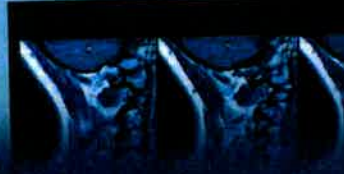
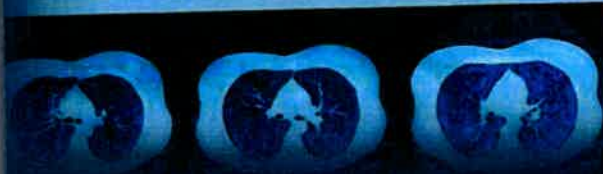


DNB Master Solutions Radiology



Vol. 2



Authored By The Faculty of Conceptual Radiology

Solved DNB Theory Papers (2022 - 25)



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PAPER 3

DNB RADIOLOGY JUNE 2022

1. Child with limp: Imaging evaluation, causes
2. CNS manifestations in HIV: Listing, details of two, imaging
3. Leukocoria in child: Differential, imaging features
4. Salivary gland tumors: Types, imaging findings
5. Subarachnoid hemorrhage: Causes, imaging
6. Skeletal changes on imaging in hemolytic anemia and leukemia
7. Malignant thyroid lesions: Types, imaging features
8. Meniscal tears (knee) on MRI: Findings, MR arthrography
9. Nerve sheath tumors: Types, imaging features
10. Cystic jaw lesions: Types, imaging features

DNB RADIOLOGY DEC 2022

1. Acute severe pancreatitis: Complications and interventional radiology
2. LI-RADS: System, imaging, clinical settings
3. Bosniak criteria for renal cysts: Classification, significance, drawbacks
4. Male infertility: Causes (pre-test, testicular, post-testicular), imaging workup
5. Biliary atresia: Imaging in neonate, differentials
6. Retroperitoneal spaces: Anatomy, imaging approach to masses
7. Hepatic venous outflow obstruction: Etiology, imaging, intervention
8. Pediatric liver mass: Imaging differentials, relevant biochemistry
9. Hirschsprung's disease: Etiology, imaging features, differentials
10. Müllerian duct anomalies: Classification, imaging features

DNB RADIOLOGY JUNE 2023

1. Technique of triple phase CT scan for focal hepatic lesions & findings in hepatocellular carcinoma.
2. Intestinal malrotation – types & radiological findings in midgut volvulus.
3. Indications of 1st trimester ultrasound & assessment of fetal congenital anomalies.
4. Imaging evaluation & differential diagnosis in postmenopausal bleeding.
5. Causes of lower gastrointestinal bleeding & role of imaging and intervention.
6. Imaging modalities for adrenal lesions, CT scan protocol & systematic evaluation.
7. Intrauterine growth restriction – role of ultrasound & Doppler in diagnosis and management.
8. Cross-sectional anatomy of prostate, role of MRI in prostate pathologies & PIRADS.
9. Interventions in the biliary tract & PTBD – indications, contraindications, procedure & complications.
10. Role of imaging in haematuria in a 40-year-old female.

DNB RADIOLOGY DEC 2023

1. Small bowel obstruction.
 2. Morbidly adherent placenta
 3. Imaging of RCC, paraneoplastic syndrome
 4. Imaging evaluation of ca colon and polyps.
-

5. Approach to neonatal jaundice and biliary atresia
6. TIPS
7. Imaging in female infertility
8. Imaging in Primary amenorrhea
9. Renal transplant: Imaging in management and complications
10. Penile doppler in erectile dysfunction.

DNB RADIOLOGY JUNE 2024

1. Technique of CT enterography + enteric & extra-enteric imaging features of Crohn's disease.
2. Risk factors, clinical presentation & imaging features of hypertrophic pyloric stenosis.
3. 50-year-old male with acute epigastric pain – differential diagnoses & brief imaging findings of each.
4. Differential diagnosis of lower end CBD obstruction in adults & their imaging findings.
5. Imaging evaluation of pancreatic adenocarcinoma.
6. Causes of bladder outlet obstruction in adults & imaging evaluation.
7. Role of ultrasound & Doppler in evaluation of twin pregnancy in third trimester.
8. Ovarian-Adnexal Reporting and Data System (O-RADS) – lexicon & risk stratification scoring.
9. Variant morphologies of placenta & imaging findings in abnormal placental adherence.
10. Role of fetal MRI & findings in posterior fossa anomalies.

DNB RADIOLOGY Dec 2024

1. Uterine fibroid (leiomyoma) mapping & interventional radiology
2. MR elastography: principles and clinical applications
3. Radiofrequency coils in MRI; MRI artifacts: types, causes, reduction
4. Hepatic iron quantification; role of post-mortem CT (virtopsy)
5. Principles (2) and applications of Dual-Energy CT (DECT)
6. X-ray tube: diagram, working, radiation protection measures
7. Artificial intelligence in radiology – applications and prospects
8. Contrast-induced nephropathy: risk factors, prevention
9. Interventional embolic agents: types, uses, techniques, complications

DNB RADIOLOGY JUNE 2025

1. Acute mesenteric ischemia: Describe the imaging findings and endovascular management.
2. Gastrointestinal (GI) lymphoma: Discuss imaging features and staging systems.
3. Fetal Growth Restriction (FGR): Describe the ultrasound and Doppler findings.
4. Liver segmental anatomy: Outline the LI-RADS classification.
5. Pediatric abdominal malignancies: Describe any two in detail.
6. Carcinoma cervix: Discuss diagnosis and imaging-based staging.
7. Sonohysterosalpingography (Sono-HSG): Imaging in incompetent cervix (incompetent os).
8. Genitourinary tuberculosis (GU TB): Discuss the imaging features across modalities.
9. Male urethra anatomy: Describe the imaging of pathologies affecting the male urethra.
10. a. Portal biliopathy: Imaging findings and differential diagnosis
b. Primary sclerosing cholangitis (PSC): Imaging features and complications

DNB RADIOLOGY PAPER-3 JUNE 2022

- 1. Renal transplant: Imaging in management and complications**
- 2. Elderly male with micturition difficulty: Imaging approach and modalities**
- 3. Chronic liver disease: Imaging**
- 4. Ectopic pregnancy: Radiological findings**
- 5. Nephrocalcinosis: Causes, imaging**
- 6. Necrotizing enterocolitis: Imaging**
- 7. Genitourinary tuberculosis: Pathophysiology, imaging findings (X-ray, US, CT)**
- 8. Hyperenhancing liver lesions (CT): Types and differentiating features**
- 9. Mesenteric ischemia: Imaging**
- 10. Cystic pancreatic tumors: Imaging findings**

Question-1.

Describe the role of imaging in the management of renal transplant patients.

[10]

Answer 1.

Renal transplantation is the definitive treatment for ESRD. Imaging plays a pivotal role in:

- Baseline graft assessment
- Surveillance for early and delayed complications
- Guidance for interventions (biopsy, drainage, stenting)

Transplant Surgical Anatomy

Feature	Description
Location	Right iliac fossa, extraperitoneal
Arterial anastomosis	End-to-side with external iliac artery
Venous anastomosis	End-to-side with external iliac vein
Ureteric anastomosis	Ureteroneocystostomy with submucosal tunnel (to prevent VUR)

Timing of Complications

Early (<4 weeks)	Delayed (>4 weeks)
ATN, acute rejection, hematoma, abscess, urinoma, vascular thrombosis, ureteric obstruction	Chronic rejection, drug toxicity, lymphocele, chronic obstruction, infection, neoplasms (e.g., PTLN, RCC)

System	Complications
Parenchymal	ATN, acute rejection, chronic allograft nephropathy, infections
Perinephric	Lymphocele, hematoma, abscess
Vascular	RAS, arterial/venous thrombosis, AVF, pseudoaneurysm
Urologic	Urinoma, VUR, ureteral stricture/leak, bladder dysfunction
Infective	Pyelonephritis, BK virus, CMV, fungal abscesses

Modalities And Indications

Modality	Role
USG + Color Doppler	First-line; evaluates parenchyma, vessels, fluid collections
CEUS	Enhances vascular and parenchymal evaluation, esp. in Doppler limitations
CT / CTA / DECT	Detailed vascular anatomy, fluid characterization, tumors, complex infections
MRI / MRA / DWI	Vascular + parenchymal assessment, functional MRI (DWI, BOLD), no radiation
Nuclear Scan (DTPA, DMSA)	Perfusion/function assessment, ATN vs rejection
Angiography (DSA)	Gold standard for vascular stenosis, allows intervention
Plain radiograph	Stones, air, calcifications, catheter placement
Cystography	VUR, bladder leaks

ULTRASOUND WITH DOPPLER

A. Gray-scale

- Kidney size, echogenicity, corticomedullary differentiation
- Fluid collections (hematoma, urinoma, lymphocele)
- Hydronephrosis (ureteric stenosis or compression)

B. Color and Spectral Doppler

Parameter	Normal Value	Abnormal
PSV (renal artery)	<180 cm/s	>180 cm/s → stenosis
Resistive Index (RI)	<0.8	>0.8 → rejection, ATN, obstruction
Acceleration Time (AT)	<0.07 s	>0.07 s → stenosis
Tardus-parvus waveform	Absent	Present in proximal stenosis

CONTRAST-ENHANCED ULTRASOUND (CEUS)

- Microbubble contrast (e.g., Sonovue, Lumason)
- Visualizes microvascular perfusion
- Differentiates infarction vs rejection vs ATN
- Useful in:
 - Low acoustic windows (obese)
 - Avoiding nephrotoxic contrast in CT/MRI

COMPUTED TOMOGRAPHY (CT / CTA / DECT)

A. Conventional CT

- Parenchymal enhancement, infarcts, abscesses
- Fluid collection characterization:
 - Hematoma: 55–66 HU
 - Lymphocele: 10–20 HU
 - Abscess: 20–30 HU

B. CT Angiography

- Visualizes **arterial and venous anatomy**
- Evaluates stenosis, thrombosis, pseudoaneurysm
- **Volume rendering / MIP** improves visualization

C. Dual-Energy CT (DECT)

- Differentiates:
 - Cyst vs enhancing lesion
 - Uric acid vs calcium stones

MAGNETIC RESONANCE IMAGING (MRI)**A. Indications**

- Functional imaging (in CKD to avoid iodinated contrast)
- Parenchymal evaluation (infection, tumor, rejection)
- MR urography and angiography

B. Sequences

Sequence	Utility
T1/T2 SSFP	Graft anatomy, fluid
3D MRA (with or without gadolinium)	Arterial stenosis, dissection
DWI	Parenchymal integrity, early rejection
BOLD	Oxygenation (hypoxia in rejection vs ATN)
31P-MRS	ATP/PI ratio predicts graft survival

Gadolinium caution in GFR <30 (NSF risk) 5

NUCLEAR MEDICINE

Radiotracer	Utility
99mTc-DTPA	Perfusion & GFR (ATN vs rejection)
99mTc-DMSA	Cortical scarring, morphology
Gallium-67 / In-111 WBC	Infection detection
ACE-inhibitor renogram	Rarely used, for suspected RAS

ANGIOGRAPHY (DSA)

- Indications:
 - Renal artery stenosis
 - Pseudoaneurysm
 - AVF
- Can be diagnostic and therapeutic (angioplasty ± stenting)
- “Pruned tree” appearance in acute rejection

COMMON COMPLICATIONS AND THEIR IMAGING

Complication	Imaging Findings	Modality of Choice
RAS	PSV > 180 cm/s, Tardus-parvus	Doppler, CTA, MRA
Artery/vein thrombosis	Absent flow	Doppler, CTA
Pseudoaneurysm	Yin-yang sign	Doppler, CTA, DSA
AVF	High velocity turbulent flow	Doppler, DSA
ATN	Enlarged graft, normal RI, ↑Na+	DTPA, Doppler
Acute rejection	↑RI, ↓perfusion, indistinct CMD	Doppler, CEUS, DWI
Chronic rejection	Shrunk graft, cortical thinning	USG, MRI
Drug toxicity	Similar to chronic rejection	MRI, biopsy
Infection/abscess	Complex cystic lesion	USG, CT
PTLD / lymphoma	Mass, LAD, infiltrative lesions	CT, MRI
Lymphocele	Anechoic collection near graft	USG
Urinoma	Collection with ↑creatinine	USG + aspiration
Hematoma	Echogenic or complex mass	USG, CT
Ureteric stricture	Hydronephrosis, abrupt tapering	USG, CT urogram, antegrade study

INTERVENTIONAL RADIOLOGY IN RENAL TRANSPLANT

Procedure	Indications
Nephrostomy	Obstruction, leak
Balloon angioplasty ± stent	RAS, ureteric stricture
Percutaneous abscess drainage	Abscess, infected lymphocele
Coil embolization	AVF, pseudoaneurysm
Sclerotherapy	Lymphocele
USG-guided biopsy	Graft dysfunction (gold standard for rejection)

Question-2.

A 76-year-old male presents with difficulty in micturition. What will be your approach to image this patient? What is the role of different modalities in such a case? [6+4]

Answer 2.

Difficulty in micturition in an elderly male most often suggests lower urinary tract obstruction, commonly due to benign prostatic hyperplasia (BPH), but may also be due to bladder outlet obstruction from malignancy, urethral stricture, neurogenic bladder, or detrusor underactivity.

Imaging aims to:

- Confirm the cause
- Assess severity and complications
- Aid in treatment planning

Stepwise Imaging Approach

Step	Modality	Purpose	First-line?
1	Ultrasound (US)	Assess bladder, prostate size, residual urine, upper tracts	Yes
2	Transrectal Ultrasound (TRUS)	Detailed prostate anatomy, guide biopsy if needed	Conditional
3	MRI Prostate	Local staging if malignancy suspected	No (problem-solving)
4	CT (abdomen & pelvis)	Evaluate complications, exclude alternate pathology	Problem-solving
5	Micturating Cystourethrogram (MCU)	Functional urethral/bladder neck assessment	Conditional
6	Urodynamic studies	Physiological assessment	Non-imaging adjunct

Role of Different Modalities

Modality	Role	Advantages	Limitations
Transabdominal US	- Measure prostate volume - Assess bladder wall thickness - Detect post-void residual urine - Evaluate hydronephrosis	Non-invasive, no radiation, widely available	Operator dependent, limited in obese patients
TRUS	- Accurate prostate volume - Zonal anatomy - Guide prostate biopsy	High-resolution for prostate	Invasive, patient discomfort
MRI Prostate (mpMRI)	- Detect/stage prostate cancer - PI-RADS scoring	Excellent soft tissue contrast, non-ionizing	Costly, not first-line for LUTS
CT Abdomen/Pelvis	- Evaluate upper tract complications - Detect pelvic masses	Widely available, quick	Radiation, limited soft tissue differentiation for prostate
MCU / Retrograde urethrogram	Detect urethral stricture, bladder neck obstruction	Functional & anatomical detail	Invasive, contrast/radiation exposure
Nuclear Renal Scan	Assess differential renal function, obstruction	Quantitative	Limited anatomical detail

Typical Imaging Findings in Common Etiologies

Etiology	Imaging Clues
BPH	Enlarged prostate (>30 cc), median lobe protrusion into bladder, trabeculated bladder wall
Prostate carcinoma	Asymmetry, focal hypoechoic lesion on TRUS, PIRADS ≥ 3 lesion on MRI
Bladder outlet obstruction	Large post-void residual (>100 mL), thickened bladder wall (>3 mm)
Urethral stricture	Narrowing on MCU/RGU
Neurogenic bladder	Large-capacity bladder, diverticula, residual urine

Question-3.

Role of Imaging in Chronic Liver Disease (CLD)

Answer 3.

- Chronic liver disease (CLD) includes a spectrum from **fibrosis** $\rightarrow$ **cirrhosis** $\rightarrow$ **complications** such as portal hypertension and hepatocellular carcinoma (HCC).

- Imaging plays a role in **diagnosis, staging, surveillance, and complication assessment**.
- Choice of modality depends on **clinical context and local availability**.

Imaging Modalities in CLD

Modality	Primary Role	Strengths	Limitations
US (B-mode + Doppler)	First-line screening; assess morphology, vascular flow, ascites	Cheap, available, no radiation	Operator-dependent, limited in obesity/gas
CT (Multiphasic)	Lesion characterization, staging, complications	High spatial resolution, fast	Radiation, contrast risk
MRI ($\pm$ Elastography)	Best soft-tissue contrast, lesion characterization, fibrosis quantification	Multiparametric, liver-specific contrast	Cost, availability, contraindications
Elastography	Quantitative fibrosis staging	Non-invasive	Influenced by inflammation, cholestasis
EUS	Varices, guided biopsy	High detail for varices	Invasive
Nuclear Medicine	Functional imaging (biliary flow, RES function)	Physiologic info	Low spatial resolution

2. Role of Individual Modalities

A. Ultrasound (First-line)

- **Morphology:** size, contour, nodularity, echotexture
- **Cirrhosis signs:** coarse echotexture, nodular surface, atrophic right lobe, caudate hypertrophy
- **Ascites detection**
- **Portal hypertension:** Doppler for portal vein diameter (>13 mm), hepatofugal flow, collaterals
- **HCC surveillance:** 6-monthly US $\pm$ AFP

B. CT

- **Multiphasic protocol:**
 - Arterial phase $\rightarrow$ detects hypervascular lesions (HCC)
 - Portal venous phase $\rightarrow$ washout assessment
 - Delayed phase $\rightarrow$ capsule detection
- **Portal hypertension:** varices, splenomegaly, shunts
- **Complications:** infarcts, abscess, biliary obstruction

C. MRI

- **Morphology:** nodular surface, altered lobe volumes
- **MR Elastography:** gold standard non-invasive fibrosis quantification
- **Liver-specific contrast:** improves detection of small lesions
- **HCC:** arterial enhancement + portal/delayed washout + capsule
- **Iron quantification:** T2*/R2 mapping for hemochromatosis
- **DWI:** detects small or infiltrative lesions

D. Elastography (US or MR)

- **Transient Elastography (FibroScan):** quantitative stiffness (kPa)

- **pSWE, 2D-SWE:** real-time, US-based
- **MR Elastography:** more accurate, maps entire liver

E. Endoscopic Ultrasound (EUS)

- **Varices:** high-resolution detection of gastric/esophageal varices
- **Portal hypertension:** assess PV/SV, collaterals
- **Guided biopsy:** FNA of focal lesions

F. Nuclear Medicine

- **Hepatobiliary scintigraphy:** bile flow, leaks, obstruction
- **Liver-spleen scintigraphy:** RES function, cirrhosis, PH
- **PET-CT:** selected cases (e.g., cholangiocarcinoma, metastatic work-up)

Imaging Findings in CLD

Feature	Imaging Modality	Typical Appearance
Fibrosis / Cirrhosis	US, MRI	Coarse echotexture, nodular contour, caudate lobe hypertrophy
Portal Hypertension	Doppler US, CT, MRI	PV diameter >13 mm, hepatofugal flow, varices, splenomegaly
Ascites	US	Anechoic free fluid in peritoneum
HCC	US, CT, MRI	Arterial hyperenhancement + washout in portal/delayed phase
Iron overload	MRI	Low T2* signal, quantitative iron mapping
Biliary obstruction	US, CT, MRCP	Ductal dilatation ± cause

Question-4.

Discuss radiological imaging findings in ectopic pregnancy

[10]

Answer 4.

- **Definition:** Implantation of a fertilized ovum outside the endometrial cavity, most commonly in the fallopian tube (ampullary segment in ~70%).
- **Importance of Imaging:**
 - Early diagnosis reduces morbidity and mortality.
 - Prevents tubal rupture and massive hemoperitoneum.
 - Guides management (medical vs surgical).
- First-line modality: **Transvaginal Ultrasound (TVUS)** combined with serum β -hCG.

1. Transvaginal Ultrasound (TVUS)

Role:

- Primary and most sensitive imaging modality for early ectopic pregnancy.
- High-frequency probe allows detailed visualization of uterus, adnexa, and cul-de-sac.

Findings:

Finding	Description	Significance
Absence of Intrauterine Pregnancy (IUP)	No gestational sac in uterus when β -hCG is above discriminatory zone (~1500–2000 mIU/mL)	Suggestive of ectopic pregnancy
Adnexal Mass	Extraovarian, solid/cystic or complex mass adjacent to uterus	Highly suggestive
Tubal Ring Sign	Hyperechoic thick wall surrounding a hypoechoic centre (gestational sac)	Classic sign of tubal pregnancy
Live Extrauterine Embryo	Gestational sac with yolk sac $\pm$ fetal pole $\pm$ cardiac activity outside uterus	Definitive diagnosis
Free Fluid in Pelvis	Anechoic or echogenic fluid in pouch of Douglas or Morrison's pouch	Echogenic fluid indicates hemoperitoneum from rupture
Pseudogestational Sac	Central intrauterine fluid collection lacking double decidual sac sign	Pitfall — may mimic IUP

Doppler Findings:

- **Ring of Fire sign:** Increased peripheral vascularity around ectopic sac on color Doppler (non-specific; can also be seen in corpus luteum cyst).

2. Transabdominal Ultrasound (TAS)**Role:**

- Complementary to TVUS, especially when TVUS is inconclusive or in unstable patients.
- Lower resolution but wider field of view.

Findings:

- Large pelvic/abdominal fluid collections.
- Large adnexal masses.
- Overview of pelvic organs when bowel gas or large uterus limits TVUS.

3. Magnetic Resonance Imaging (MRI)**Role:**

- Not first-line; used for problem solving when US is equivocal.
- Excellent for evaluating unusual implantation sites (interstitial, cervical, ovarian, abdominal, scar ectopic).

MRI Features:

Sequence	Findings
T2-weighted	Gestational sac appears hyperintense; thick hypointense wall; surrounding adnexal anatomy well seen
T1-weighted	Hyperintense hemorrhage in sac or pelvis
Post-contrast	Enhancement of ectopic wall; helps delineate vessels and hemorrhage
Advantages	High tissue contrast, multiplanar imaging, no radiation

4. Computed Tomography (CT)

Role:

- Not recommended for primary diagnosis (radiation + low sensitivity for early gestation).
- May detect ectopic pregnancy incidentally in patients scanned for acute abdominal pain.

Findings:

- Adnexal mass $\pm$ hematoma.
- High-attenuation free fluid (hemoperitoneum).
- Occasionally visualizes gestational sac outside uterus.

Correlation of Imaging with Clinical & Laboratory Data

- **β -hCG discriminatory zone:** Above this level, absence of IUP on TVUS strongly suggests ectopic pregnancy.
- **Serial β -hCG:** Normally doubles every ~48 hrs in viable IUP; plateau or slow rise suggests abnormal pregnancy (ectopic or failing IUP).

Common Sites of Ectopic Pregnancy & Imaging Clues

Site	Frequency	Imaging Clues
Ampullary tube	~70%	Tubal ring sign, adnexal mass adjacent to ovary
Isthmic tube	12%	Smaller sac, earlier rupture
Fimbrial	11%	Extraovarian mass near fimbrial end
Interstitial (cornual)	2–4%	Eccentric sac surrounded by <5 mm myometrium; interstitial line sign
Ovarian	<1%	Gestational sac within ovary, contiguous ovarian tissue
Cervical	<1%	Sac within cervical canal; ballooned cervical canal
Cesarean scar	Increasing	Sac embedded at scar site; thinned myometrium anteriorly

Pitfalls & Mimics

- Corpus luteum cyst (can mimic tubal ring; differentiate via location within ovary, thicker echogenic rim).
- Early IUP before visible on US.
- Pseudogestational sac (central, single layer decidua vs peripheral double decidual sac in true IUP).

Question-5.

What are the causes of nephrocalcinosis? Describe in brief their imaging findings.

[5+5]

Answer 5.

- **Nephrocalcinosis:** Deposition of calcium salts (calcium phosphate or calcium oxalate) in the renal parenchyma.
- **Types:**
 - **Medullary nephrocalcinosis** – most common; deposition in renal pyramids.
 - **Cortical nephrocalcinosis** – rare; deposition in cortex.

- **Main causes:** Disorders causing hypercalcemia, hypercalciuria, or tubular injury.

Causes & Imaging Correlation Table

Cause	Mechanism	Ultrasound	CT	X-ray / IVP
1. Hyper-parathyroidism	$\uparrow$ PTH $\rightarrow$ $\uparrow$ Ca reabsorption from bone $\rightarrow$ hypercalcemia, hypercalciuria	Echogenic pyramids or cortex	Bilateral diffuse punctate calcifications (medullary)	Medullary calcifications
2. Medullary Sponge Kidney (MSK)	Congenital cystic dilatation of collecting ducts	Echogenic medullary pyramids $\pm$ shadowing	"Paintbrush-like" medullary calcifications (clustered in papillae)	IVP: Linear striations/clusters of contrast in papillae
3. Renal Tubular Acidosis (Type 1 – distal)	Impaired acid secretion $\rightarrow$ alkaline urine $\rightarrow$ Ca phosphate precipitation	Echogenic medulla	Punctate/linear medullary calcifications	–
4. Primary Hyperoxaluria	$\uparrow$ Oxalate production $\rightarrow$ Ca oxalate deposition in cortex & medulla	Highly echogenic parenchyma $\pm$ shadowing	Dense cortical + medullary calcifications	–
5. Chronic Hypercalcemia (e.g., Vit D intoxication, sarcoidosis, milk-alkali)	Persistent $\uparrow$ Ca $\rightarrow$ deposition in medulla	Echogenic pyramids	Diffuse medullary calcifications	Medullary punctate calcifications
6. Sarcoidosis	Granulomatous disease with $\uparrow$ Vit D activation $\rightarrow$ hypercalcemia	Echogenic renal parenchyma	Diffuse/nodular medullary calcifications	–
7. Dent Disease	X-linked $\rightarrow$ hypercalciuria, nephrocalcinosis	Echogenic foci in medulla	Focal/diffuse medullary calcifications	–
8. Idiopathic Hypercalciuria	Unknown cause of $\uparrow$ Ca in urine	Echogenic medulla	Punctate/linear calcifications in pyramids	–

Imaging Patterns of Nephrocalcinosis

Pattern	Typical Causes	Key Imaging Clues
Medullary (most common)	Hyperparathyroidism, MSK, RTA, idiopathic hypercalciuria	Calcifications confined to pyramids; "paintbrush" pattern in MSK
Cortical (rare)	Chronic GN, cortical necrosis, oxalosis	Rim-like or punctate cortical calcifications
Mixed	Hyperoxaluria, advanced nephrocalcinosis	Calcifications in both cortex and medulla

Question-6.

Imaging of Necrotizing Enterocolitis

Answer 6.

NEC is primarily a radiographic diagnosis supported by clinical findings, but ultrasound and occasionally CT add important complementary information. Imaging not only establishes the diagnosis but also monitors progression and guides surgical decision-making.

1. Abdominal Radiography (Mainstay Investigation)

Views:

- **Supine:** Routine baseline view; best for general bowel gas pattern, bowel wall changes, and portal venous gas.
- **Left lateral decubitus / cross-table lateral:** More sensitive for pneumoperitoneum than supine; free air will layer anteriorly.
- **Upright:** Limited in neonates but may reveal subdiaphragmatic air.

Radiographic Findings:

A. Pneumatosis Intestinalis (*pathognomonic for NEC*)

- Represents **intramural gas** in the submucosa or subserosa from bacterial translocation and gas production.
- **Appearance:**
 - **Linear form:** Continuous or discontinuous thin radiolucent lines paralleling the bowel wall contour.
 - **Bubbly form:** Clustered, round, or mottled radiolucencies within bowel wall.
- **Distribution:** Often segmental; commonly in terminal ileum and proximal colon.
- **Pitfall:** Mucosal folds or stool can mimic bubbly pneumatosis; confirm with serial films.

B. Portal Venous Gas (PVG)

- Gas dissecting into the portal venous system and peripheral hepatic branches.
- **Appearance:** Fine branching radiolucencies extending to within 2 cm of the liver capsule.
- **Best seen:** Supine view over the liver shadow.
- **Significance:** Severe disease and poorer prognosis; often precedes perforation.

C. Pneumoperitoneum (*indicates perforation – surgical emergency*)

- **Signs:**
 - **Football sign:** Large oval lucency outlining the peritoneal cavity, with central falciform ligament visible.
 - **Rigler's sign:** Visualization of both sides of bowel wall due to intraluminal and extraluminal air.
 - **Supine signs:** Lucent triangles between bowel loops (falciform ligament sign, inverted V sign).
- **Detection tip:** Lateral decubitus with horizontal beam is more sensitive than supine.

D. Bowel Dilatation

- **Appearance:** Loops exceeding expected diameter (>2–2.5 cm in term neonates), often with multiple air–fluid levels on upright/decubitus views.
- Reflects ileus or obstruction secondary to inflammation.