

PART 1 | IMAGING IN CLINICAL PRACTICE

Radiology signs inspired by food

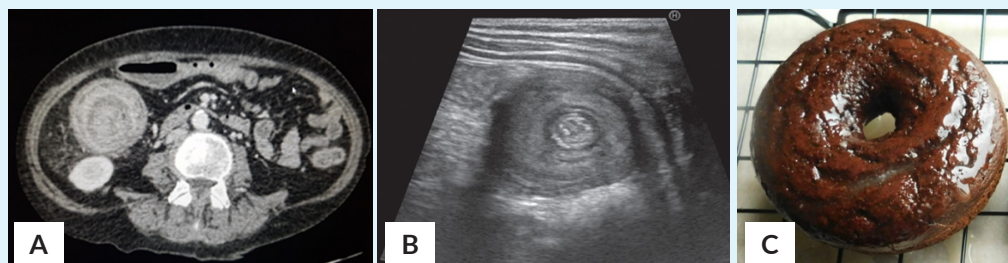
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Some conditions caused by diseases have classic demonstrations in radiology that are similar to a wide range of foods. These “food signs” are easily remembered and recognised, as well as having findings that are similar to different fruits and vegetables, pasta, grains, bread, desserts, cakes, and so on. It is crucial that radiologists identify these classic signs, which will help to give assured determination of the disease (diagnosis) according to imaging findings solely or limiting the process of distinguishing conditions with similar signs or symptoms (differential diagnosis).

Radiologists have special skills of observation and description. Pattern recognition is one of the approaches used in the explanation of images (radiographs), and this ability develops with experience. Specific diseases show classic signs in radiology that are identified by the trained radiologists, which results in assertive diagnosis based on nothing but imaging findings. In other cases, characteristic radiologic signs allow narrowing of the differential diagnosis.

Radiology sign number 1 Doughnut sign

Definition | The doughnut sign refers to the alternating concentric bands which are caused by the invagination of the bowel, the concentric bands represent the mucosa and muscularis which appear echogenic by US and dense by CT, and the submucosa which is hypoechoic in US and hypodense in CT scan. This sign is seen in intussusception.



Images | The intussusceptum with an accompanying complex of mesenteric fat and blood vessels, is surrounded by the intussusciens. A: CT scan view, B: Ultrasound view, C: Real doughnut

Causes | In children intussusception is usually idiopathic, it may be secondary to lead points like Meckel's diverticulum, duplication cyst, polyp, tumours (eg, lymphoma), Peutz-Jeghers syndrome, Schönlein-Henoch purpura, and after surgery. While in adults, intussusception is frequently caused by serious underlying disease, with 70%–90% of cases having a demonstrable cause including: ^{1,2,3}

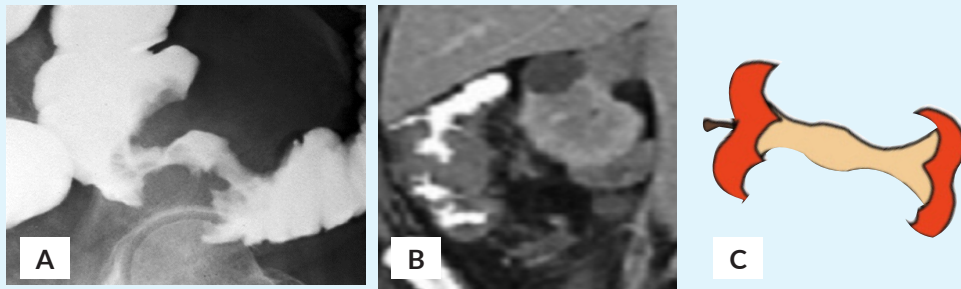
- Malignancy in 54-69% (primary neoplasms eg, bowel carcinoma, lymphomas, polyps, or lipomas or metastatic deposits (rare) - eg, renal cell carcinoma.
- Meckel's diverticulum.

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- Abnormal peristalsis (secondary to ulceration).
- Heterotopic pancreatic tissue.
- Endometriosis.
- Inflammatory bowel disease.
- Adhesions.
- Association with enterovirus infection.
- Association with diabetic ketoacidosis - possibly by altering gastrointestinal tract motility.

Radiology sign number 2 Apple core appearance

Definition | The apple core appearance is the visual manifestation of an annular lesion of the bowel with irregular overhanging edges and shouldered margins, it is most frequently associated with constriction of the lumen of the colon by a stenosing annular colorectal carcinoma



Images | A) A single-contrast barium enema B) CT scan . An annular carcinoma of the colon with stricture and shouldered margins. C: Apple core shape, how it appears

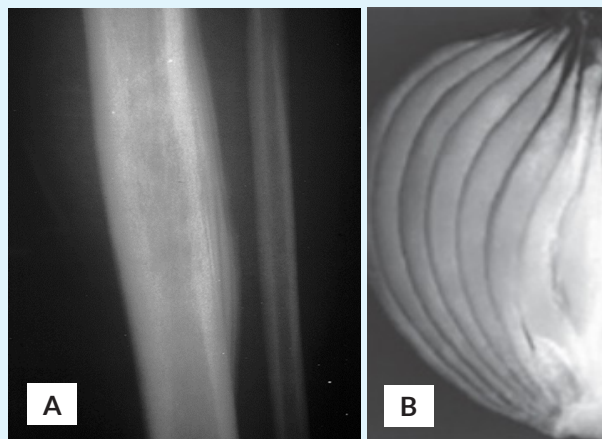
Causes | ^{4,5,6}

- Stenosing annular colorectal carcinoma.
- Lymphoma with colonic involvement - appears more diffuse
- Crohn's disease: the risk of colorectal carcinoma in patients with long-standing colitis, strictures, fistulae, and right-sided colonic disease
- Chronic ulcerative colitis : the neoplastic process typically begins after a long duration of disease of 8 to 10 years and it can occur despite excellent control of most UC disease symptoms.
- Ischaemic colitis
- Chlamydia infection
- Colonic tuberculosis
- Colonic amoebiasis
- Colonic cytomegalovirus
- Radiotherapy

Radiology sign number 3 Onion skin appearance

Definition | Represents multiple concentric parallel layers of new bone adjacent to the cortex, reminiscent of the layers on an onion.

Images | A: lamellated fine multi-layered periosteal reaction along the mid-shaft of the tibia. The layers are thought to be the result of periods of variable growth and indicate a pathological process. B: the onion skin as it appears.



Causes |⁷

- Osteosarcoma
- Acute osteomyelitis
- Ewing sarcoma
- Langerhans cell histiocytosis (LCH)
- Hypertrophic osteoarthropathy

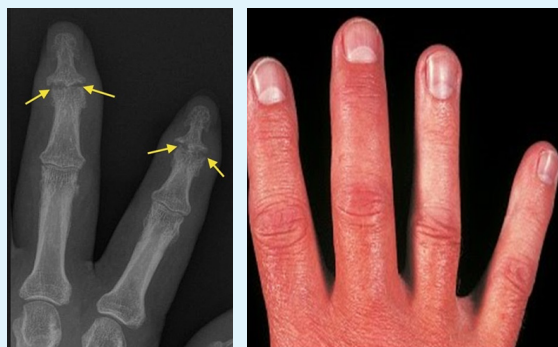
Radiology sign number 4 Sausage finger

Definition | The term sausage digit refers to the clinical and radiologic appearance of diffuse fusiform swelling of a digit due to soft tissue inflammation from underlying arthritis or dactylitis causing sausage appearance.

Images | Soft tissue swelling causing sausage appearance of the second and third fingers with peri and subarticular erosive changes in DIP joints associated joint space narrowing and marginal osteophytes.

Causes |^{5,8}

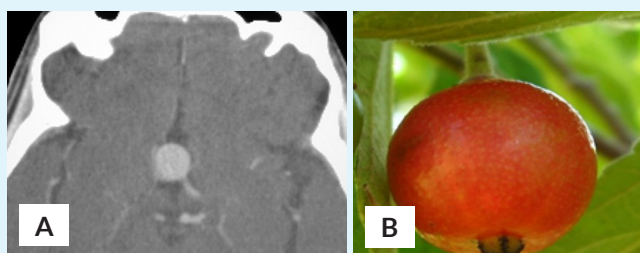
- Psoriatic arthropathy
- Osteomyelitis
- Sickle cell disease
- Sarcoidosis
- Tuberculous dactylitis (spina ventosa)
- Leukaemia
- Syphilitic dactylitis
- Gout



Radiology sign number 5 Berry aneurysm

Definition | A berry aneurysm, which looks like a berry on a narrow stem, is the most common type of brain aneurysm.

Images | A: Axial contrast material-enhanced brain CT scan demonstrate an aneurysm that arises from the anterior communicating artery. B: how berry looks like.



Features and location | Saccular (Berry) aneurysms are developmental abnormalities in the blood vessel of the circle of Willis and their branches. They may be due to an inherited connective tissue weakness, anatomical defects and abnormal flow patterns. They are not detectable at birth or in childhood but then appear in early adult life and begin to enlarge and become more detectable in later life. They can remain silent lifelong or in some patients can bleed and cause subarachnoid haemorrhage (5% of all strokes). They can enlarge and cause local pressure effects e.g. 3rd nerve palsy. Only a minority present with an acute bleed and 90% are less than 10 mm diameter. 15% have multiple aneurysms. The risk of rupture of an asymptomatic intracranial aneurysm is approximately 0.7%. Berry aneurysms are the commonest but not the only cause of SAH.

Anterior circulation: ~90%

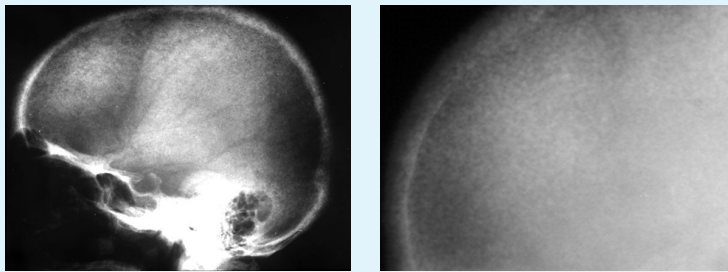
- ACA/ACoA complex: 30-40%
- Supraclinoid ICA and ICA/PCoA junction: ~30%
- MCA (M1/M2 junction) bi/trifurcation: 20-30%

Posterior circulation: ~10%

- Basilar tip
- SCA
- PICA 9, 10

Radiology sign number 6 Salt and pepper sign (skull)

Definition | An appearance in which minute radiopaque 'granules' are mixed with equally-sized radiolucent granules.

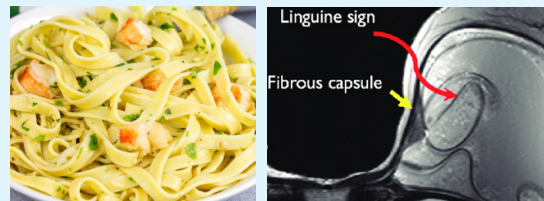


Images | Salt and pepper calvaria (pepper pot skull) in a patient with hyperparathyroidism. (a) Lateral skull radiograph shows multiple tiny well-defined lucencies. (b) Detailed projection showing the ground-glass appearance and ill definition of the inner and outer tables.

Causes | This appearance caused by resorption of the trabecular bone in hyperparathyroidism and resolution of such lesions may occur with treatment.^{11,12}

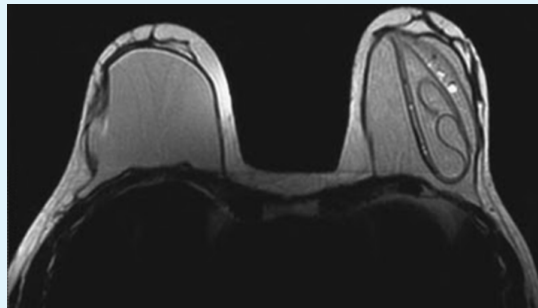
Radiology sign number 7 Linguine sign

Definition | The linguine sign is described as the thin, wavy hypodense wall of the implant within the hyperintense silicone on T2-weighted images indicative of rupture of the implant within the naturally formed fibrous capsule.



Images | Multiple curvilinear strands of reduced intensity are seen in the breast and represent the shell of the implant floating in silicone surrounded by the fibrous capsule that forms naturally around the implant shell.

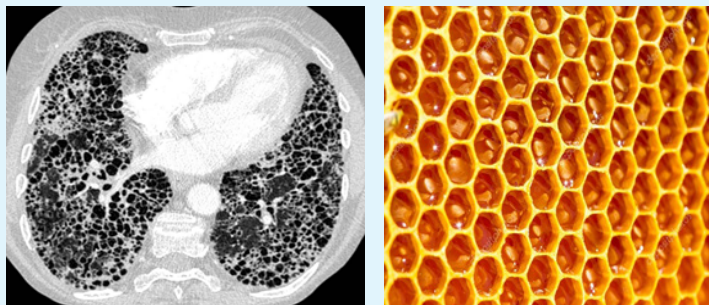
Cause | A sign on MRI of an intracapsular silicone implant rupture, most commonly seen in breast imaging and it is seen also in musculoskeletal imaging like in cases of ruptured calf silicone implant. ^{13,14,15}



Radiology sign number 8 Honey comb appearance

Definition | Honeycombing consists of enlarged airspaces (between 3-10 mm in diameter but occasionally as large as 2.5 cm) with thick fibrotic walls (1-3 mm) lined by bronchiolar epithelium and often filled with mucin and inflammatory cells.

Images | bilateral diffuse honeycombing in end stage lung. Honeycombing represents an end-stage lung that is destroyed by fibrosis.



Causes ^{16, 17}

I. Usual interstitial pneumonitis

A. Collagen vascular diseases: Rheumatoid lung, Scleroderma, Dermatomyositis and polymyositis, Mixed connective tissue disease and ankylosing spondylitis. **B.** Environmental diseases: Asbestosis, Chemical pneumonitis, hard metal pneumoconiosis. **C.** Idiopathic pulmonary fibrosis (IPF).

II. Inflammatory diseases

A. Sarcoidosis. **B.** Langerhans cell histiocytosis (LCH). **C.** Hypersensitivity pneumonitis (chronic). **D.** Desquamative interstitial pneumonitis (DIP; rarely causes honeycombing)

III. Mimicking opacities with lucent spaces

A. Cystic bronchiectasis, **B.** Superimposed cysts (LCH; lymphangioleiomyomatosis [LAM])

Radiology sign number 9 Miliary opacities

Definition | Millet is a small, round whole grain, it is used both for human consumption and livestock and bird feed. Miliary opacities refers to innumerable, small 1-4 mm pulmonary nodules scattered throughout the lungs.

Images | Bilateral diffuse miliary shadows, A: healed varicella pneumonia, B: miliary TB, C: millet



Causes^{18,19}

1. Infection: TB, fungal, healed varicella pneumonia.
2. Miliary metastasis: Thyroid, renal cell and breast carcinomas, malignant melanoma, osteosarcoma and trophoblastic disease.
3. Sarcoidosis
4. Pneumoconiosis: Silicosis and coal worker pneumoconiosis
5. Others like pulmonary haemosiderosis, hypersensitivity pneumonitis and langerhans cell histiocytosis.

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Conflict of interest: Author has nothing to disclose.

Funding: Nothing apart from self-funding.