Coronary Computed Tomography Angiography (CCTA)

Coronary computed tomography angiography (CCTA) is a noninvasive anatomic imaging modality that enables visualization and diagnosis of both **nonobstructive and obstructive coronary artery disease (CAD)**. CCTA can characterize the **extent and severity of coronary atherosclerosis**, as well as **plaque composition and high-risk features**, including positive remodeling and low-attenuation plaque, which are associated with adverse cardiovascular outcomes[1–8].

Beyond anatomic assessment, **fractional flow reserve derived from CT (FFR-CT)** provides an estimate of **lesion-specific ischemia**, adding functional relevance to anatomic stenosis severity and supporting clinical decision-making regarding further testing or revascularization[9].

Advances in scanner technology and imaging protocols have substantially reduced radiation exposure. Contemporary CCTA is associated with **low radiation doses**, with effective exposure typically in the **3–5 mSv range** for most patients[10].

Although CCTA contraindications are summarized in Table 5 of the guideline, appropriate patient selection remains essential. In select clinical situations, comprehensive imaging protocols that evaluate the **coronary arteries, aorta, and pulmonary arteries** may be considered. However, the preferred strategy is to use **imaging protocols tailored to the most likely diagnosis**, rather than routinely employing a broad “triple rule-out” approach.

Coronary CT Angiography (CCTA): Practical Limitations and Contraindications

CCTA is **contraindicated or limited** in the following situations:

- **Allergy to iodinated contrast media**
- **Inability to cooperate with image acquisition**, including inability to follow breath-hold instructions
- **Clinical instability**, including:
- Acute respiratory distress
- Severe hypotension
- Unstable arrhythmia
- **Renal impairment**, as defined by institutional contrast safety protocols
- **Inability to achieve adequate heart rate control**, including:
- Contraindications to beta-blockers
- Lack of alternative rate-controlling agents
- **Significant heart rate variability or frequent arrhythmia**, which may degrade image quality
- **Contraindication to nitroglycerin**, when required as part of the imaging protocol

Recognition of these limitations is critical when selecting anatomic testing strategies and may necessitate alternative diagnostic approaches, including functional stress testing or invasive coronary angiography, depending on the clinical context.

References

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