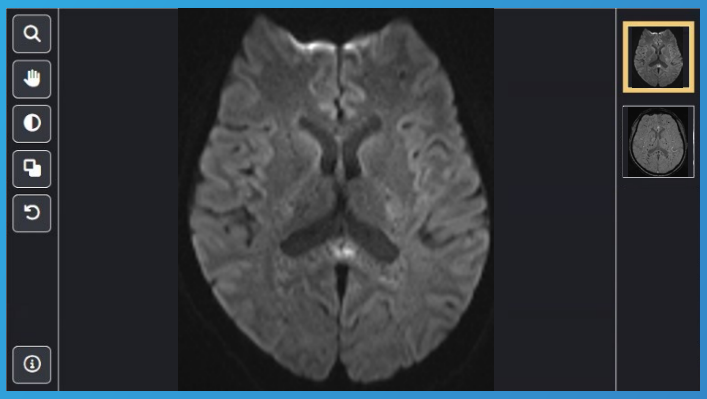
A 24-year-old man is admitted to the ICU after a high-speed motor vehicle collision. He is initially lucid, but develops sudden-onset confusion and hypoxia 48 hours after admission. Brain MRI with diffusion-weighted imaging (DWI) and susceptibility-weighted imaging (SWI) is obtained. Which of the following best explains the imaging findings?



(A) Diffuse axonal injury from rotational shear forces

(B) Hematogenous dissemination of septic emboli

(C) Fat embolism with cerebral microinfarcts and petechial hemorrhage

(D) Global hypoxic-ischemic injury with selective cortical necrosis

(E) Cerebral small vessel vasculitis with microvascular hemorrhagewith selective cortical necrosis

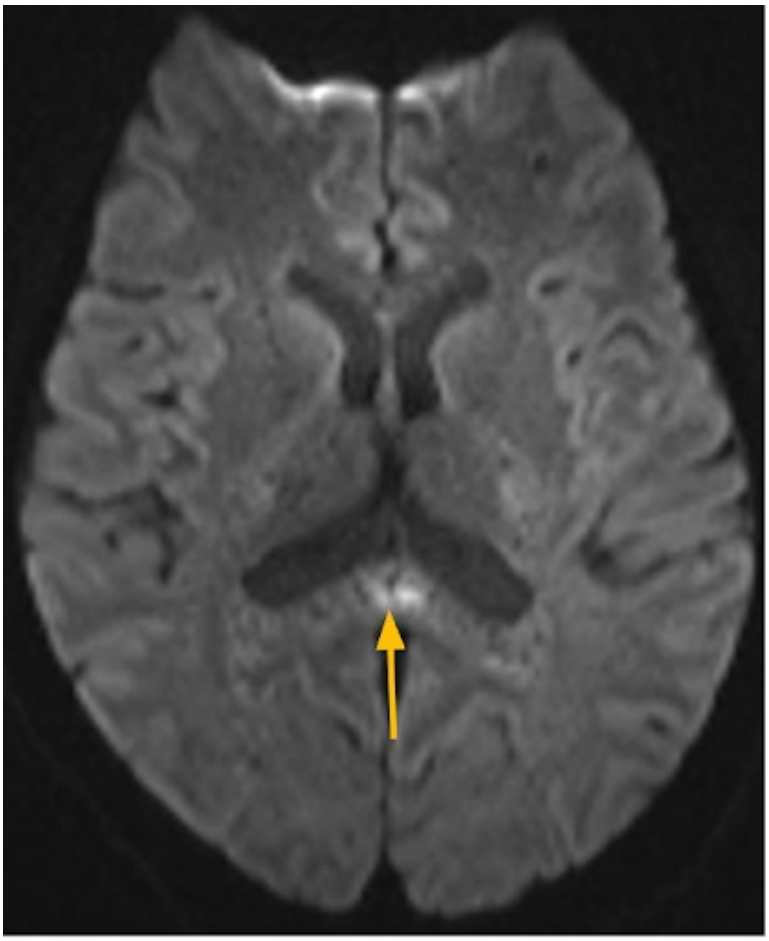
Correct Answer

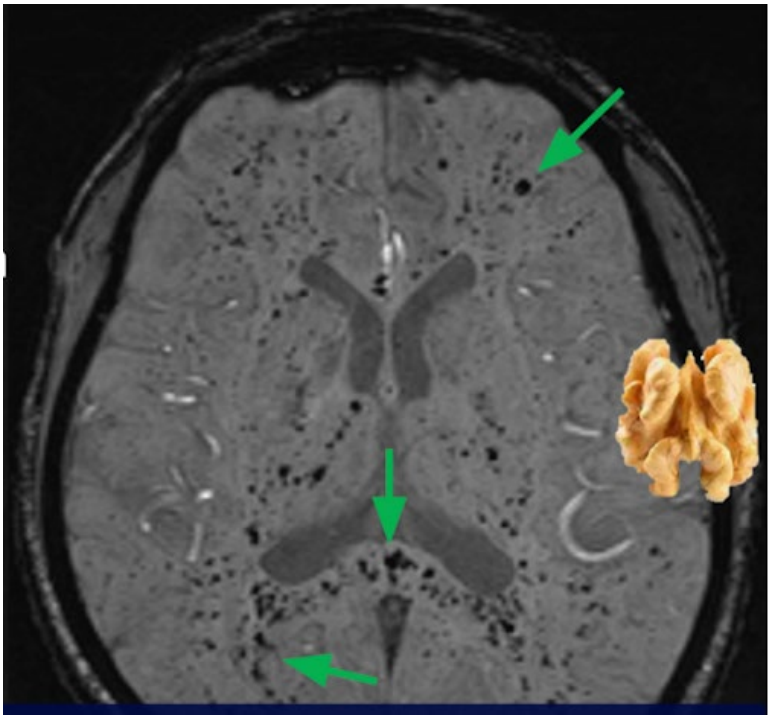
Choice C

Fat embolism syndrome is a serious complication seen after trauma, orthopedic surgery, or sickle cell crises, in which fat droplets enter the systemic circulation and embolize to the brain, lungs, and skin. Neurologic symptoms typically develop **24 to 72 hours** after the initial event and can include altered mental status, confusion, seizures, or coma, often accompanied by hypoxia.

MRI findings are classic:

- **DWI** shows a **"starfield pattern"**—numerous small, scattered foci of restricted diffusion involving the **subcortical white matter, deep gray nuclei,** and **corpus callosum** (orange arrow), reflecting **microinfarcts**
- **SWI** reveals **widespread microbleeds**, creating a **"walnut kernel" appearance, reflecting petechial hemorrhage** from embolic vascular injury (green arrows)





Incorrect Answers

- **Choice A:** Diffuse axonal injury (DAI) results from rotational or shearing forces and typically presents with immediate loss of consciousness. Imaging shows microhemorrhages at the gray-white junction, corpus callosum, and brainstem, but not the starfield diffusion pattern or widespread microbleeds seen here.
- **Choice B:** Septic emboli may produce multiple infarcts, often cortical or subcortical, and ring-enhancing lesions, but do not typically present with the diffuse punctate pattern and microhemorrhages characteristic of fat embolism.
- **Choice D:** Hypoxic-ischemic injury affects watershed zones and shows laminar necrosis with cortical DWI hyperintensity, rather than a multifocal punctate pattern.
- **Choice E:** Cerebral vasculitis is typically subacute to chronic and manifests with territorial infarcts or white matter lesions rather than diffuse microbleeds and punctate infarcts.

★ Bottom Line

In trauma patients with delayed-onset neurologic decline and hypoxia, the combination of starfield DWI pattern and diffuse SWI microbleeds is classic for cerebral fat embolism, even in the absence of overt long bone fracture history.

For more information, see:

Parizel PM, Demey HE, Veeckmans G, et al. Early diagnosis of cerebral fat embolism syndrome by diffusion-weighted MRI (starfield pattern). *AJNR Am J Neuroradiol.* 2001;22(4):622–624.

A 27-year-old man presents with pain and instability in the right thumb following a football injury. MRI is shown. Which of the following findings most strongly supports the need for surgical repair?

(A) High-grade partial tear of the ulnar collateral ligament

(B) Associated bone contusion of the metacarpal head

(C) Interposition of the adductor aponeurosis between the torn ligament

(D) Dorsal capsular sprain of the metacarpophalangeal joint

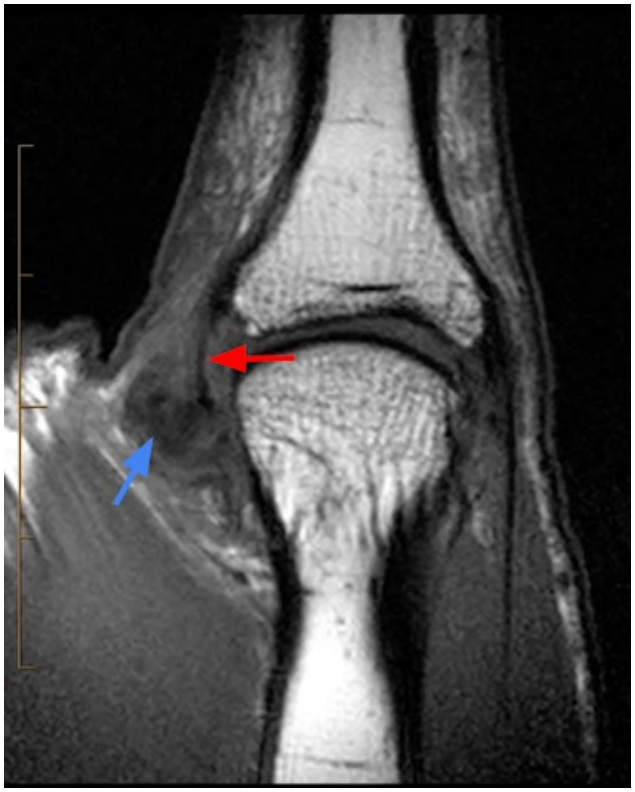
Correct Answer

Choice C

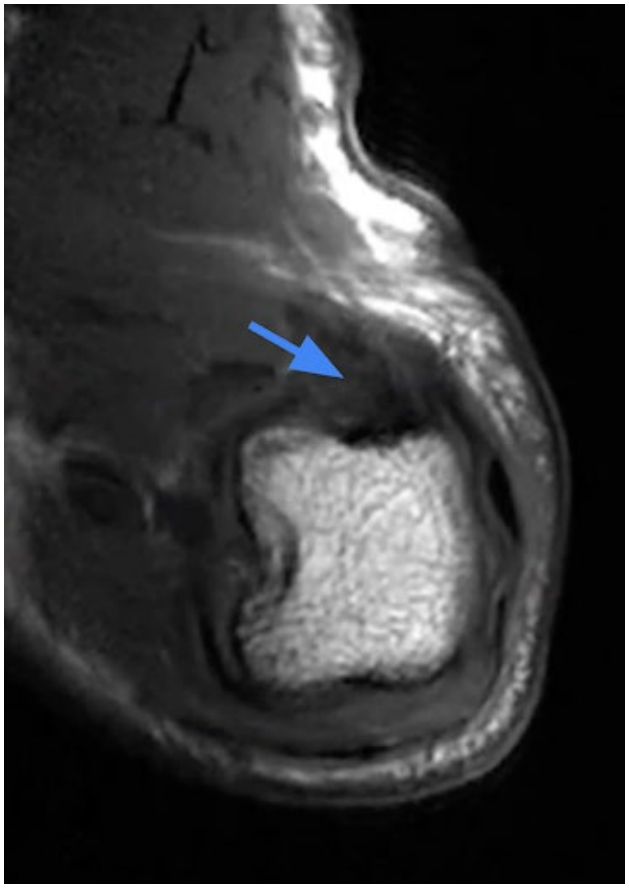
A **Stener lesion** refers to complete disruption of the **ulnar collateral ligament** (UCL) of the thumb with the torn end displaced superficially to the adductor aponeurosis. This interposition mechanically blocks the ligament from reattaching to the base of the proximal phalanx, making surgical intervention necessary. It most often occurs after forced thumb abduction and is a well-known complication of **skier's thumb**.

On MRI, a Stener lesion is identified by complete discontinuity of the ulnar collateral ligament (UCL) of the thumb at or near its insertion on the base of the proximal phalanx. The torn ligament **retracts proximally** and becomes **displaced superficial to the adductor aponeurosis**, which interposes between the ligament and its insertion site. This interposition prevents anatomic healing and mandates surgical repair.

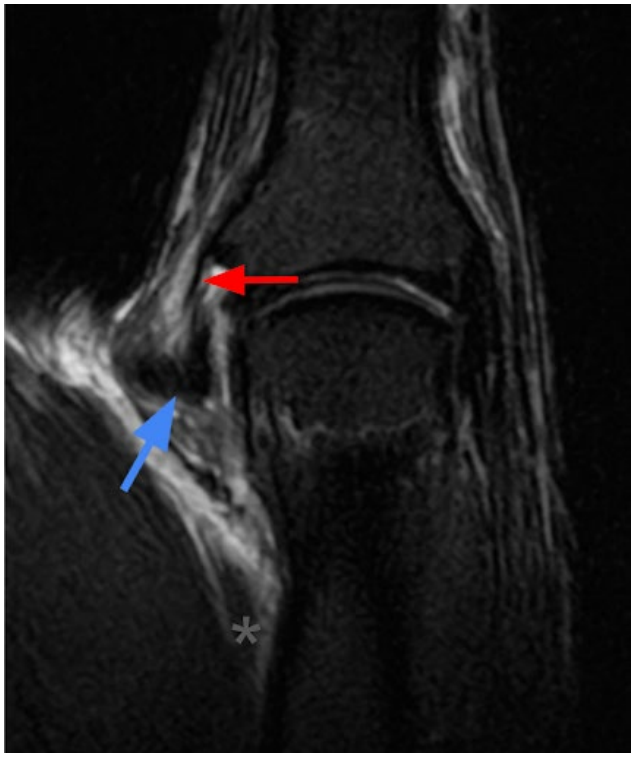
On coronal images, the retracted ligament appears as a thickened, curled low-signal structure just proximal to the MCP joint (blue arrow). The adductor aponeurosis may be seen as a linear low-signal band deep to the displaced ligament (red arrow), confirming interposition. Axial images are useful to confirm the superficial displacement of the UCL relative to the adductor aponeurosis and metacarpal head. Associated soft tissue edema and MCP joint effusion are often present but nonspecific.



Coronal T1



Axial T1



Coronal T2 STIR

Incorrect Answers

- **Choice A:** High-grade partial UCL tear indicates severe injury but does not involve interposition of the adductor aponeurosis. These injuries may heal with immobilization if ligament continuity is preserved and no displacement is seen.
- **Choice B:** Bone contusion of the metacarpal head is a common associated finding in valgus injuries but is not specific for a Stener lesion. It does not influence the decision for surgical repair unless accompanied by displaced ligamentous disruption.
- **Choice D:** Dorsal capsular sprain represents a less severe soft tissue injury involving the joint capsule rather than the UCL. These injuries typically present with less mechanical instability and are managed conservatively with rest and immobilization.

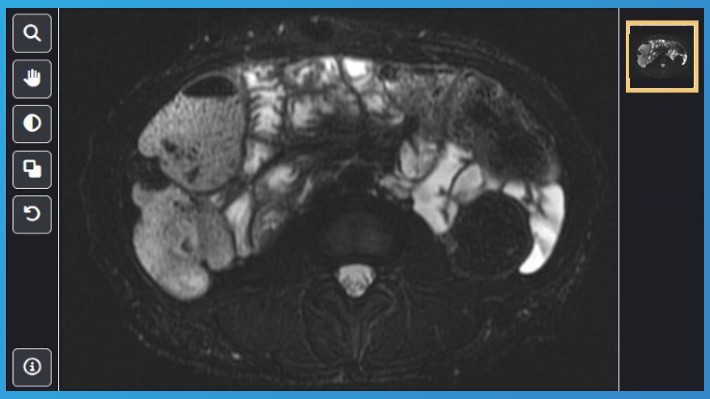
★ Bottom Line

A Stener lesion is defined by proximal retraction of the UCL superficial to the adductor aponeurosis and represents a surgical injury due to mechanical interposition preventing ligament healing.

For more information, see:

Lark ME, Maroukis BL, Chung KC. The Stener Lesion: Historical Perspective and Evolution of Diagnostic Criteria. Hand (N Y). 2017 May;12(3):283-289.

A 32-year-old woman presents with chronic diarrhea, weight loss, and iron deficiency anemia. MR enterography was performed. Which of the following is the most likely diagnosis?



(A) Crohn's disease

(B) Ulcerative colitis

(C) Celiac disease

(D) Bacterial overgrowth

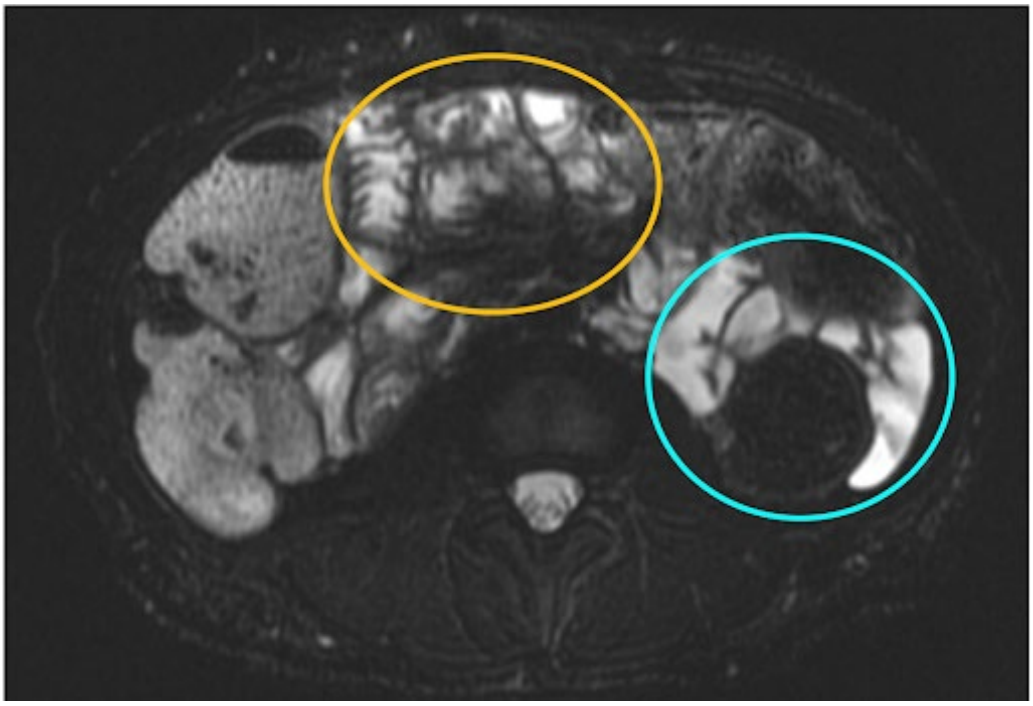
(E) Autoimmune vasculitis

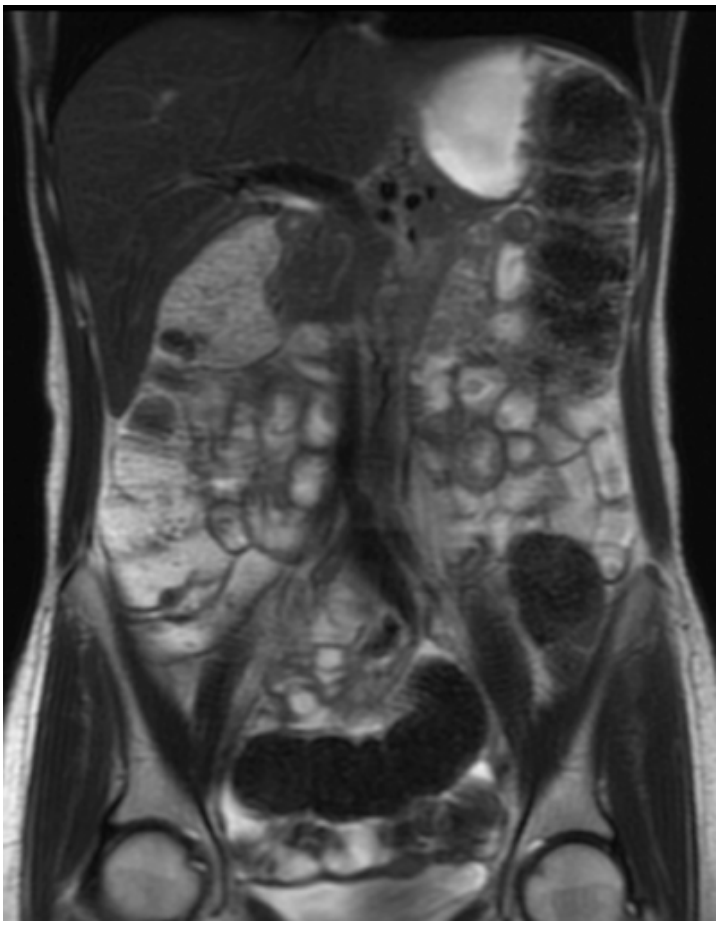
Correct Answer

Choice C

The MR enterography demonstrates the characteristic **"reversal sign" of celiac disease**, where the **normal jejunal-ileal fold pattern is reversed**. Normally, the jejunum has thick, closely spaced valvulae conniventes while the ileum has fewer, thinner folds. In celiac disease, **gluten-sensitive enteropathy** causes **severe villous atrophy** and **mucosal inflammation** that predominantly affects the **proximal small bowel** (duodenum and jejunum). This results in **flattening** and **loss of the normal jejunal folds** (cyan oval), making the **jejunum appear smooth** like normal ileum.

Compensatory mechanisms in the unaffected or less affected distal ileum can lead to **relative mucosal hypertrophy** and **more prominent fold appearance** than expected (orange oval). This reversal of the normal fold pattern is a characteristic imaging finding in moderate to severe celiac disease and correlates with the degree of proximal mucosal damage and malabsorption severity.





Incorrect Answers

- **Choice A:** Crohn's disease typically affects the terminal ileum and colon with skip lesions and transmural inflammation, not diffuse jejunal atrophy or fold reversal.
- **Choice B:** Ulcerative colitis is typically limited to the colon and rectum and does not involve the small bowel or cause jejunal fold changes.
- **Choice D:** Small intestinal bacterial overgrowth (SIBO) may mimic malabsorption clinically but does not produce the characteristic jejunal-ileal fold reversal seen on imaging.
- **Choice E:** Autoimmune vasculitis would cause ischemic changes affecting random bowel segments rather than the characteristic proximal-to-distal gradient of celiac disease.

★ Bottom Line

The fold pattern reversal sign in celiac disease reflects proximal villous atrophy with compensatory distal mucosal changes, creating the characteristic imaging pattern.

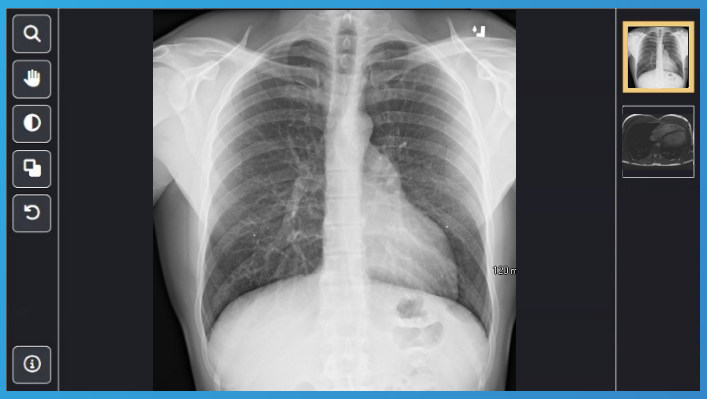
Insight:

When jejunum looks like ileum and ileum looks like jejunum on imaging, think celiac disease.

For more information, see:

Penizzotto A, Vespa F, Roy López Grove, Rendón O, Tsai R, Jorge Alberto Ocantos. CT and MR Enterography in the Evaluation of Celiac Disease. *Radiographics.* 2024;44(4).

A 24-year-old woman presents to the emergency department with acute chest pain. A chest radiograph is obtained followed by a cardiac MRI for further evaluation. Which of the following is the most likely diagnosis?



A. Partial anomalous pulmonary venous return

B. Pericardial effusion

C. Congenital absence of the pericardium

D. Hypertrophic cardiomyopathy

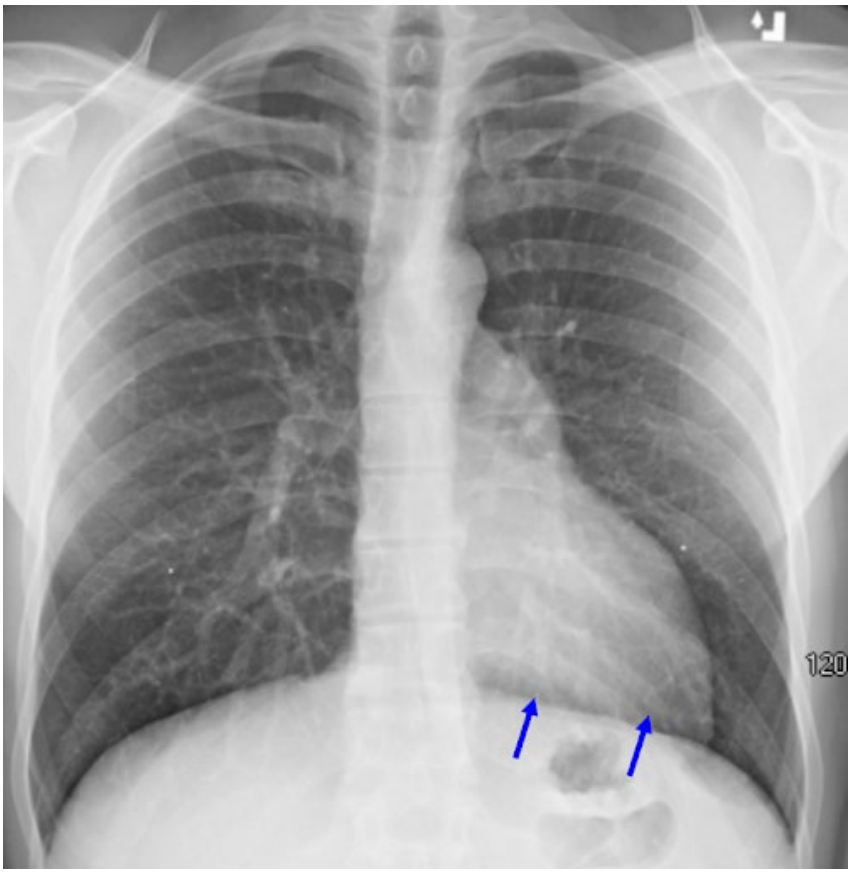
E. Atrial septal defect

Correct Answer

Choice C

Congenital absence of the pericardium (CAP) is a rare developmental anomaly resulting from **failure of fusion of the pleuropericardial membranes during embryogenesis**. It can be **complete** or **partial**, with complete left-sided absence being most common. Patients may be asymptomatic or present with atypical chest pain, palpitations, or dyspnea, often leading to incidental discovery on imaging.

On imaging, **chest radiographs** typically show a **markedly leftward displacement of the cardiac silhouette** with **loss of the right heart border** and **interposition of lung tissue between the aorta and pulmonary artery or between the heart and diaphragm** (blue arrows). **Cardiac MRI** confirms the diagnosis by showing **absence of pericardial tissue** (yellow arrows) and **excessive cardiac mobility**, most pronounced in systole and diastole.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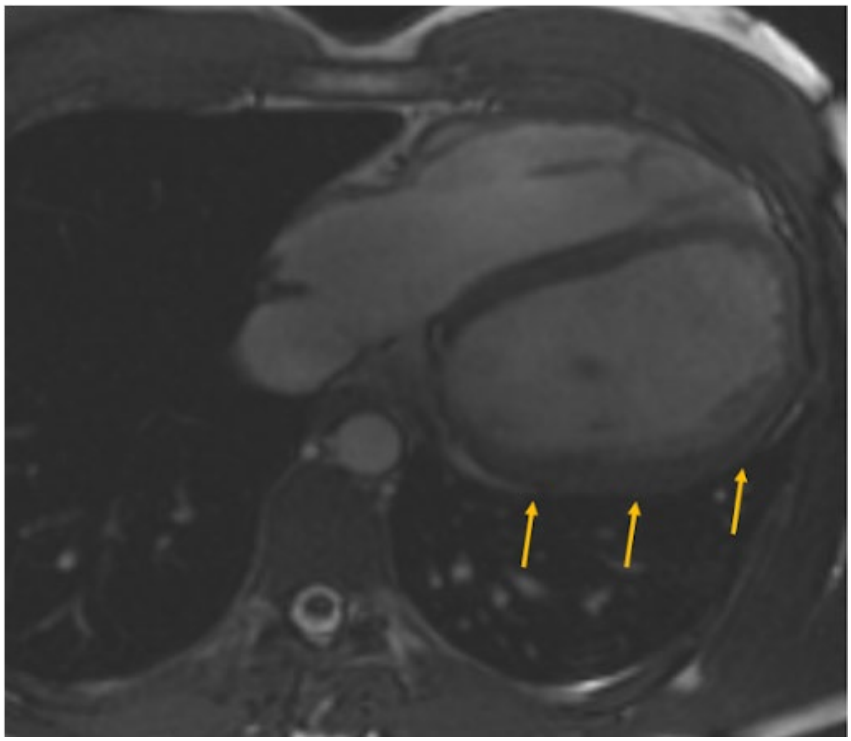


Incorrect Answers

- **Choice A:** Partial anomalous pulmonary venous return would demonstrate anomalous pulmonary veins draining into systemic veins (e.g., SVC), not cardiac displacement or pericardial absence.
- **Choice B:** Pericardial effusion presents as an enlarged, globular cardiac silhouette on X-ray and fluid signal encasing the heart on MRI, rather than missing pericardial tissue.
- **Choice D:** Hypertrophic cardiomyopathy would demonstrate myocardial thickening, particularly of the interventricular septum, without cardiac displacement or lung interposition.
- **Choice E:** Atrial septal defect is associated with right atrial and right ventricular enlargement and increased pulmonary vasculature, not abnormal cardiac position or absent pericardium.

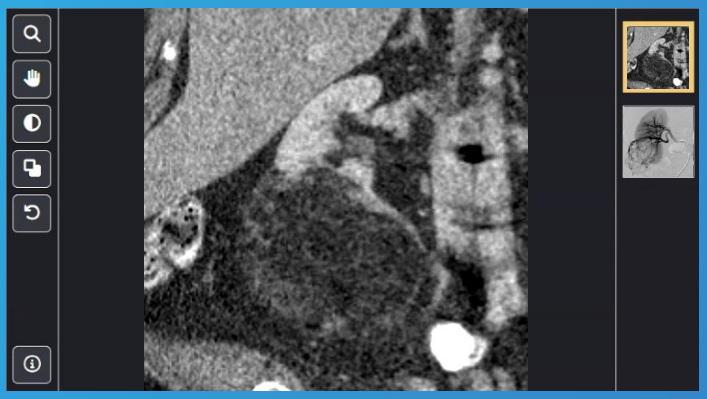
★ Bottom Line

Congenital absence of the pericardium should be suspected when the heart is shifted leftward with lung tissue interposed between the heart and diaphragm or great vessels and confirmed on MRI by absence of pericardial tissue.

For more information, see:

Brulotte S, Roy L & Larose E. (2007). Congenital absence of the pericardium presenting as acute myocardial necrosis. *Canadian Journal of Cardiology*, 23(11), 909-912.

A 45-year-old woman presents with acute left flank pain. Multimodality work-up is performed. Which of the following is the most appropriate next step in management?



(A) Partial nephrectomy

(B) Radical nephrectomy

(C) Observation and interval follow-up imaging

(D) Selective arterial embolization

(E) Percutaneous biopsy

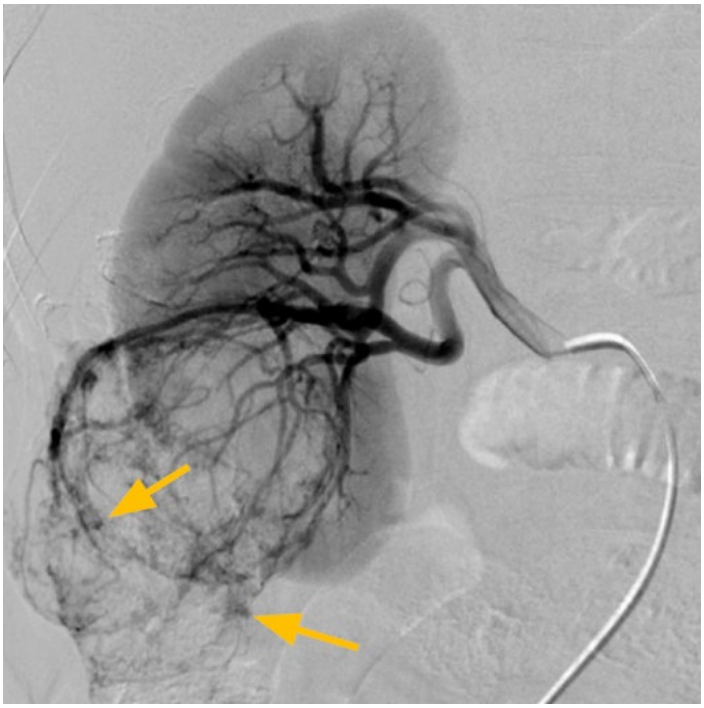
Correct Answer

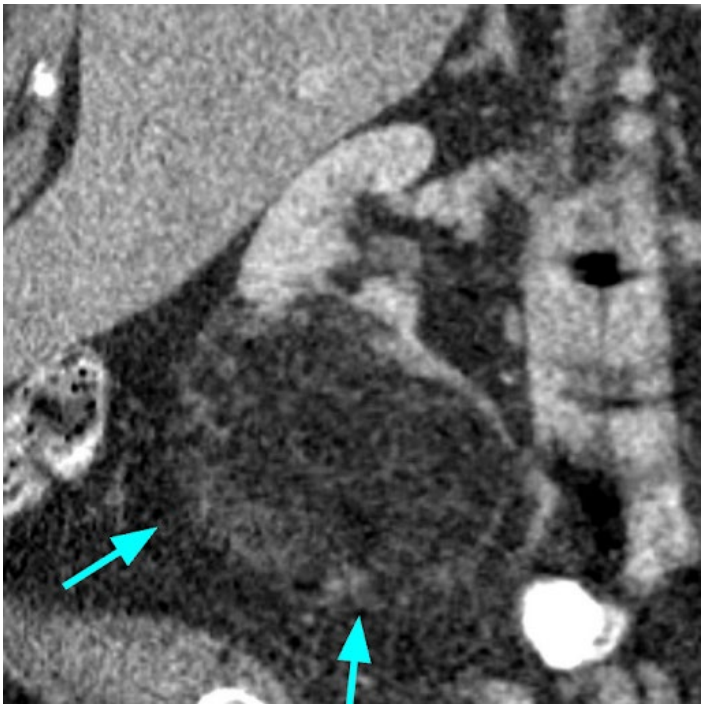
Choice D

Renal angiomyolipoma (AML) is a **benign** mesenchymal tumor composed of varying proportions of mature adipose tissue, smooth muscle, and dysplastic vessels. The vascular component is structurally abnormal and prone to aneurysm formation and rupture, which can result in spontaneous retroperitoneal hemorrhage, known as Wunderlich syndrome. The risk of hemorrhage increases with lesion **size greater than 4 cm** or with the presence of **intralesional aneurysms larger than 5 mm**.

On **CT**, AMLs demonstrate regions of **macroscopic fat** (teal arrows; < –10 HU) interspersed with soft tissue density, which is diagnostic in most cases. In the setting of acute hemorrhage, CT may reveal high-attenuation perinephric hematoma and active extravasation of contrast (not shown). Importantly, AML is distinguished from renal cell carcinoma by the presence of macroscopic fat, although a minority of AMLs are “fat-poor” and can mimic malignancy. Digital **subtraction angiography** (DSA) shows a **hypervascular lesion** supplied by **tortuous, dysplastic arteries** with **multiple small pseudoaneurysms** (yellow arrows).

The best management for a symptomatic or high-risk angiomyolipoma (either > 4 cm or with intralesional aneurysms) is **selective arterial embolization**. This minimally invasive procedure allows targeted occlusion of feeding arteries using coils, particles, or liquid embolic materials, leading to devascularization of the tumor while preserving adjacent renal parenchyma. Embolization effectively prevents hemorrhage and achieves durable lesion control with minimal morbidity. Post-procedure follow-up imaging is typically performed at 6–12 months to confirm devascularization and assess for regrowth.





Incorrect Answers

- **Choice A:** Partial nephrectomy may be appropriate if embolization fails or if malignancy cannot be excluded. However, for a lesion with diagnostic macroscopic fat and high-risk vascular features, selective embolization is less invasive and organ-sparing.
- **Choice B:** Radical nephrectomy is overly aggressive for a benign lesion and should be reserved for cases with uncontrolled hemorrhage or persistent diagnostic uncertainty after less invasive therapy.
- **Choice C:** Observation and interval follow-up imaging is appropriate for small (< 4 cm), asymptomatic AMLs without aneurysmal change or hemorrhage. The presence of multiple intralesional aneurysms in this case indicates a high risk of rupture, warranting prophylactic embolization rather than observation.
- **Choice E:** Percutaneous biopsy is contraindicated in AML because of the vascular nature of the lesion and the risk of hemorrhage. Biopsy is unnecessary when macroscopic fat is clearly demonstrated on CT, which is diagnostic for AML.

★ Bottom Line

Renal angiomyolipomas larger than 4 cm or containing aneurysms greater than 5 mm should be treated with selective arterial embolization even in the absence of active bleeding, as these lesions carry a high risk of spontaneous rupture.

For more information, see:

Flum AS, Hamoui N, Said MA, Yang XJ, Casalino DD, McGuire BB, Perry KT, Nadler RB. Update on the Diagnosis and Management of Renal Angiomyolipoma. *J Urol*. 2016 Apr;195(4 Pt 1):834-46.