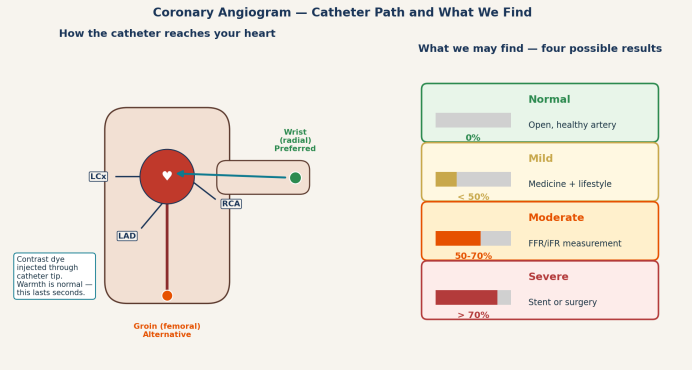
Understanding Your Coronary Angiogram

A Step-by-Step Guide to the Procedure, Results, and Next Steps

The most accurate test for coronary artery disease — what to expect before, during, and after.



Online: https://go.riasalimd.com/angiogram-guide

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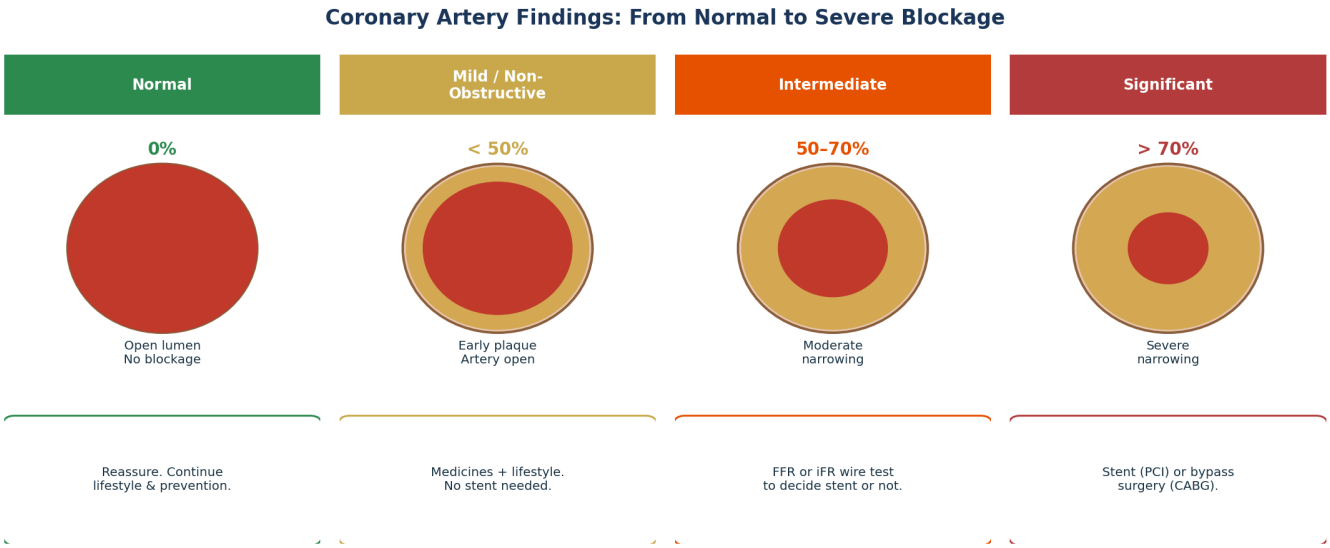
Names & Terms You Will Hear

Term	Meaning
Coronary angiogram	Heart artery X-ray / coronary cath
Cardiac catheterization (cath)	Tube-and-dye heart test
PCI	Percutaneous coronary intervention / stent procedure
CABG	Coronary artery bypass graft / bypass surgery
FFR	Fractional flow reserve — pressure wire test
iFR	Instantaneous wave-free ratio — pressure wire, no adenosine
IVUS	Intravascular ultrasound — plaque imaging inside artery
OCT	Optical coherence tomography — near-microscope artery view
Fluoroscopy	Live X-ray used to guide the catheter
Contrast dye	Iodine liquid that makes arteries visible on X-ray
Stenosis	Narrowing of an artery by plaque
Radial access	Catheter enters through the wrist
Femoral access	Catheter enters through the groin
Left main (LM)	Main trunk of the left coronary artery
LAD	Left anterior descending artery — front of the heart
LCx	Left circumflex artery — side of the heart
RCA	Right coronary artery — right side and bottom of heart

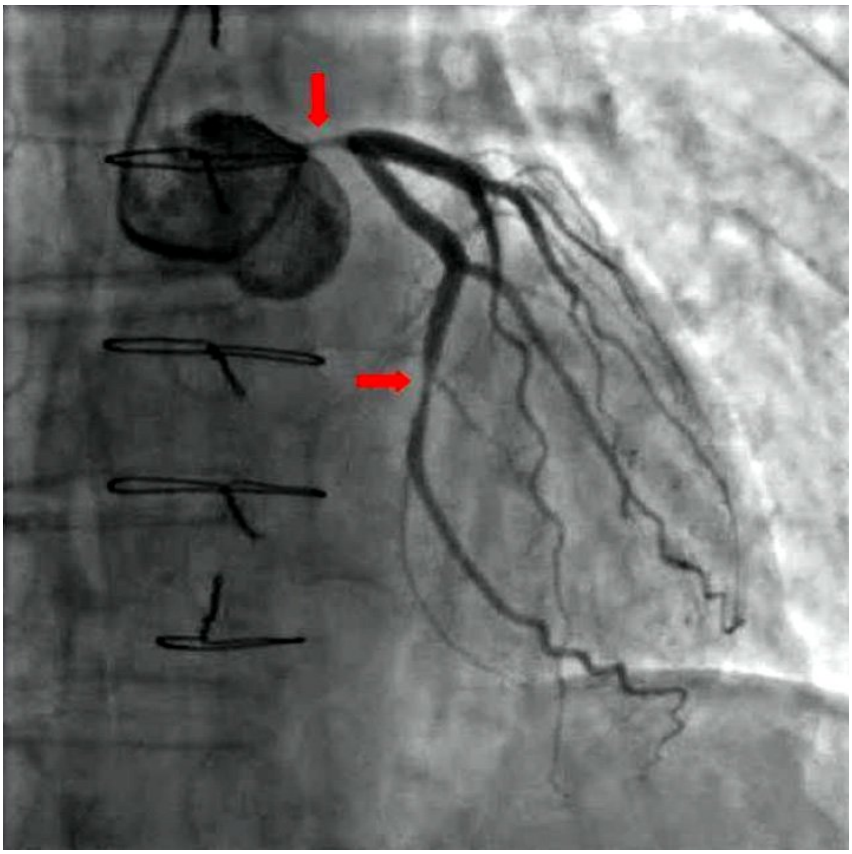
This guide covers the coronary angiogram — the diagnostic test.
If a stent is placed the same day, that is called PCI (stent procedure). See the **Angioplasty & Stents Guide** for stent details. See the **Cardiac Catheterization Guide** for the broader cath lab overview.

What Is Your Coronary Angiogram?

- **A coronary angiogram** is the gold-standard test for your heart arteries. It is also called cardiac catheterization with coronary imaging.
- A thin, soft tube called a **catheter** travels from your wrist or groin up to each coronary artery.
- **Contrast dye** is injected through the catheter. Live X-rays show how the dye flows. This reveals any blockages or narrowings.
- The test takes **30–60 minutes**. Most patients go home the same day.
- The main goal is to get answers. A stent may be placed the same day if a blockage is found and you are stable.
- No other test shows coronary anatomy as clearly. FFR and iFR wires can also measure blood flow. IVUS and OCT can image the artery wall up close.



Coronary artery findings spectrum from normal (open) to severe (>70% blockage). The clinical decision at each stage is shown below the artery cross-section.



A real coronary angiogram. The red arrows point to narrowed spots where plaque is blocking blood flow. This is the kind of picture your cardiologist reads during the test. Image credit: Pantaleo et al., via Wikimedia Commons (CC BY 2.0).

The Three Coronary Arteries — What Each One Supplies

LAD	LCx	RCA
• Left Anterior Descending artery	• Left Circumflex artery	• Right Coronary Artery
• Supplies the front wall of the heart	• Wraps around the left side of the heart	• Supplies the right ventricle and bottom of heart
• Called 'the widow maker' — most common site of serious blockage	• Supplies the lateral and posterior walls	• Gives rise to the PDA (posterior descending artery) in most people
• Diagonal branches supply the side wall	• Obtuse marginal branches off the LCx	• Controls the heart's electrical node in most patients

Why It Matters

- **Explains chest pain or shortness of breath** when other tests have not given a clear answer.
- **Before major surgery:** your surgeon needs to know your coronary anatomy.
- **After a heart attack:** the angiogram shows which artery was blocked. Treatment can follow right away.
- **Guides the right treatment:** it confirms whether a blockage needs a stent, surgery, or only medicine.
- **FFR or iFR testing** can be done through the same catheter. This checks if a borderline blockage truly limits blood flow. No second procedure is needed.
- **About 30–40% of angiograms** show no major blockage (NCDR data). A normal result is great news. It redirects care toward other causes like spasm or microvascular disease.

Coronary Angiogram vs. Coronary CTA — When to Use Which

Feature	Coronary Angiogram (Invasive)	Coronary CTA (Non-Invasive)
When preferred	Unstable pain, high-risk stress test, planned stent, after positive CTA	Low-to-intermediate risk, stable symptoms, ruling out disease
Access required	Arterial puncture (wrist or groin)	No arterial access — IV only
Can treat at same time?	Yes — stent can be placed in same sitting	No — imaging only
Functional test (FFR/iFR)?	Yes — wire through same catheter	No — anatomy only, not flow
Best for	Confirming and treating significant disease	Ruling OUT disease (high negative predictive value)
Limitation	Small procedural risk; radiation; contrast dye	Artifact with heavy calcium or metal stents; no intervention

Risk Factors

Some patients are more likely to develop this condition. Knowing your risk helps your care team take extra precautions.

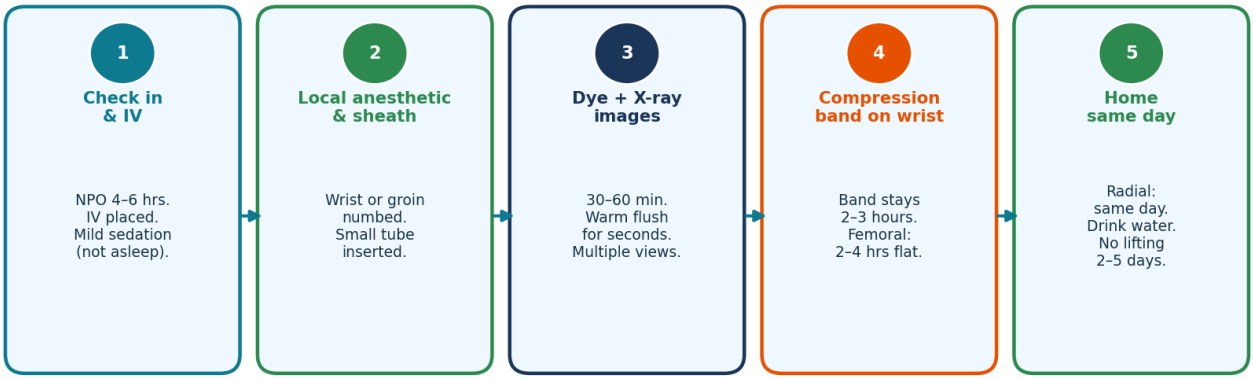
Risk Factor	Why It Increases Risk
Unstable chest pain / ACS	Urgent. May have an active blockage. Needs immediate answers.
Positive stress test	Stress imaging shows reduced blood flow. Angiogram confirms the anatomy.
Positive coronary CTA	CTA found significant plaque. Invasive test measures the severity.
Before heart surgery	Surgeon needs a coronary map before valve repair, bypass, or transplant.
After heart attack	Identifies the blocked artery. Guides stent placement.
Unexplained heart failure	Rules out coronary disease as the cause of a weak heart muscle.
High-risk stable symptoms	Multiple risk factors plus symptoms not explained by other tests.
Surveillance after bypass	Checks if bypass grafts are still open years after surgery.

Contrast Dye and Your Kidneys:
Contrast dye is safe for most patients. If you have chronic kidney disease (CKD), IV fluids before the test cut the risk of kidney injury. Your team will check your creatinine level first. For severe CKD or iodine allergy, carbon dioxide gas can be used instead. It has no kidney risk and no allergy risk.

Treatment Options

- **No food or drink** for 4–6 hours before the test. Your doctor will tell you the exact cutoff time.
- **Medicines to hold:** Hold metformin (diabetes pill) 24–48 hours before and after. Blood thinners — ask which to stop. Aspirin is usually continued.
- **Kidney check:** A creatinine blood test is done first to confirm contrast dye is safe for your kidneys.
- **Day of the test:** An IV is placed. You get mild sedation to help you relax. You are NOT put to sleep. You stay awake and can talk.
- **Numbing medicine** is injected at the wrist or groin. A small sheath is placed into the artery.
- **Catheter guided to your arteries** using live X-ray. Arteries have no pain nerves. You do not feel the catheter inside.
- **Contrast dye injected.** You may feel warmth for 5–10 seconds. This is normal. It goes away quickly.
- **X-ray images taken** from multiple angles. This maps each artery.
- **FFR or iFR wire** may be used through the same catheter to check blood flow. IVUS or OCT may image the artery wall. No extra needle is needed.
- **Wrist (radial) access:** A band stays on your wrist for 2–3 hours. Most patients go home the same day.
- **Groin (femoral) access:** You lie flat for 2–4 hours. Some patients stay one night.
- **After you leave:** Drink extra water to flush out the dye. Avoid heavy lifting for 2–5 days. Some bruising at the access site is normal.

What Happens on the Day of Your Coronary Angiogram



Five steps of the coronary angiogram procedure — from check-in to going home the same day. Most patients using the radial (wrist) approach are discharged within a few hours.

Advanced Imaging: FFR, iFR, IVUS, and OCT

- **FFR (Fractional Flow Reserve):** A pressure wire goes through the catheter across a blockage. FFR at or below 0.80 means the blockage limits blood flow. A stent is likely to help (FAME trial). FFR above 0.80 means medicine alone is safe.
- **iFR (Instantaneous Wave-Free Ratio):** Also a pressure wire test. Does not need the drug adenosine. As accurate as FFR (DEFINE-FLAIR trial). Threshold: iFR at or below 0.89 means treat.
- **IVUS (Intravascular Ultrasound):** An ultrasound tip on the catheter creates a 360-degree view of plaque inside the artery. Used for the left main artery and to confirm a stent is fully expanded.
- **OCT (Optical Coherence Tomography):** Near-infrared light gives near-microscope detail of the artery wall. It identifies plaque type and checks stent placement after PCI.
- All of these are done through the **same catheter** that is already in place. No extra needle is needed.

If a Blockage Is Found: Stents, Surgery, or Medicines

- **Normal arteries:** No stent needed. Medicines and lifestyle changes are the focus. Other causes of symptoms are explored if needed.
- **Less than 50% blockage:** Statins, blood pressure medicine, aspirin, and lifestyle. No stent at this stage.
- **50–70% blockage:** FFR or iFR wire decides. If flow is limited, a stent is placed. If not, medicine is used.
- **More than 70% blockage:** A stent (PCI) is usually placed. For simple one or two-vessel disease, the stent may be placed the same day.
- **Left main artery or complex 3-vessel disease:** A Heart Team — cardiologist and cardiac surgeon — reviews the angiogram together. CABG (bypass surgery) is often best for complex disease or diabetic patients with 3-vessel disease (FREEDOM trial). PCI is an option for less complex left main disease (EXCEL / NOBLE trials).
- **Staged PCI:** For multiple vessels, stents may be placed in separate visits rather than all at once.

Wrist vs. Groin Access: What You Should Know

- **Wrist (radial) is now the first choice** at most centers. The RIVAL trial (7,021 patients) showed radial reduces vascular complications. MATRIX showed it reduces death in heart attack patients.
- **Same-day discharge:** Wrist access means a compression band for 2–3 hours, then home. No overnight stay for a routine diagnostic angiogram.
- **Groin (femoral) is still used** for complex procedures or large catheters. Also used if wrist access fails or the radial artery is too small.
- **Complication rates:** Groin: bleeding or bruising 1–2%. Wrist: complications 0.1–0.3% (NCDR). Your hand has two blood supplies — radial and ulnar. If the radial is blocked, the ulnar takes over.
- **Before wrist access,** your team will check that the hand has good blood flow from the ulnar artery (Allen's test or Barbeau test). This is a simple bedside check.

Risks, Benefits, and Alternatives

Every choice has trade-offs. Use this table to start the shared decision conversation.

Option	Risks	Benefits	Alternatives
Coronary angiogram	Bleeding or bruising at access site. Rare major risks: death 0.1%, heart attack 0.05%, stroke 0.07% (NCDR). Radiation 3–10 mSv.	Most accurate coronary test. Stent can be placed same day. FFR/iFR measures blood flow. Guides stent vs bypass vs medicine.	Coronary CTA or stress test if symptoms are mild and risk is low
Coronary CTA	Radiation 2–5 mSv. Artifact with calcium or metal stents. Cannot treat or measure FFR.	No arterial puncture needed. Excellent for ruling out disease. Finds plaque early.	Best for low-to-intermediate risk. Not suitable if a stent is planned.
Medicine only — no imaging	May miss a significant blockage. Could delay needed treatment.	No procedure risk at all. Appropriate when symptoms are mild.	Suitable only for very low risk or when patient declines a procedure.

Common Misconceptions

Myth	Reality
The warm feeling means something went wrong.	FACT: Warmth or flushing is normal when dye is injected. It lasts 5–10 seconds. It is not an allergic reaction.
You are fully asleep for the procedure.	FACT: You get mild sedation to help you relax. You are awake and can talk. General anesthesia is NOT used.
A stent is automatic if I need an angiogram.	FACT: 30–40% of angiograms show no major blockage. Even when a blockage is found, a stent is not always needed. FFR or iFR testing helps make that decision.
The catheter goes through the chest wall.	FACT: The catheter travels through the wrist artery or the groin artery. No chest cut is made.
A coronary angiogram is like open-heart surgery.	FACT: It is a small outpatient procedure. A tiny puncture is made at the wrist or groin. Most patients go home the same day.
FFR or iFR is a separate procedure on a different day.	FACT: The FFR or iFR wire goes through the same catheter that is already in place. No extra needle is needed.
Contrast dye always damages the kidneys.	FACT: Kidney injury occurs in 1–3% of patients with chronic kidney disease. IV fluids before the test cut this risk. Most patients tolerate contrast with no kidney effect at all.
Normal arteries mean my chest pain is not real.	FACT: Normal arteries do not mean your pain is imaginary. Spasm, microvascular disease, and non-heart causes are real. A normal angiogram redirects care — it does not dismiss your symptoms.

Possible Complications

Knowing what can go wrong helps you spot problems early. Most complications are uncommon, especially with treatment.

Where / What	What Can Happen
Wrist (radial) access site	Bruising and soreness — common and normal. Wrist artery blockage in 1–2% of cases; usually no symptoms because the hand has a backup artery. Serious bleeding is rare: less than 0.3% (RIVAL trial).
Groin (femoral) access site	Bruising 1–2%. Pseudoaneurysm (pulsing lump) is rare, less than 0.1%. Internal bleeding is very rare.
Major cardiac events — elective procedure	Death 0.1%. Heart attack 0.05%. Stroke 0.07%. Emergency bypass surgery less than 0.1%. (Source: NCDR CathPCI Registry.)
Contrast dye allergy	Mild rash 1–2%. Severe allergic reaction less than 0.01%. Pre-medication with steroids and antihistamines reduces risk in patients with prior reactions.
Contrast and kidneys	Kidney injury in 1–3% of patients with chronic kidney disease. Rare in normal kidneys. IV fluids before the test cut the risk.
Radiation	Effective dose 3–10 mSv. This equals 1–3 years of natural background radiation. The lifetime cancer risk from one procedure is very small.
Irregular heartbeat (arrhythmia)	A brief flutter may happen when dye is injected. It usually stops on its own within seconds. Sustained arrhythmia needing treatment is rare.

Points to Know

If you remember nothing else, remember these key points.

- A coronary angiogram is the most accurate test for your heart arteries. No other test shows blockages as clearly.
- The procedure takes 30–60 minutes. You are awake but relaxed with mild sedation. You are NOT put to sleep.
- Most patients use the wrist (radial) approach. You go home the same day. Fewer bleeds than the groin approach (RIVAL trial).
- The warm feeling when dye is injected is normal. It lasts 5–10 seconds and stops.
- About 30–40% of angiograms show no major blockage. A normal result is great news. It is not a wasted test.
- FFR or iFR wire testing checks blood flow through the same catheter. No extra needle is needed.
- If a blockage is found, a stent may be placed the same day. Or your team may plan bypass surgery (CABG). It depends on the type and number of blockages.
- For complex disease, a Heart Team — cardiologist plus cardiac surgeon — reviews your angiogram together. This is called shared decision-making.

When to Call Us - and When to Call 911

If you are not sure, call. We would rather hear from you twice than miss a real problem.

- **Call 911:** Chest pain, severe trouble breathing, stroke signs (face drooping, arm weakness, slurred speech), fainting, or loss of consciousness.
- **Call our office NOW:** Bleeding at the wrist or groin that will not stop. Press firmly and call. Do not remove the pressure.
- **Call our office:** Expanding bruise or hard lump at the access site.
- **Call our office:** Skin that is cold, pale, or numb below the wrist or groin.
- **Call our office:** Pulsing or throbbing swelling at the access site. This can mean a pseudoaneurysm.
- **Call our office:** Fever above 100.4°F in the first 48 hours after the test.
- **Call our office:** Much less urine than normal, or dark urine after the procedure.
- **Normal and expected:** Mild bruising and soreness at the wrist or groin. A small firm lump that does NOT grow or pulse. These go away in 1–2 weeks.
- **Related guides:** Cardiac Catheterization | Angioplasty & Stents | CAD Guide

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Trusted Resources

The links below are the trusted resources Dr. Ali used to write this guide and that he recommends you visit for more information. Each is a clickable link in the digital version and a Short.io tracked URL on the printed version.

- ACC — Cardiac Catheterization Patient Information - American College of Cardiology patient-facing explanation of the procedure and risks.
- AHA — Cardiac Catheterization - American Heart Association overview of catheterization for patients.
- Cleveland Clinic — Coronary Angiogram - Step-by-step procedure explanation and preparation instructions.
- Mayo Clinic — Cardiac Catheterization - Detailed overview with risk summary and what to expect.
- SCAI — Society for Cardiovascular Angiography & Interventions - Professional society patient-education resources about cath lab procedures and interventions.
- NCDR CathPCI Registry — Public Reporting - National registry that tracks outcomes from over 2 million coronary procedures annually.

Sources Used to Build This Guide

Every recommendation in this guide is grounded in one or more of the studies, guidelines, or trusted resources below. Short links are tracked so Dr. Ali can see which references patients are reading; nothing personally identifying is captured.

- RIVAL Trial — Radial vs Femoral Access *[Randomized Trial]*
  Landmark trial proving radial access reduces vascular complications vs femoral. Foundation for radial-first standard of care.
- FAME Trial — FFR-Guided PCI *[Randomized Trial]*
  Proved FFR-guided PCI reduces major adverse cardiac events vs angiography alone. FFR threshold ≤0.80 defines ischemia-causing lesions.
- FAME-2 Trial — FFR-Guided PCI vs Medical Therapy *[Randomized Trial]*
  Showed FFR-guided PCI superior to medical therapy alone for hemodynamically significant lesions in stable disease.
- DEFINE-FLAIR Trial — iFR vs FFR *[Randomized Trial]*
  Proved iFR non-inferior to FFR for guiding PCI decisions, without adenosine. Supports routine iFR use in angiogram reports.
- SYNTAX Trial — PCI vs CABG for Complex CAD *[Randomized Trial]*
  SYNTAX score from angiogram stratifies complexity; higher SYNTAX favors CABG. Referenced when explaining Heart Team decision-making.
- FREEDOM Trial — PCI vs CABG in Diabetics with 3-Vessel Disease *[Randomized Trial]*
  Showed CABG superior to PCI for diabetic patients with 3-vessel disease. Informs post-angiogram treatment decision framing.
- EXCEL Trial — Left Main PCI vs CABG *[Randomized Trial]*
  5-year outcomes for left main disease. Both PCI and CABG acceptable; Heart Team individualization. Referenced in post-angiogram pathway.
- NOBLE Trial — Left Main PCI vs CABG *[Randomized Trial]*
  Complementary to EXCEL; slight CABG advantage at 5 years in left main disease. Cited alongside EXCEL for balanced framing.
- NCDR CathPCI Registry — Complication Rates *[Registry Data]*
  National registry source for procedure complication rates: death 0.1%, MI 0.05%, stroke 0.07%, vascular complications 1–2% femoral vs 0.1–0.3% radial.
- ACC/AHA 2021 Guideline — Stable Ischemic Heart Disease *[Clinical Guideline]*
  Primary guideline framework for indications for coronary angiography, FFR/iFR use, and revascularization decision thresholds.
- Cleveland Clinic — Coronary Angiogram Patient Guide *[Patient Education]*
  Plain-language framing for procedure steps, preparation, and aftercare. Competitor benchmark reviewed; this guide adds FFR/iFR/IVUS/OCT explanations, findings spectrum with clinical decisions, and radial-first data.
- Mayo Clinic — Cardiac Catheterization Overview *[Patient Education]*
  General procedure overview and risk description reviewed as competitor benchmark. This guide adds specific numerical complication rates, contrast nephropathy prevention, and post-procedure decision pathway.

- MATRIX Trial — Radial vs Femoral in ACS *[Randomized Trial]*
  Proved radial access reduces mortality in ACS patients compared to femoral. Supports radial-first standard in high-risk settings.

About This Guide

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Reviewer note: Reviewed against: Cleveland Clinic coronary angiogram page, Mayo Clinic cardiac catheterization overview, AHA patient education. This guide adds: FFR/iFR/IVUS/OCT tool explanations by name, four-stage findings spectrum with clinical decisions, NCDR complication rates, contrast nephropathy prevention, and radial-first trial evidence.

Disclaimer

This guide is for educational purposes only and does not replace medical advice from your physician. Recommendations may not apply to every patient. Always follow the specific instructions of Dr. Ali and your care team. In an emergency call 911 or go to the nearest emergency department.

Take This Guide With You

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