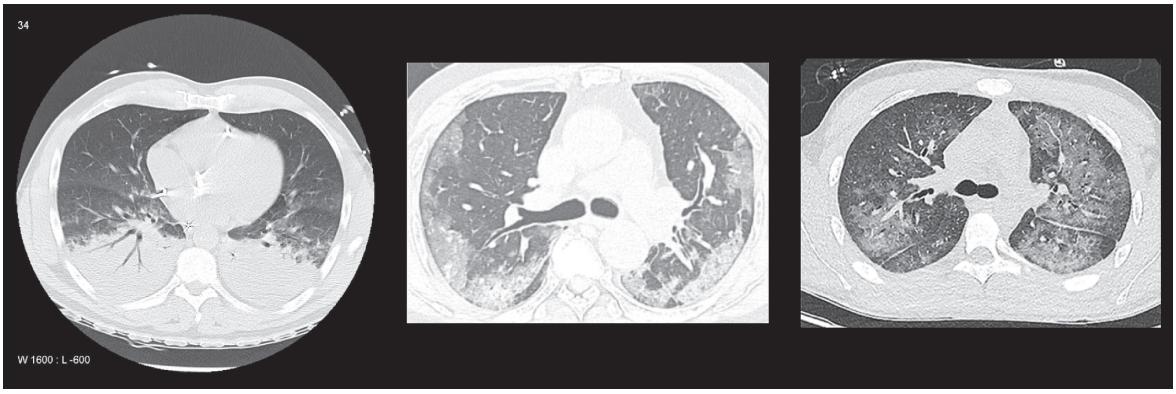

R
Mobile
resus
19:10
VA20Q
H-SP-CR
IV CONTRAST
W 400

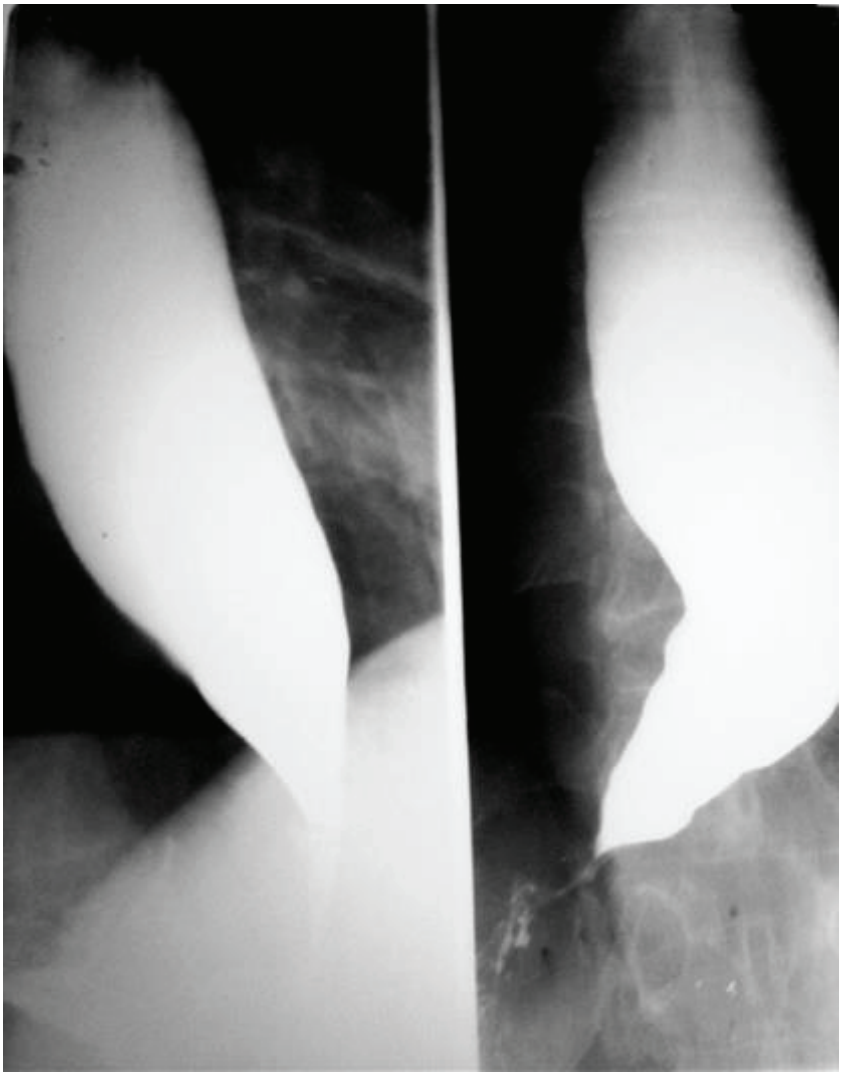

B

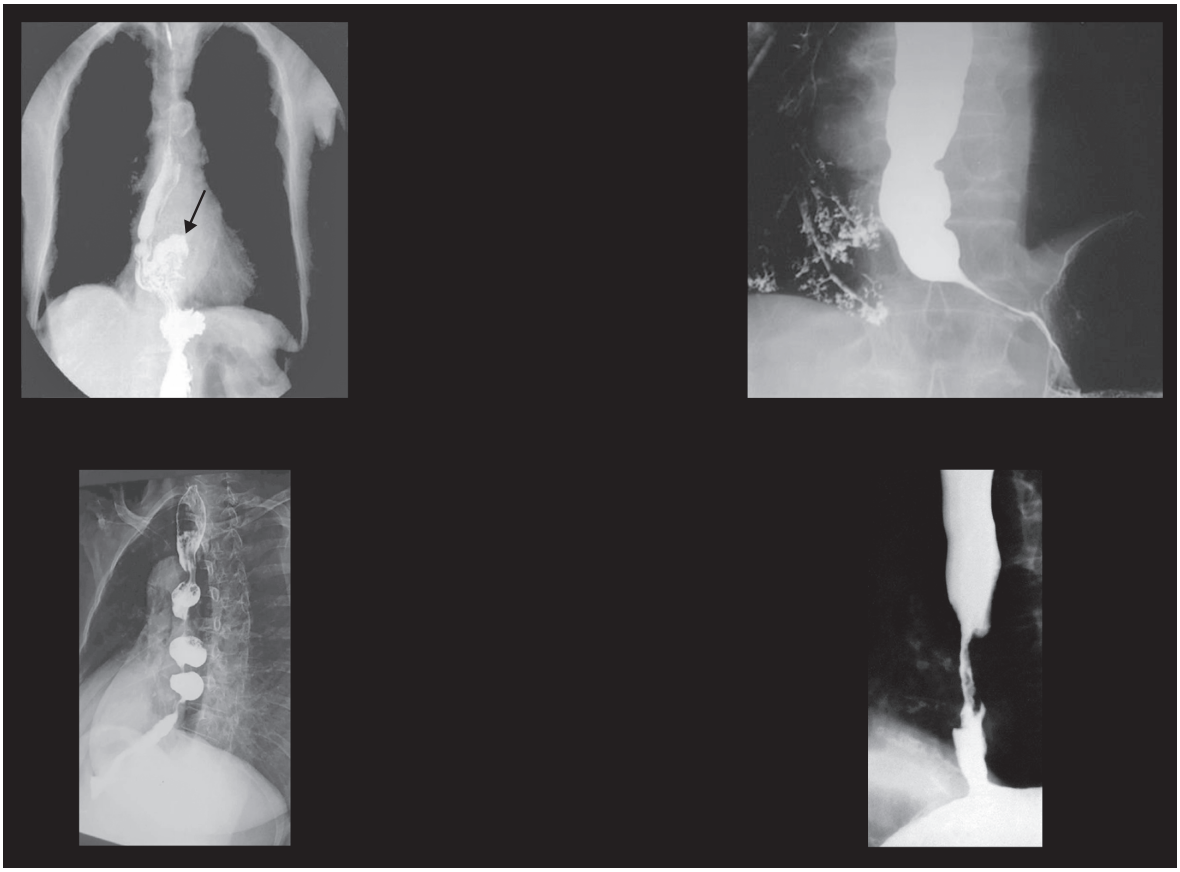


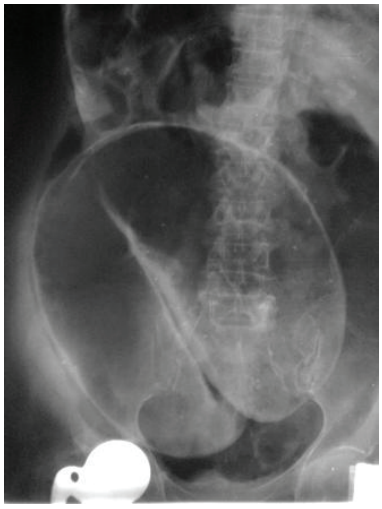


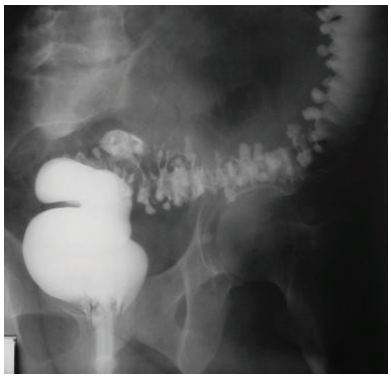

pa
L

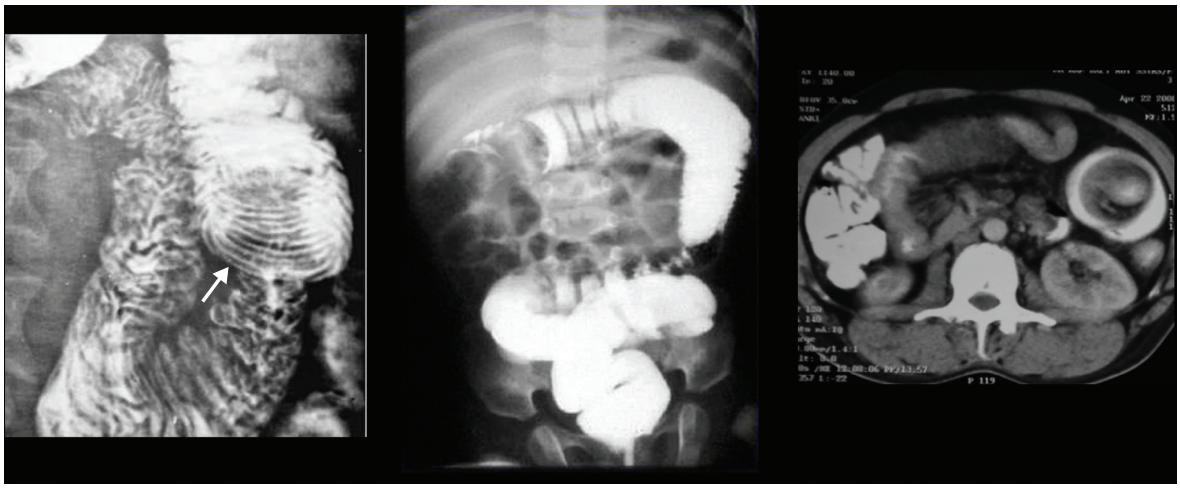

34
W 1600 : L -600

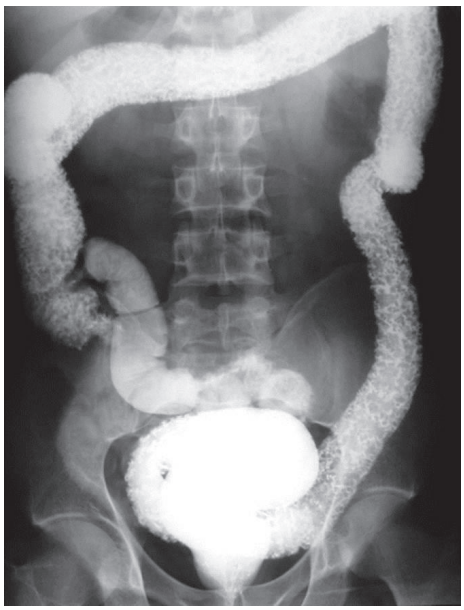


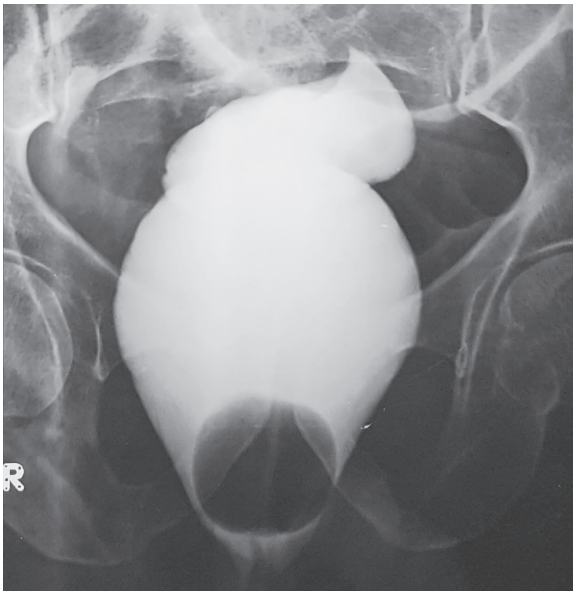


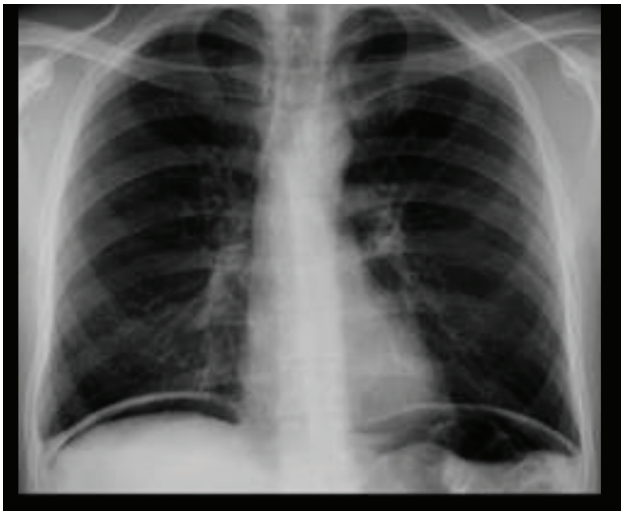


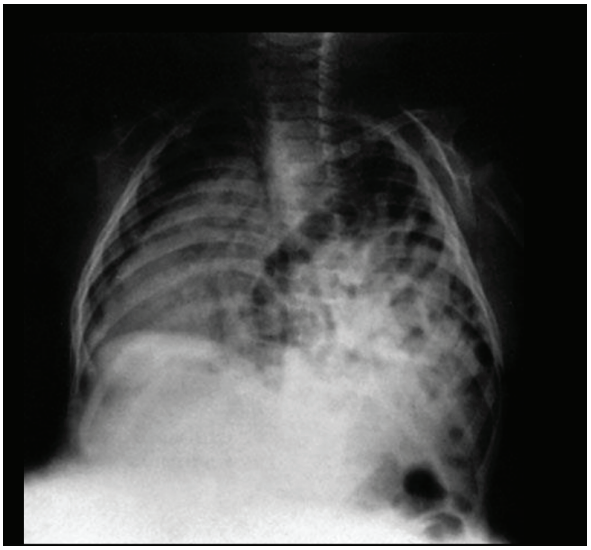


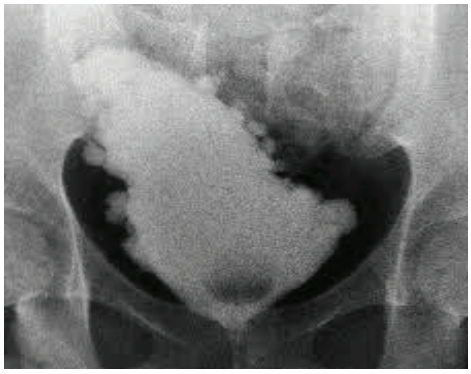


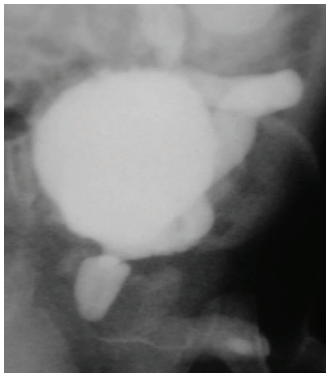


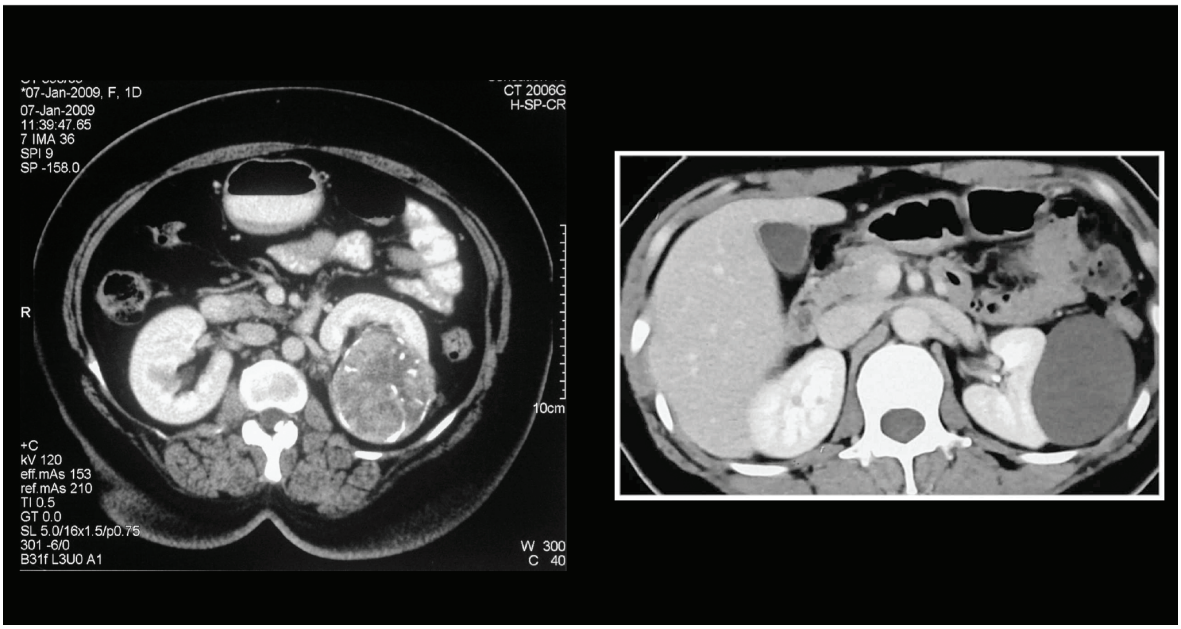











*07-Jan-2009, F, 1D
07-Jan-2009
11:39:47.65
7 IMA 36
SPI 9
SP -158.0
CT 2006G
H-SP-CR
R
10cm
+C
kV 120
eff.mAs 153
ref.mAs 210
TI 0.5
GT 0.0
SL 5.0/16x1.5/p0.75
301 -6/0
B31f L3U0 A1
W 300
C 40

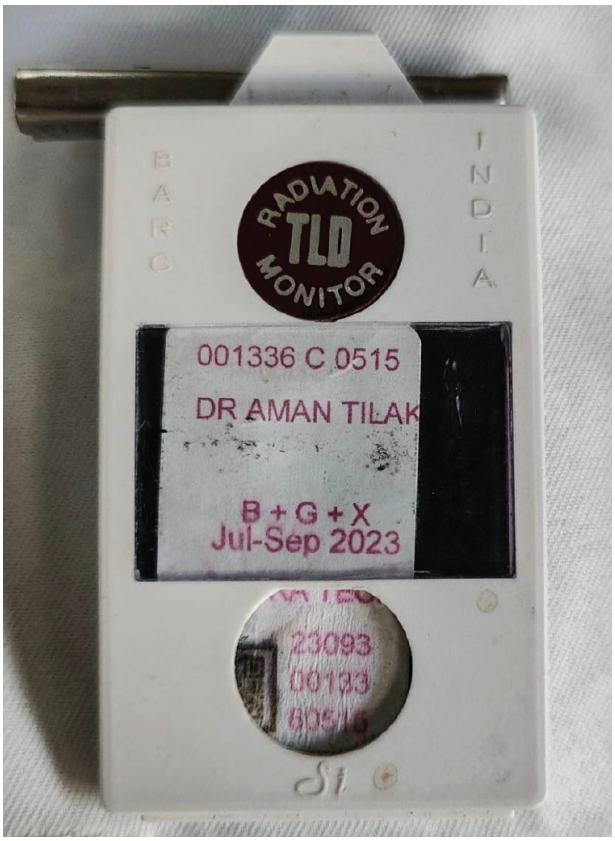
Diagnostic procedure	Dose (msv)
• Chest (single PA film)	0.02
• Mammography	0.2-0.8
• IVU	2.5
• Barium Enema	7
• CT Chest	8
• CT Head	2.3
• CT Abdomen	10
• Bone scan	4

Category	Dose Limit (mSv)
• Patient	50 mSv/Yr
• Occupational worker	100 mSv/5 Yr
• Pregnant patient	5 mSv/term
• Pregnant occupational worker	2 mSv/declared term
• General public	1 mSv/ Yr

Dose	Conventional Unit	SI Unit
Exposure Dose	ROENTGEN (R)	Coulombs/ Kgs
Absorbed Dose	RAD	GRAY
Equivalent Dose	Rem	Sievert
Effective Dose		Sievert
Radio activity	Curie	Becquerel

Dose Limitations

Part of the Body	Occupational Exposure	Public Exposure
Whole body (Effective dose)	20 mSv/year averaged over 5 consecutive years	1 mSv/y
Lens of eyes (Equivalent dose)	150 mSv in a year	15 mSv/y
Skin (Equivalent dose)	500 mSv in a year	50 mSy
Extremities (Hands and Feet) Equivalent dose	500 mSv in a year	—


BARC
INDIA
RADIATION
TLD
MONITOR
001336 C 0515
DR AMAN TILAK
B + G + X
Jul-Sep 2023
23093
00133

MRI Contrast Agent.

HIGH OSMOLAR CONTRAST MEDIA	LOW OSMOLAR CONTRAST MEDIA	NIM	ISO-OSMOLAR CONTRAST MEDIA
E.g.: i) Urograffin's ii) Gastrograffin iii) Diatrizoate	i) Ioxaglate	i) Iohexol (omnipaque) ii) Iopamidol	i) Iodixanol (VISIPAQUE)

- Dianosil
- Conray

} OBSOLETE

Radiosensitivity

	Most	Least
Stage of cell cycle	G2M	S
Organ	Ovary, testis	Vagina > bone > CNS
Tissue	Bone marrow	Nervous tissue
Cell type	**Undifferentiated**, well nourished, divide quickly and are highly **metabolically** active	Quiscent
Blood cell	Lymphocyte	Platelet

Radiosensitivity of Tumors

Highly Sensitive	Least Radiosensitive
Wilms	Hepatoma
Ewings	Osteosarcoma
Lymphoma	Melanoma
Myeloma	Pancreatic Carcinoma
Seminoma	
WELMS	**HOMP**

Half- life

Isotope	Half Life
Tc99	6 hours
I-123	13 hours
I-125	60 days
I-131	8 days
I-132	2.3 hours
P32	14 days
Co60	5.2 years
Ir-192	74 days

NOTES