CONTRAINDICATIONS TO CORONARY ANGIOGRAPHY (CAG)

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Last reviewed: October 2026

I THE OVERALL CLINICAL PRINCIPLE

- **Emergency Override:** In the setting of an acute, life-threatening emergency such as **Acute ST-Elevation Myocardial Infarction (STEMI)** or **Cardiogenic Shock**, there are practically **no absolute medical contraindications** to coronary angiography; the life-saving benefit of emergency revascularization outweighs all relative procedural risks.

II ABSOLUTE CONTRAINDICATIONS

- **Patient Refusal:** Lack of informed consent from a mentally competent patient or their legally authorized representative in an elective or non-emergent setting.
- **Inadequate Facility or Personnel:** Lack of appropriate cardiac catheterization equipment or absence of trained personnel equipped to manage life-threatening procedural emergencies (such as coronary perforation or cardiac arrest).

III RELATIVE CONTRAINDICATIONS

- **Renal Impairment: Acute Kidney Injury (AKI)** or severe **Chronic Kidney Disease (CKD)** due to the high risk of precipitating **Contrast-Induced Acute Kidney Injury (CI-AKI)**.
- **Hematologic and Bleeding Disorders: Active internal bleeding**, severe **coagulopathy** (such as an INR greater than 2.0), or severe uncompensated **anemia** (hemoglobin less than 8 g/dL).
- **Severe Allergic History:** Known previous **anaphylactic or severe anaphylactoid reaction** to iodinated contrast media.
- **Hemodynamic Instability: Uncontrolled severe systemic hypertension** (which increases the risk of access-site bleeding and stroke) and **uncompensated acute pulmonary edema** (where the patient cannot lie flat on the catheterization table without airway or diuretic stabilization).
- **Systemic Infections: Active infective endocarditis** (where aortic root catheter manipulation can dislodge valvular vegetations and cause systemic embolization) or unexplained systemic febrile illness.
- **Metabolic and Electrolyte Derangements:** Severe **hypokalemia or hyperkalemia** (which lowers the threshold for lethal ventricular arrhythmias during catheter manipulation) and **Digitalis toxicity**.
- **Neurologic Status:** Acute ongoing **stroke** or severe systemic encephalopathy.

Relative Contraindication	Primary Procedural Hazard	Mandatory Pre-Procedural Mitigation Protocol
Previous Contrast Anaphylaxis	Recurrent anaphylactic shock / bronchospasm	**Oral Prednisone (50 mg at 13 h, 7 h, & 1 h prior)** + **Diphenhydramine (50 mg IV/PO 1 h prior)**
Severe CKD / AKI	Contrast-Induced Acute Kidney Injury (CI-AKI)	**Isotonic 0.9% NaCl hydration** + low/iso-osmolar contrast + **Total Contrast Volume < 3x eGFR** + **IVUS guidance**
Coagulopathy (INR > 2.0) / Bleeding Risk	Retroperitoneal or access-site hemorrhage	Strict **Transradial Artery Access** (easily compressible) and correction of reversible anemia/bleeding
Hypokalemia / Digitalis Toxicity	Catheter-induced Ventricular Fibrillation	Normalize serum potassium/magnesium and clear digoxin toxicity prior to elective angiography

IV MITIGATION STRATEGIES FOR RELATIVE CONTRAINDICATIONS

- **Contrast Allergy Pre-Medication Protocol:** Administer systemic corticosteroids (**Prednisone 50 mg orally at 13 hours, 7 hours, and 1 hour prior to the procedure**) combined with an H1 antihistamine (**Diphenhydramine 50 mg intravenously or orally 1 hour prior**).
- **Renal Protection Protocol:** Administer pre- and post-procedure **intravenous isotonic Normal Saline hydration**, use exclusively **low-osmolar or iso-osmolar contrast agents**, and restrict total contrast volume to an absolute minimum (**less than 3 times the patient's estimated Glomerular Filtration Rate [eGFR]** in milliliters).
- **Coagulopathy and Obesity Management:** Utilize the **Transradial Artery Access** approach, which provides superficial anatomical compressibility over the radial bone and virtually eliminates catastrophic retroperitoneal hemorrhage compared to femoral access.

V PRACTICAL CONSIDERATIONS IN THE INDIAN CLINICAL CONTEXT

- **The Radial-First Standard:** Widespread adoption of transradial access as the default standard in India has transformed moderate coagulopathy and obesity from major relative contraindications into manageable procedural considerations.
- **Ultra-Low and Zero-Contrast PCI in Diabetic CKD:** Given the high prevalence of advanced diabetic nephropathy in India, utilizing **Intravascular Ultrasound (IVUS)** for vessel sizing and stent landing-zone selection enables **Ultra-Low Contrast or Zero-Contrast PCI**, preserving residual renal function and avoiding permanent hemodialysis.

KEY REFERENCES

- **Libby P, Bonow RO, Mann DL, Tomaselli GF, Bhatt DL, Solomon SD:** *Braunwald's Heart Disease: A Textbook of Cardiovascular Medicine*, 12th Ed., Elsevier, 2022.
- **Lawton JS, Tamis-Holland JE, Bangalore S, et al.:** 2021 ACC/AHA/SCAI Guideline for Coronary Artery Revascularization, *Circulation*, 2022.