



Case #154

NAME Educational Activities Committee

Case provided by:

Casey P. Schukow, DO (he/him)

Resident Pathologist (PGY4, 2026-2027 Academic Year)

Corewell Health William Beaumont University Hospital, Royal Oak, Michigan

Resident Member, National Association of Medical Examiners

Associate Member, Michigan Association of Medical Examiners

Michael Cantley, MD (he/him)

Resident Pathologist (PGY2, 2026-2027 Academic Year)

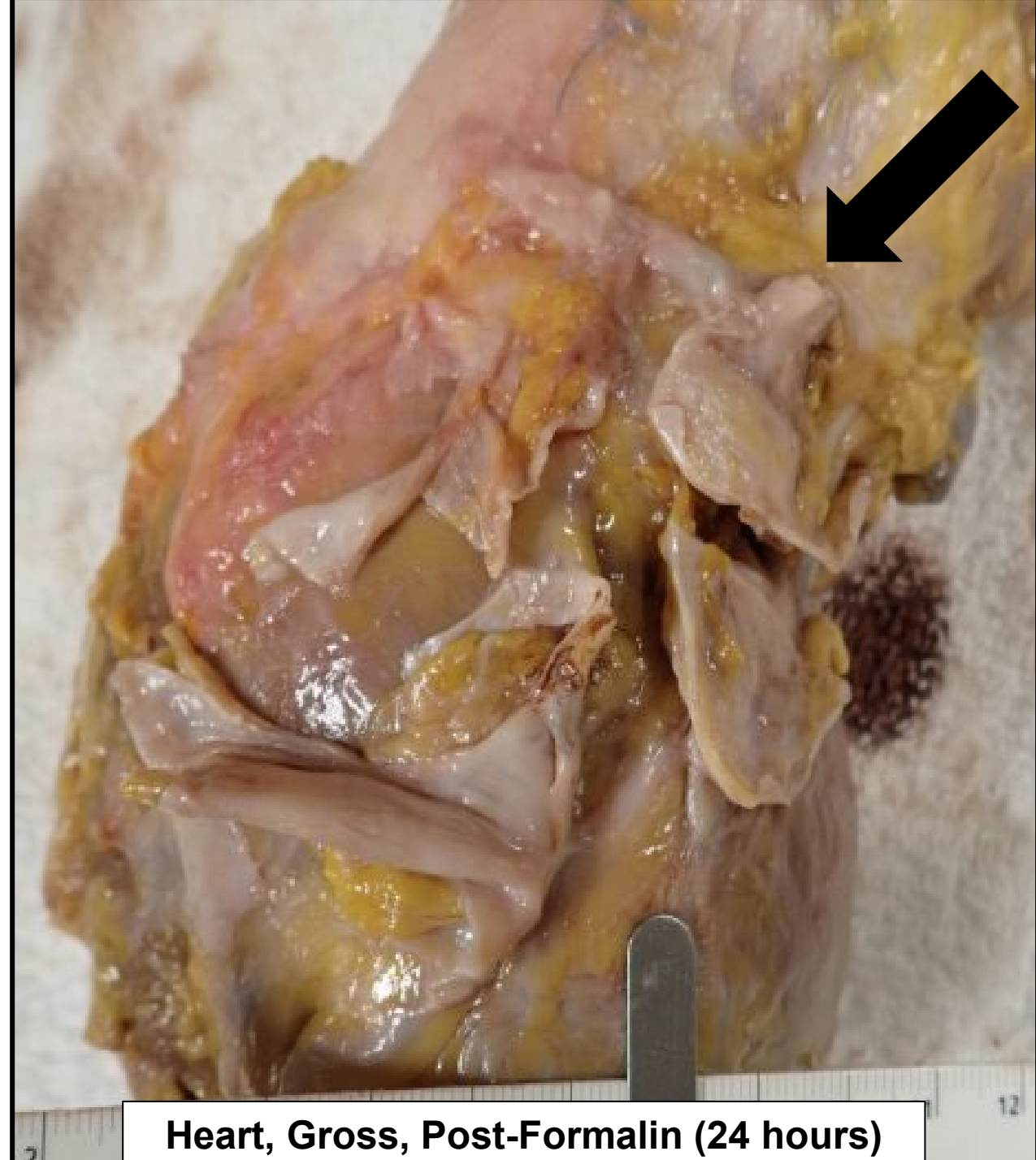
Corewell Health William Beaumont University Hospital, Royal Oak, Michigan

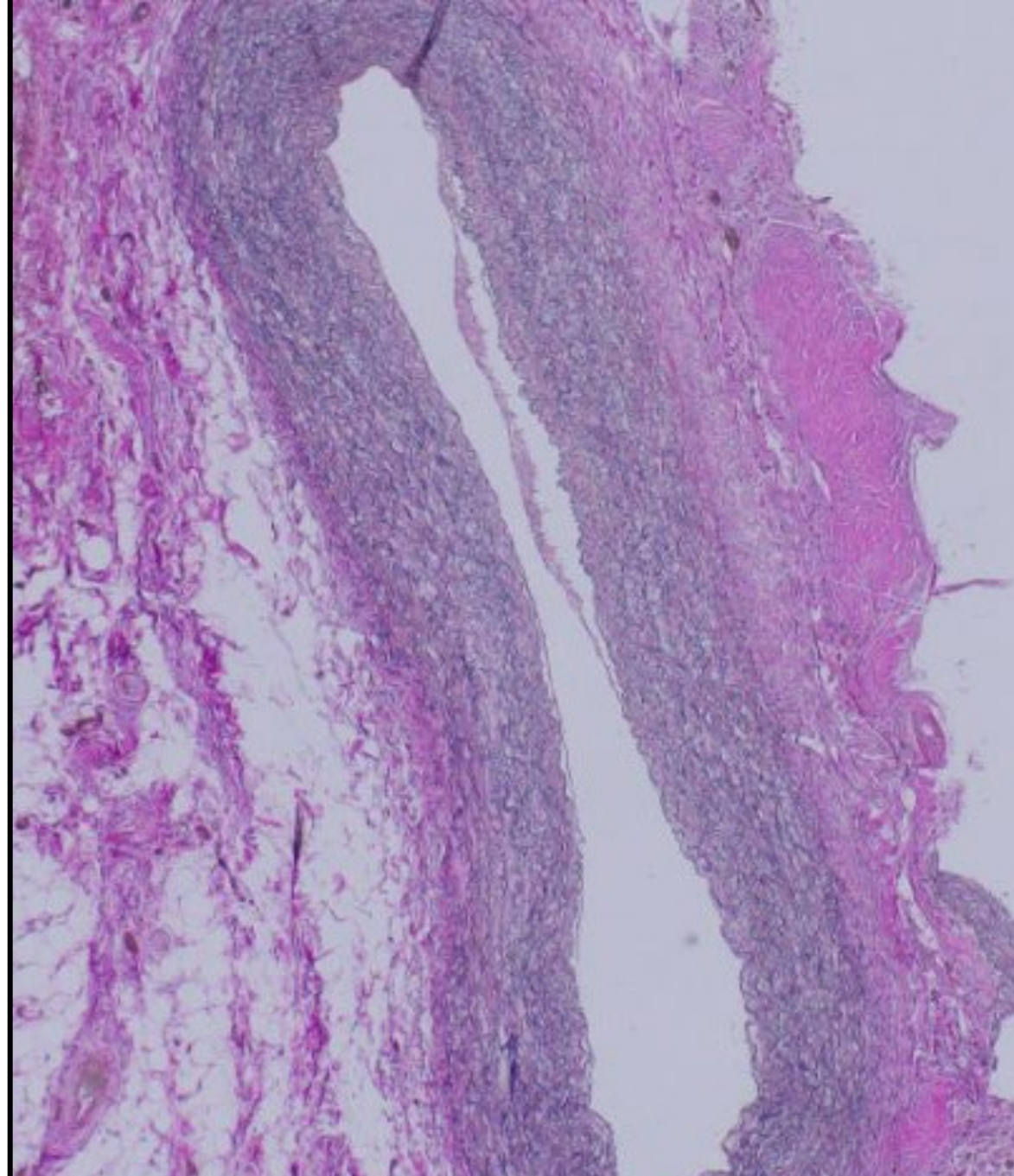
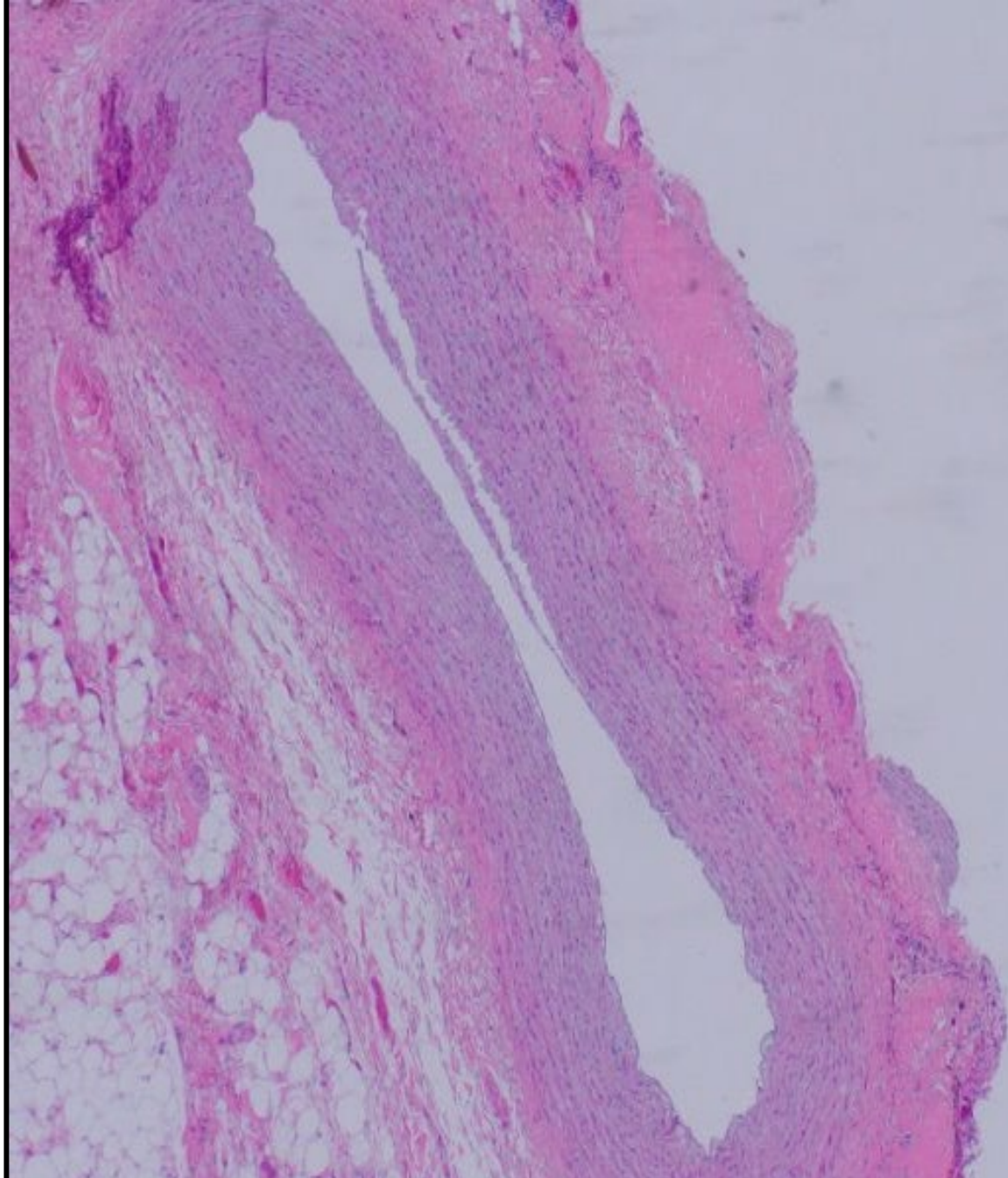
Carolina C. Polanco, MD (she/her)

Faculty Pathologist

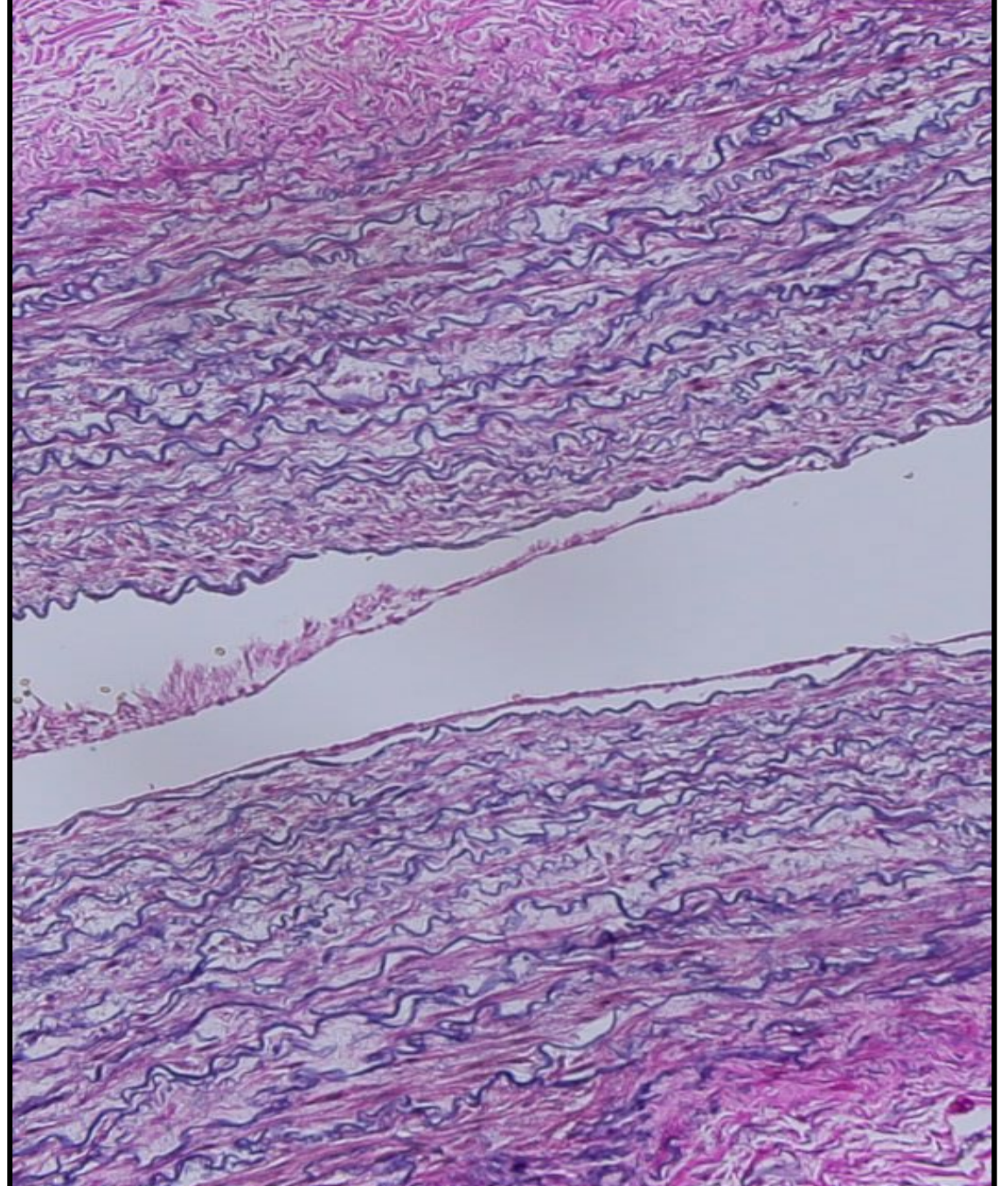
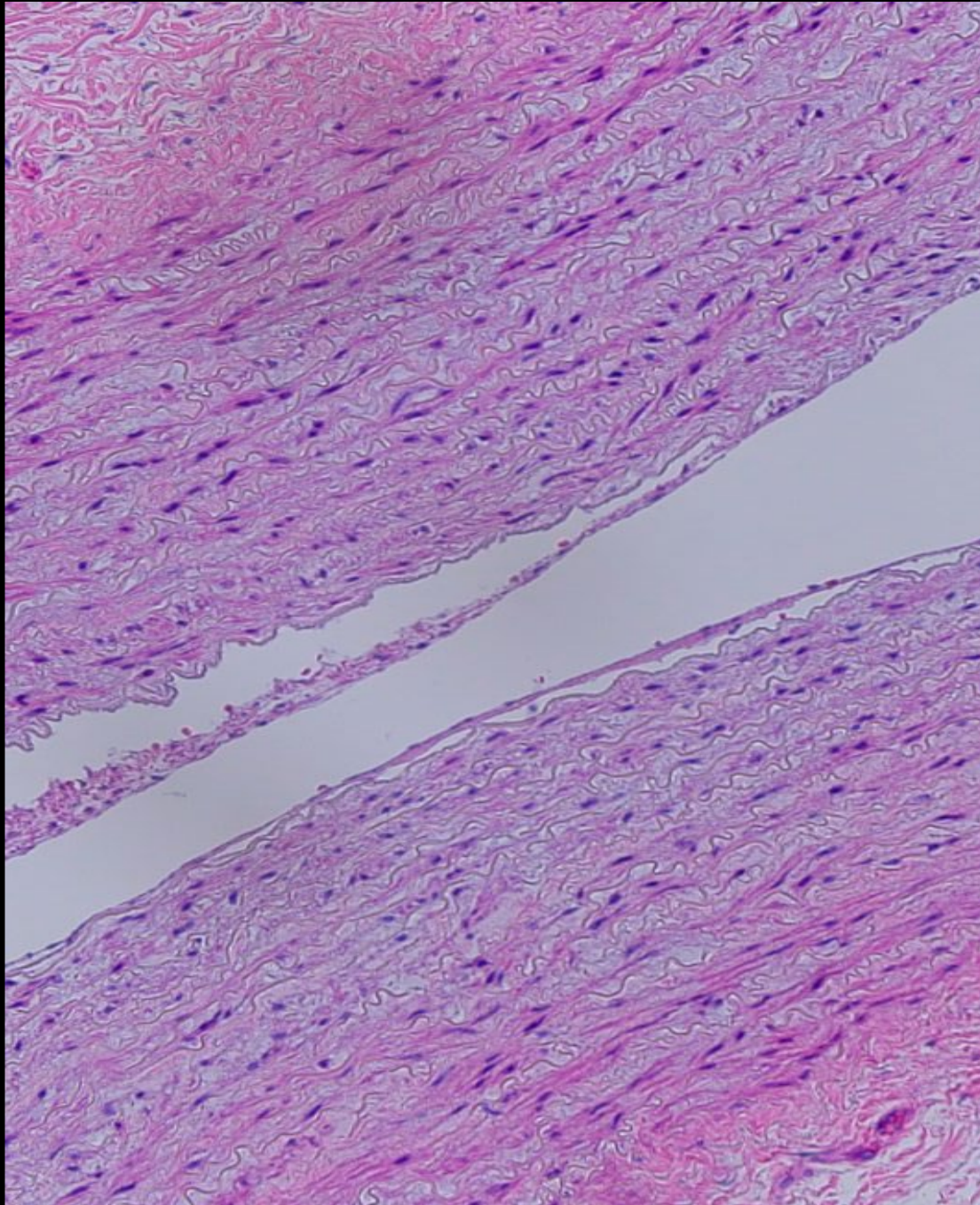
Corewell Health William Beaumont University Hospital, Royal Oak, Michigan

Member, College of American Pathologists





Graft Vessel, 40x; Hematoxylin & Eosin (Left), Verhoeff's Van Gieson (Right)



Graft Vessel, 200x, Oil Immersion; Hematoxylin & Eosin (Left), Verhoeff's Van Gieson (Right)

The decedent is a male in his 70s with history of severe atherosclerotic coronary artery disease status multi-vessel bypass grafting (CABG). One of the vessels was inadvertently severed at its proximal aspect due to the local presence of severe fibrous adhesions (see gross images with thick black arrow).

Histologic images of this graft vessel are provided. What vessel is most likely depicted in this image?

- A. Cephalic vein
- B. Internal mammary artery
- C. Radial artery
- D. Saphenous vein

Answer...

B. Internal Mammary Artery (CORRECT answer, 69.61% of responses)

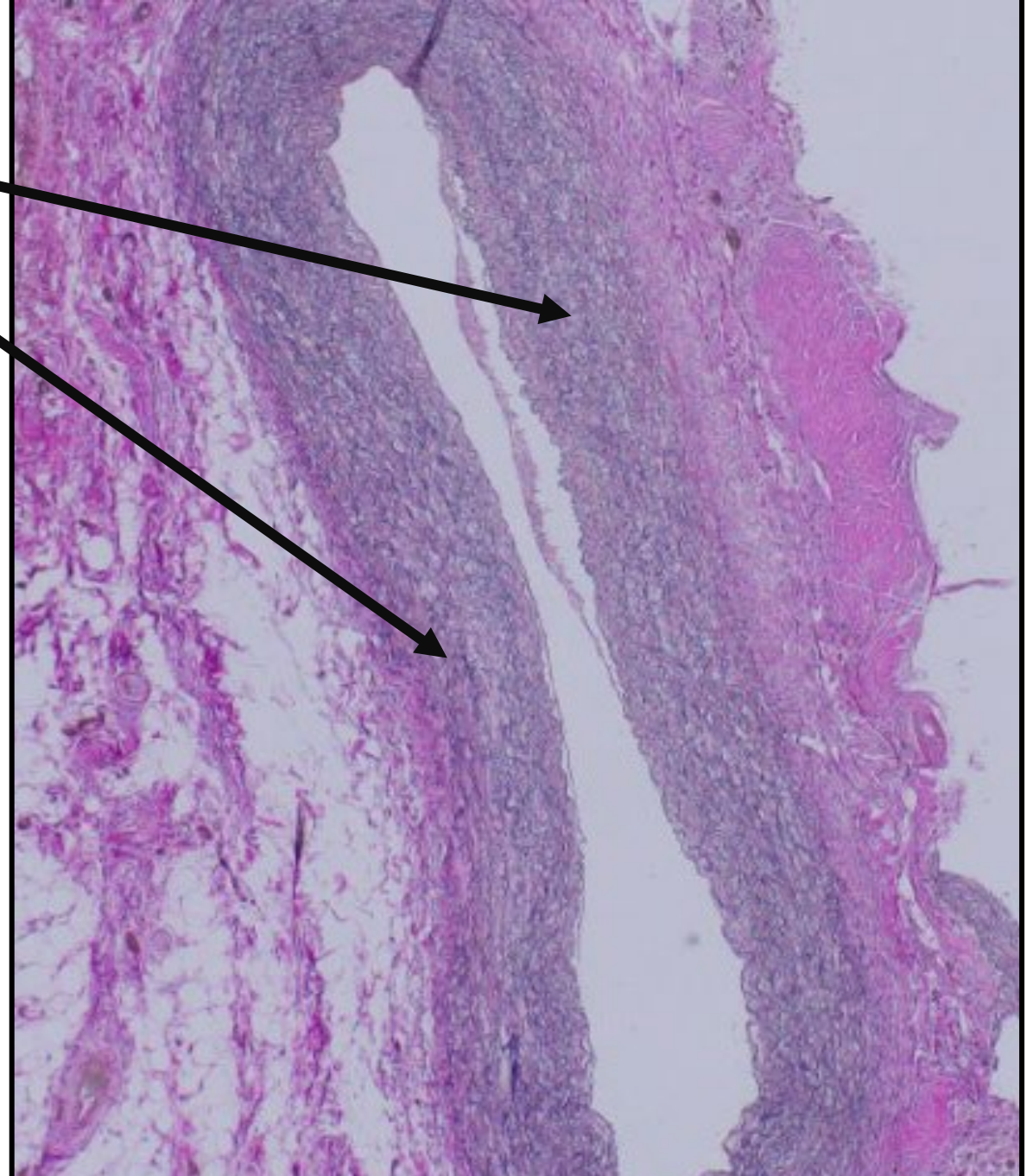
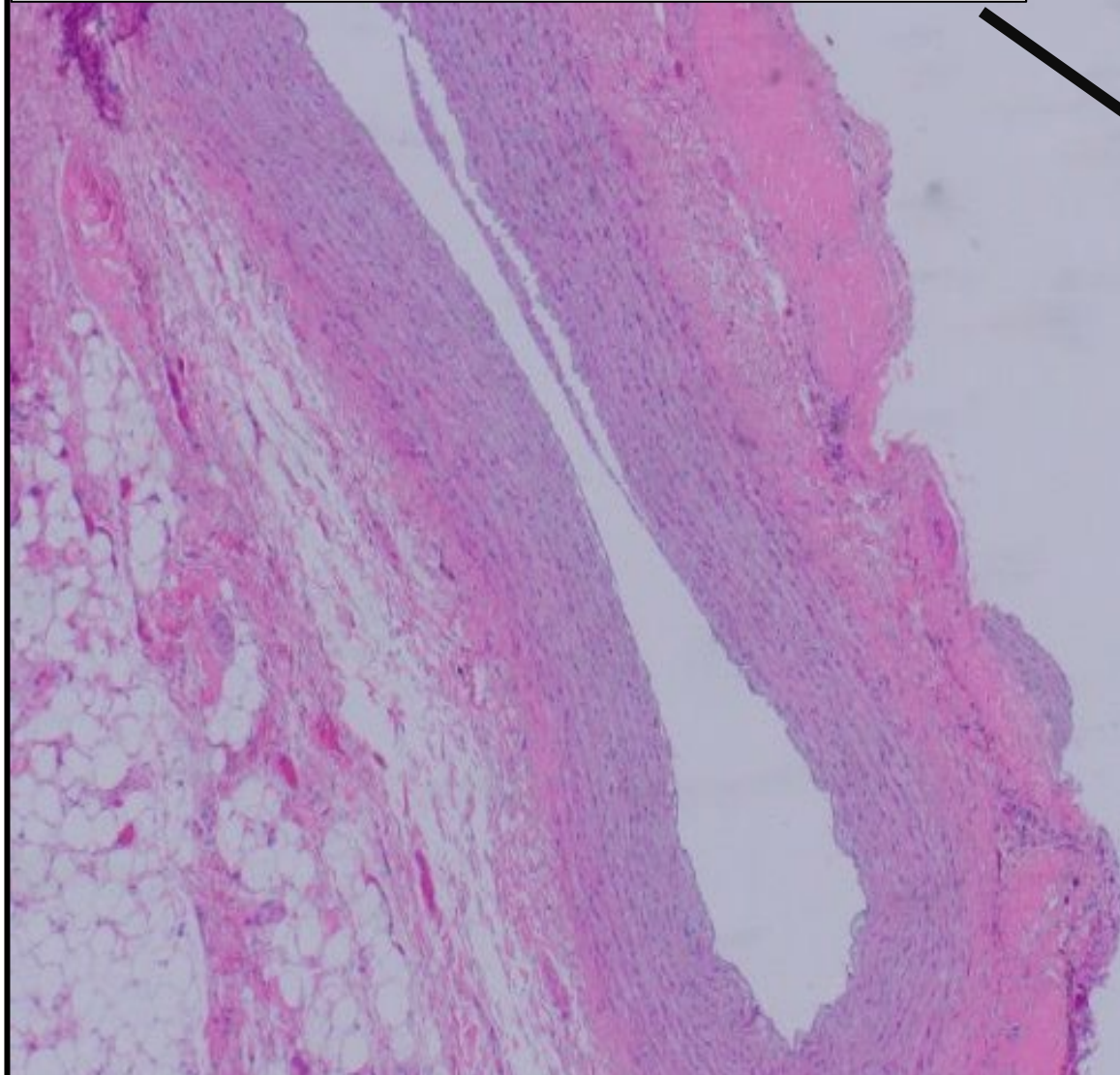
The histologic features are most consistent with an **internal mammary artery (IMA) graft**. Also known as the internal thoracic artery, the IMA is one of the preferred conduits in coronary artery bypass grafting due to its excellent long-term patency, resistance to atherosclerosis, and favorable flow characteristics. It typically arises from the **subclavian artery** and courses **inferiorly along the inner chest wall**.

Histologically, the IMA shows features of a **muscular-elastic (elastic/muscular hybrid) artery**, characterized by **multi-layered elastic lamina** including the internal and external lamina and involving the media (see next slides), which helps distinguish the IMA from other venous conduits or arteries.

In this case, the **Verhoeff's Van Gieson elastin stain** highlights these multilayered elastic laminae, confirming the arterial origin of the graft. Because the vessel's proximal segment was inadvertently transected during autopsy dissection (which does not infrequently happen given the vessel's proximity to the chest plate), the histologic features helped confirm it as a left IMA graft that terminated on the left anterior descending artery (LAD, consistent with the decedent's clinical history).

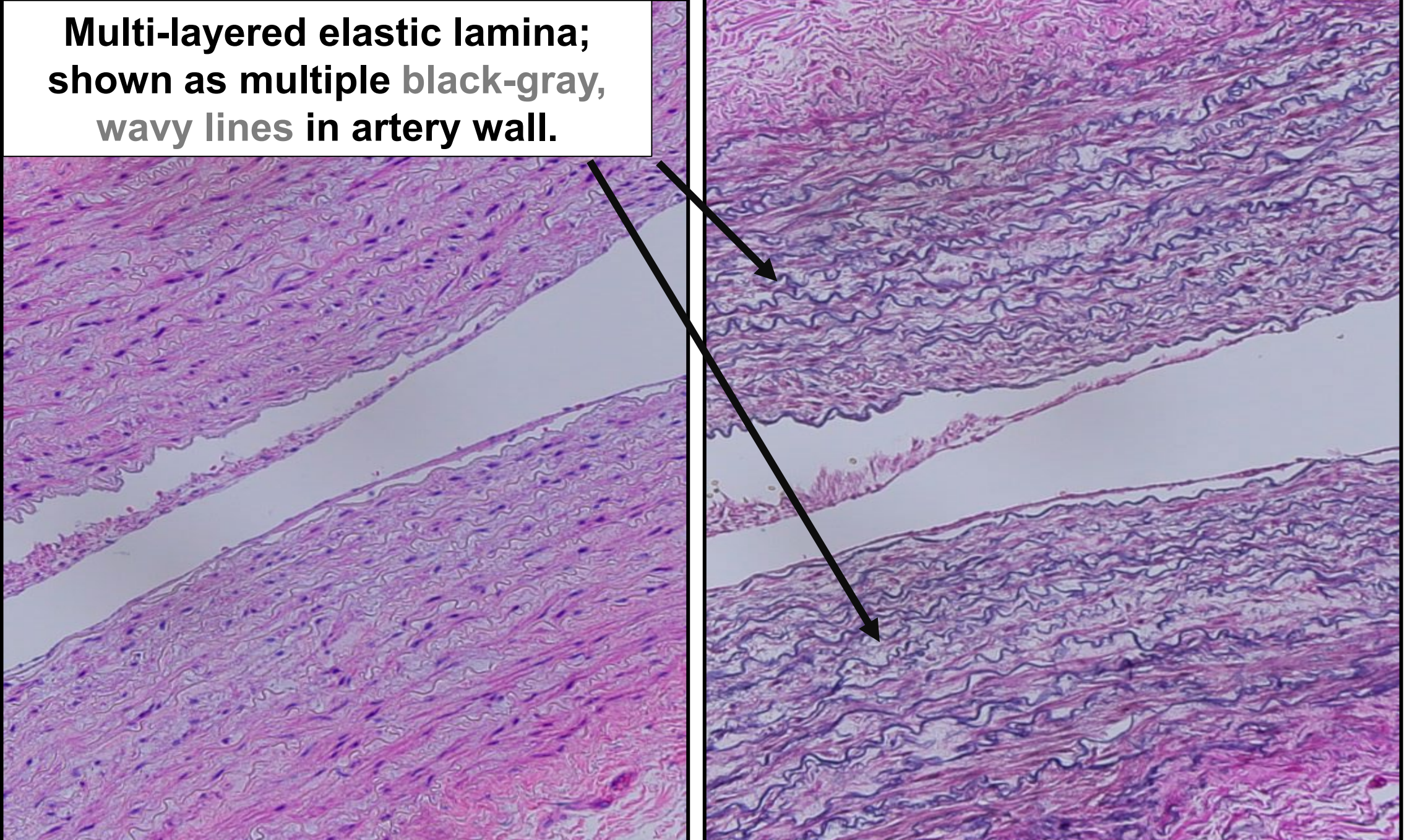


**Multi-layered elastic lamina;
shown as multiple black-gray,
wavy lines in artery wall.**



Internal Mammary Artery, 40x; Hematoxylin & Eosin (Left), Verhoeff's Van Gieson (Right)

**Multi-layered elastic lamina;
shown as multiple black-gray,
wavy lines in artery wall.**



Internal Mammary Artery, 200x, Oil Immersion; Hematoxylin & Eosin (Left), Verhoeff's Van Gieson (Right)

Other responses...

A. Cephalic vein (1.77% of responses)

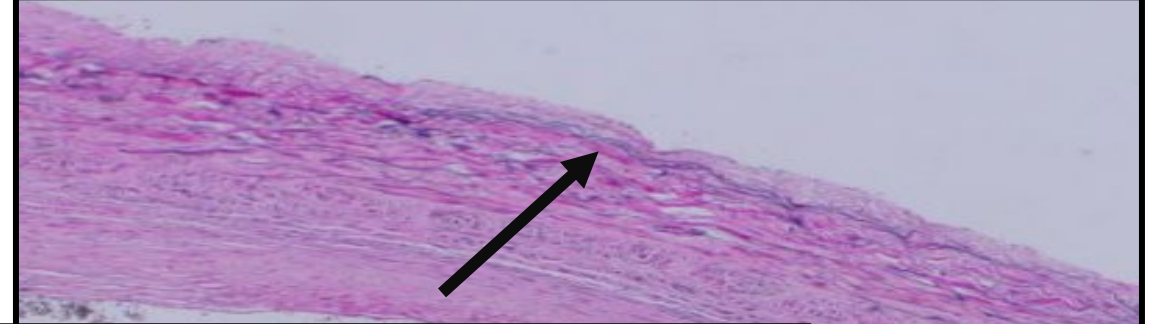
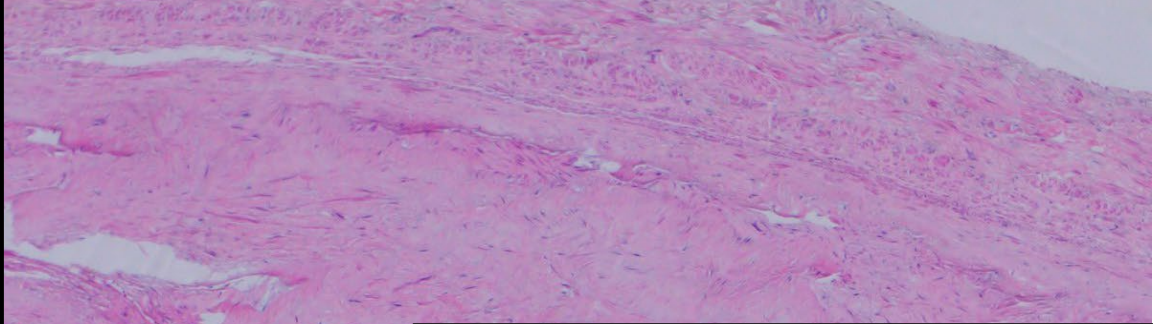
Incorrect. The cephalic vein is **infrequently used as a coronary bypass conduit** but may be considered when other more commonly used arterial or venous grafts are not suitable. Histologically, the cephalic vein lacks the multilayered elastic laminae seen in the IMA and instead shows a thin wall with a less prominent elastic component.

C. Radial artery (4.59% of responses)

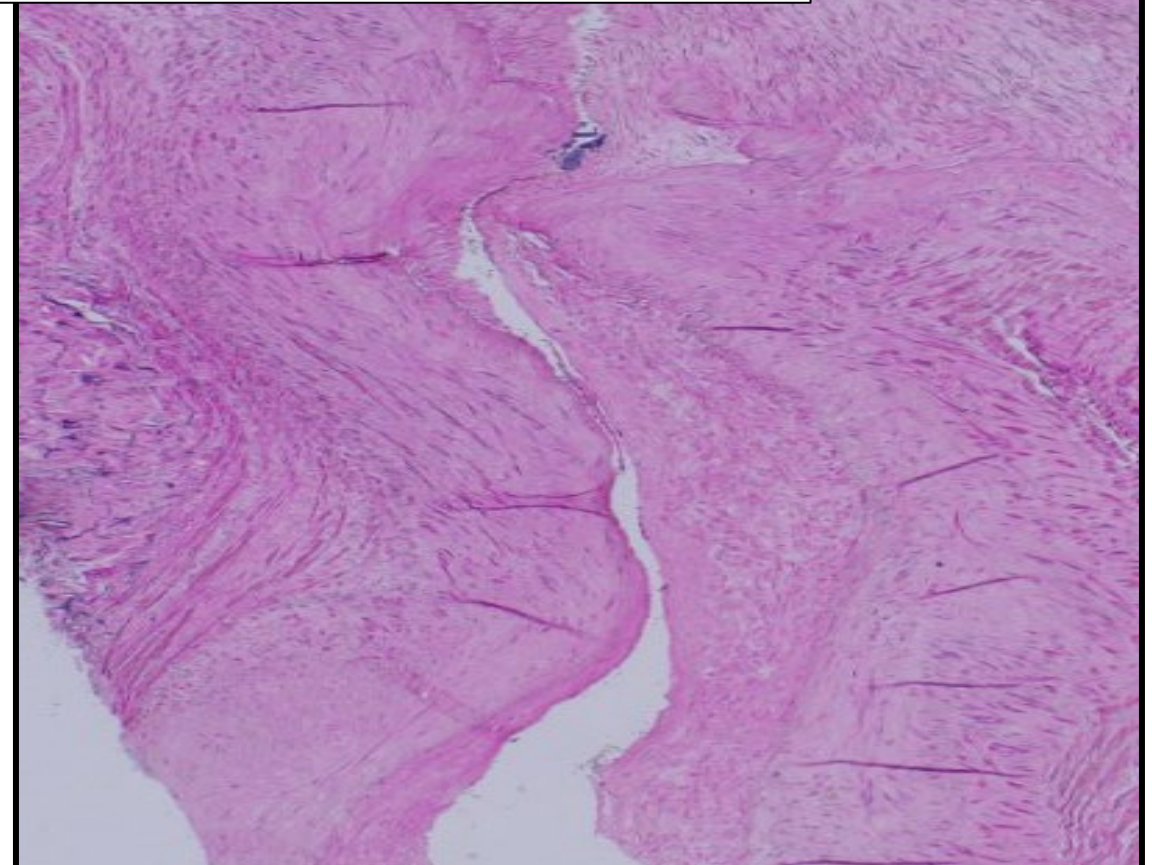
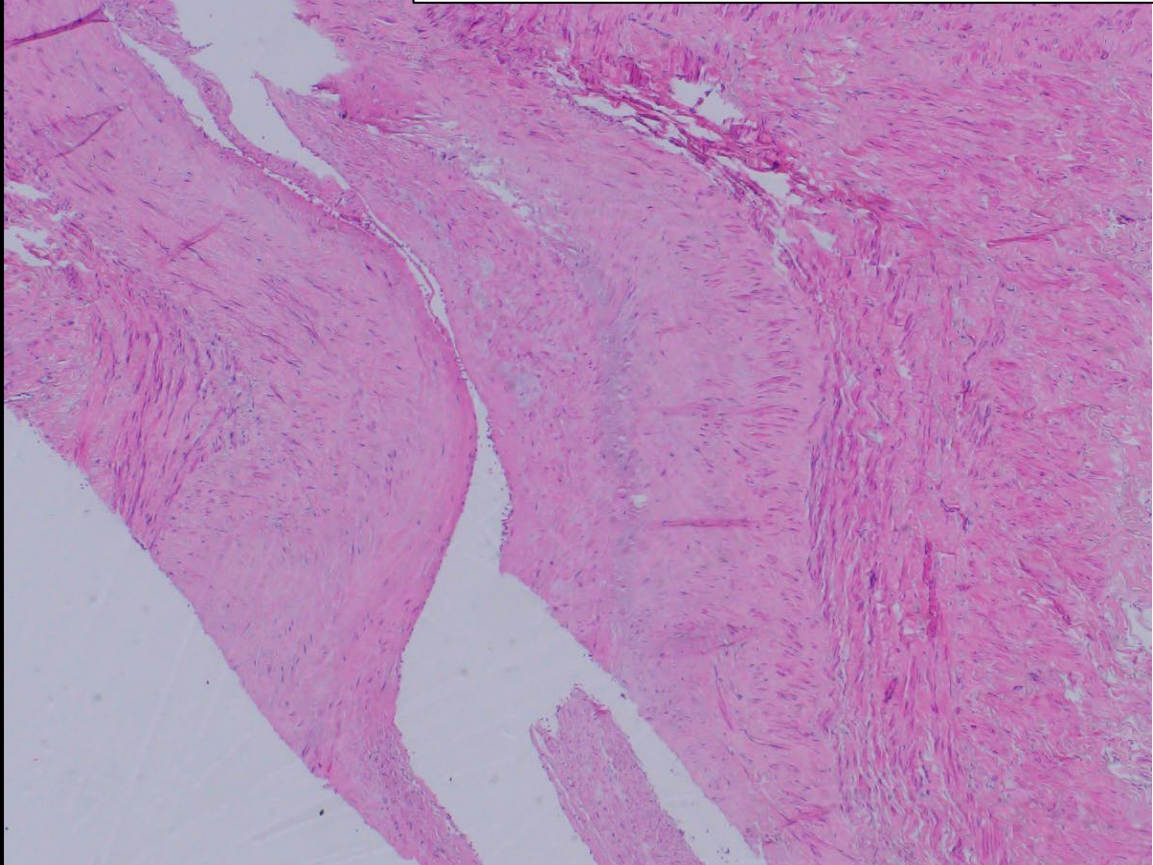
Incorrect. The radial artery is a **medium-sized muscular artery** characterized by a **prominent internal elastic lamina** and a **single external elastic lamina**. While elastin stains can highlight both, the radial artery does not demonstrate the multiple elastic lamellae within the media that are characteristic of the internal mammary artery. These histologic distinctions help differentiate it from the IMA in bypass specimens.

D. Saphenous vein (24.03% of responses)

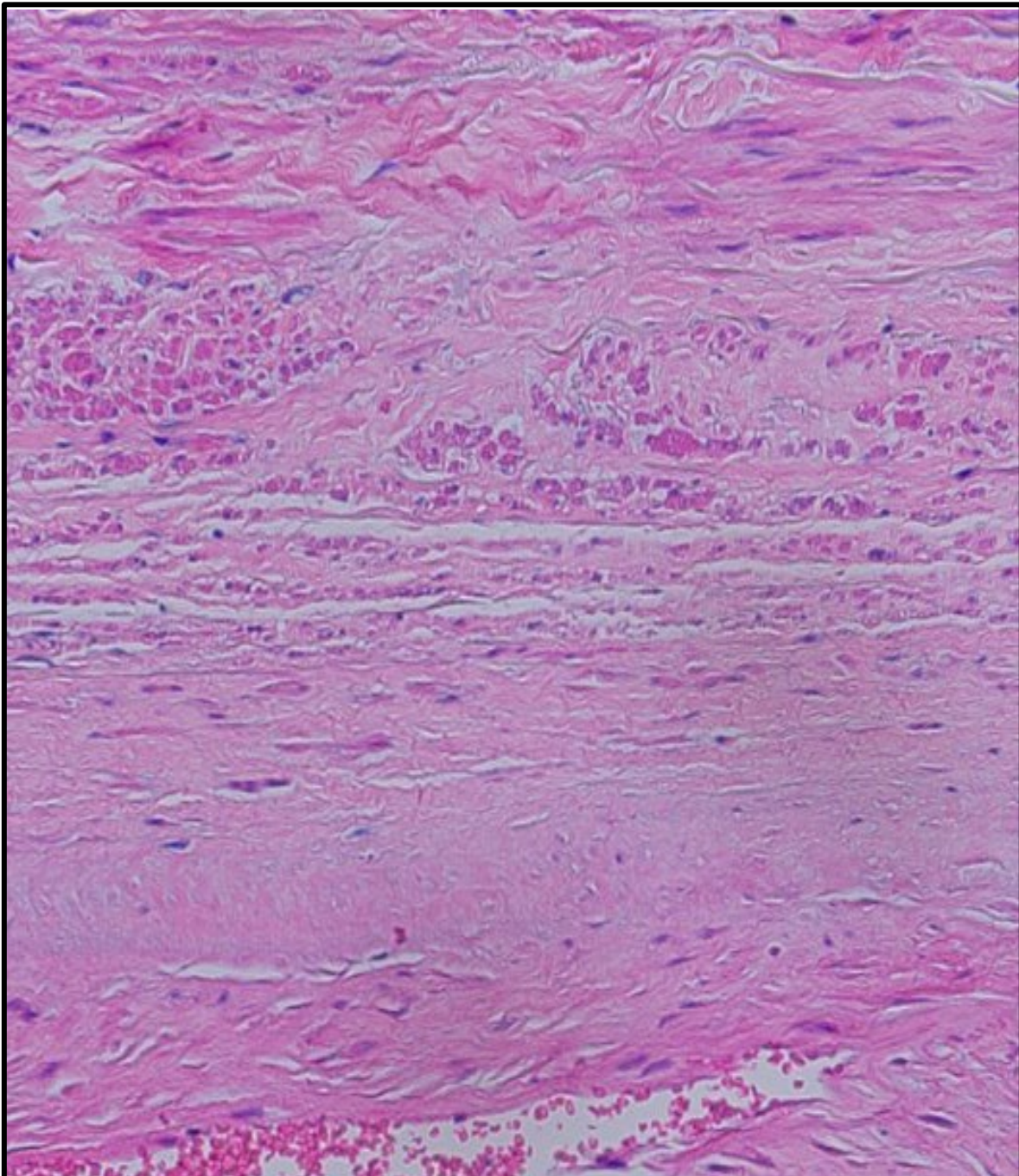
Incorrect. The saphenous vein is a commonly used conduit in CABG, but its histology is distinctly venous with a **single external elastic lamina** and the absence of the multilayered elastic laminae characteristic of the IMA. **A faint internal elastic lamina may be present (but not always present or clearly identified).**



Single external black-gray, wavy elastic lamina; no internal elastic lamina is clearly identified.



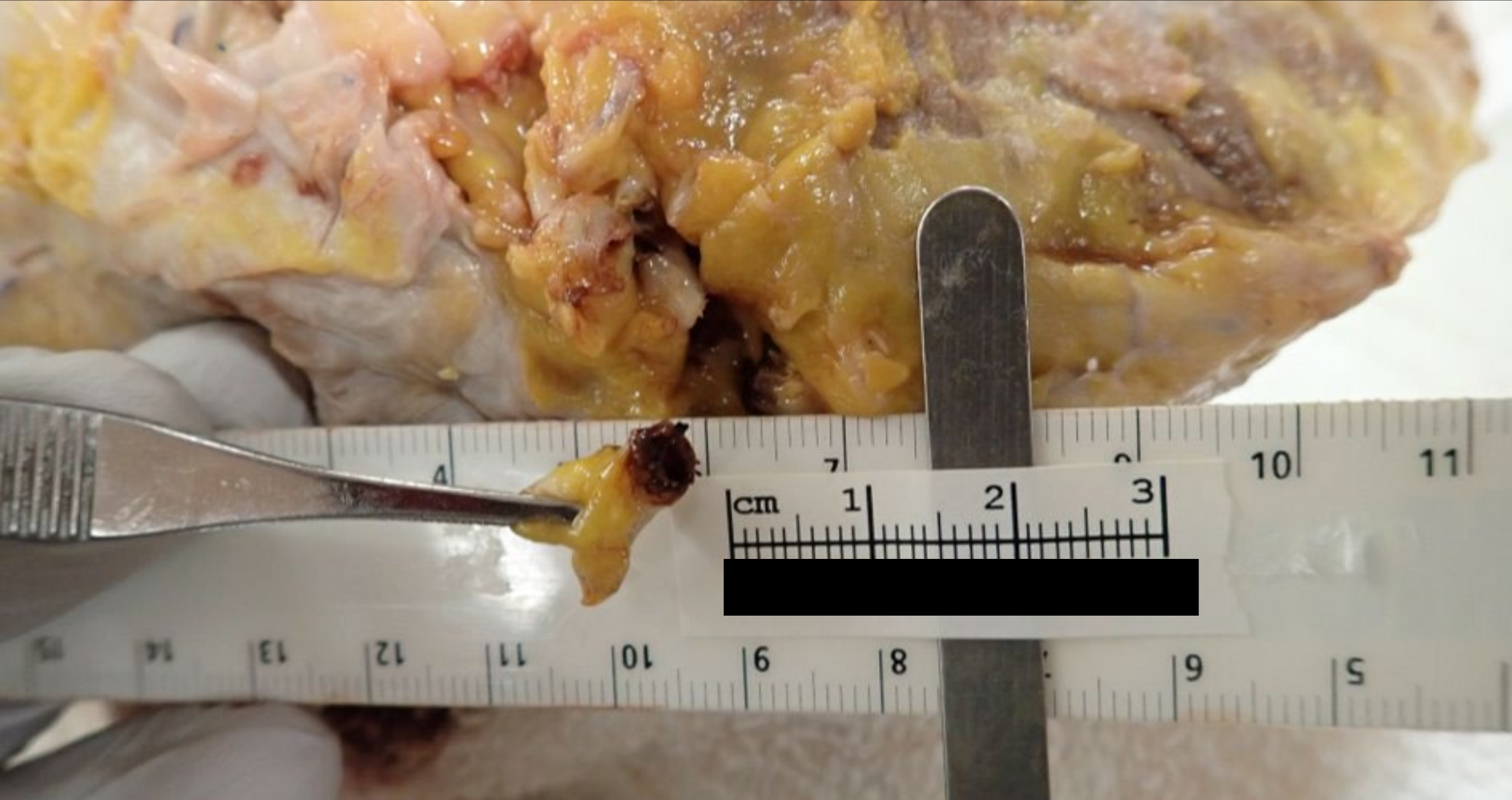
Saphenous Vein Graft, 40x; Hematoxylin & Eosin (Left), Verhoeff's Van Gieson Right)



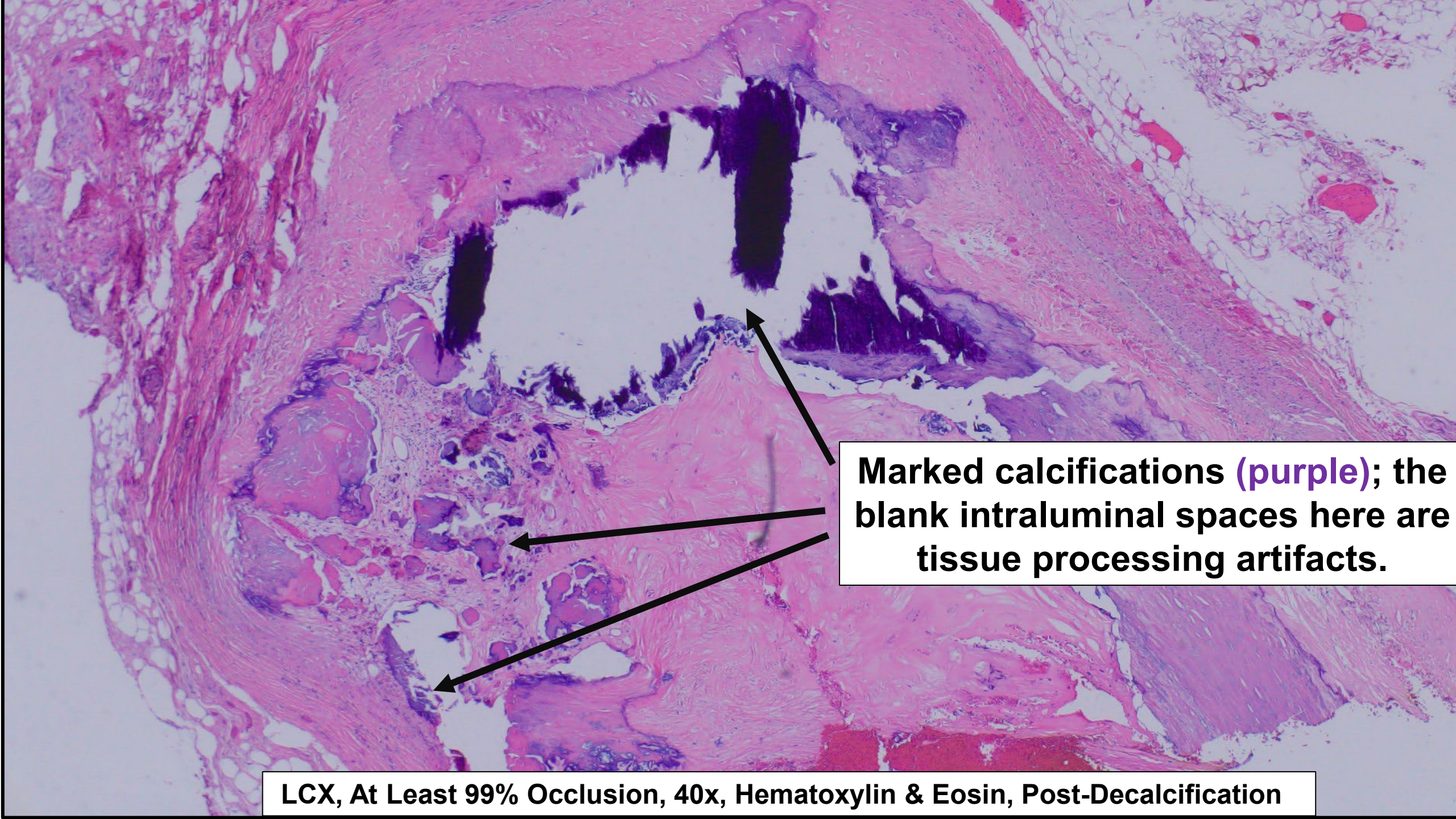
**Single external black-gray,
wavy elastic lamina.**

Saphenous Vein Graft, 200x, Oil Immersion; Hematoxylin & Eosin (Left), Verhoeff's Van Gieson (Right)

Of note, the decedent had severe calcific atherosclerotic disease of his native coronary arteries (including arteries proximal to termination sites from graft vessels), with at least 99% occlusion of his left circumflex (LCX) artery. See next slides for representative images.



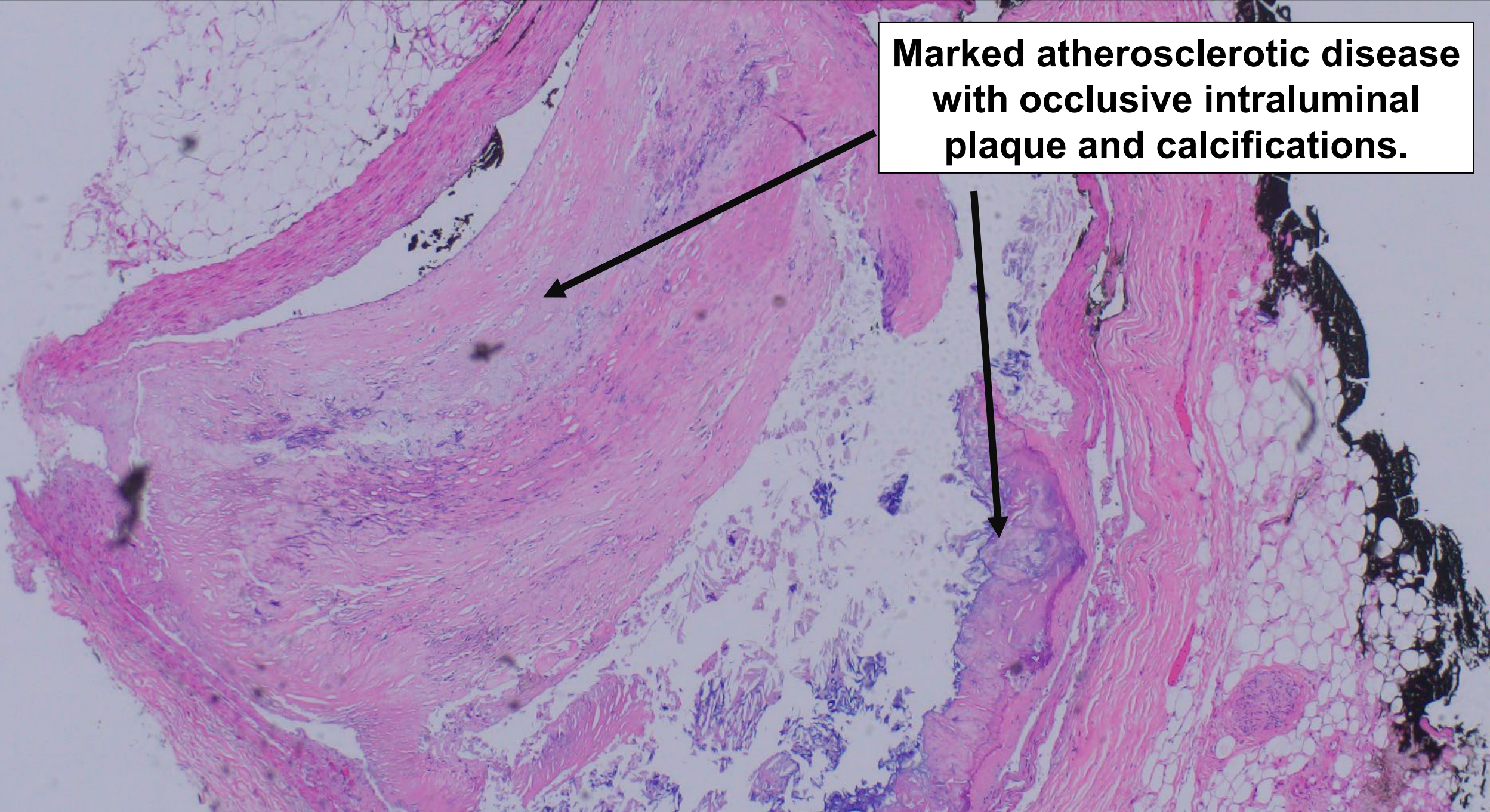
LCX, At Least 99% Occlusion, Gross, Post-Formalin (24 hours)



Marked calcifications (purple); the blank intraluminal spaces here are tissue processing artifacts.

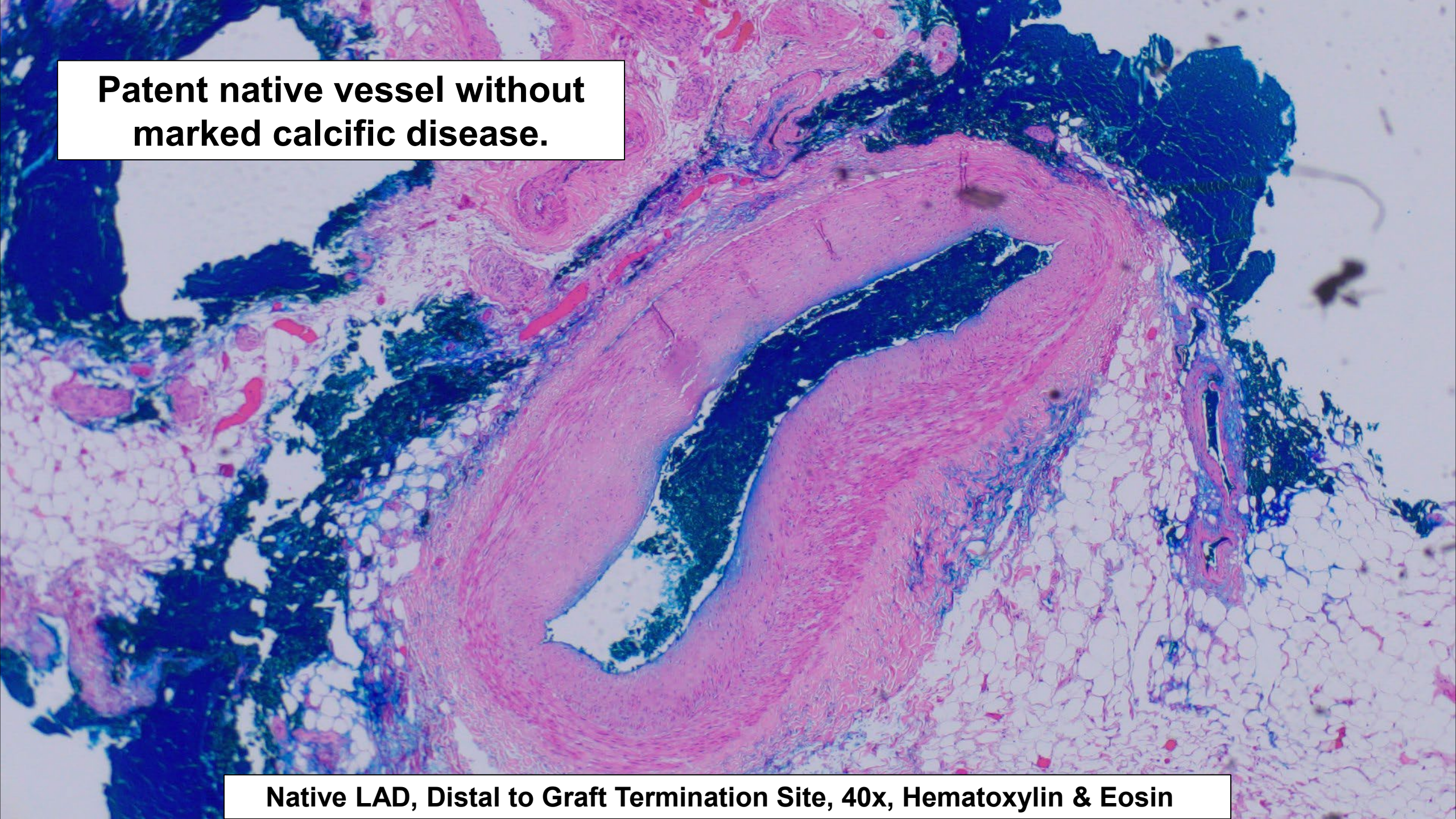
LCX, At Least 99% Occlusion, 40x, Hematoxylin & Eosin, Post-Decalcification

**Marked atherosclerotic disease
with occlusive intraluminal
plaque and calcifications.**



Native LAD, Proximal to Graft Termination Site, 40x, Hematoxylin & Eosin, Post-Decalcification

**Patent native vessel without
marked calcific disease.**



Native LAD, Distal to Graft Termination Site, 40x, Hematoxylin & Eosin

REFERENCES

1. Bachar BJ, Manna B. Coronary Artery Bypass Graft. 2023 Aug 8. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan—. PMID: 29939613.
2. Coronary Artery Bypass Graft (CABG). The Autopsy Book. Available at: <https://theautopsybook.com/coronary-artery-bypass/>. Accessed November 28th, 2025.
3. Licht P, Jacobsen E, Lerbjerg G, Andersen PE, Alstrup P. Cephalic veins in coronary artery bypass surgery. *Eur J Cardiothorac Surg*. 1996;10(5):327-330. doi:10.1016/s1010-7940(96)80090-x