Fig. 1 bottom). Increasing CACS was also associated with higher perioperative MACE (CACS ≥100 OR 5.1, p < 0.01). In a cohort deemed high risk by established clinical indices, absence of multivessel disease on CTA demonstrated a negative predictive value of 96% (95% CI 92.8–98.4) for predicting freedom from MACE.

Conclusion: Severity and extent of CAD on CTA conferred incremental risk for perioperative MACE post noncardiac surgery. The ‘rule-out’ capability of CTA is comparable to other non-invasive modalities and may be a viable alternative in perioperative risk stratification.

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Computed Tomography Coronary Angiography (CTCA) Detected High Risk Plaques are a Predictor of Future Coronary Events – Insights from a Propensity Matched Study of Patients who have Undergone Invasive Coronary Angiography, Fractional Flow Reserve and CTCA

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Background: High risk plaque (HRP) features, such as low attenuation plaque (LAP), positive remodelling and spotty calcification, identified on coronary computed tomography angiography (CTCA) have been shown to associate with fractional flow reserved (FFR) and acute plaque ruptures. No studies have compared the predictive value of HRP, quantitative plaque measures and FFR in predicting future major adverse cardiac events (MACE).

Methods: Patients from MonashHeart who had undergone CTCA and FFR between 2009–2017 were reviewed. Patients with MACE (cardiovascular death, myocardial infarction, stroke, hospitalisation for unstable angina, or coronary revascularisation >90 days following CTCA) were propensity matched to patients without MACE.

Results: 265 patients were reviewed with 17 (6.4%) having documented MACE over a median follow up of 5.4 years. MACE events included 2 STEMI, 2 NSTEMI, and 13 unstable anginas. Of the 34 propensity matched patients (mean age 60.5 ± 9.5 years, 74% men), 22 (65%) had HRF significant (defined as FFR <0.8) lesions and 12 (35%) had FFR nonsignificant lesions. MACE occurred in 10 FFR significant and 7 FFR non-significant patients. The mean interval between CTCA and MACE was 523 days. High risk plaques with ≥2 HRP features (hazard ratio 4.09, 1.37 to 12.18, p = 0.01) was the only predictor of future MACE. Total plaque burden (p = 0.82), minimal luminal area (p = 0.39) and FFR significance were not predictors of MACE (p = 0.55).

Conclusions: In patients who have undergone both CTCA and FFR, the presence of high risk plaques (≥2 HRP features) is the only predictor of future MACE.

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Computed Tomography Coronary Angiography Derived High Risk Plaques Predict Physiological Significance of Coronary Artery Stenoses as Assessed with Invasive Fractional Flow Reserve

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Background: High-risk plaque (HRP) characteristics such as low attenuation plaque (LAP), positive remodelling and spotty calcification are feasibly identified on computed tomography coronary angiography (CTCA). The presence of ≥2 HRF are considered very high-risk with a strong independent association with prognosis. Fractional Flow Reserve (FFR) however, remains the reference standard for lesion-level coronary intervention in stable patients.

Purpose: We investigated the relationship between qualitative HRF (non-invasive anatomical assessment) and FFR (invasive functional assessment).

Methods: Consecutive stable coronary artery disease patients who underwent CTCA and invasive FFR at MonashHeart between 2009–2017 were reviewed. Patients with significant FFR (<0.8) were propensity-matched for age, sex and cardiovascular risk factors to patients with non-significant FFR resulting in 55 patients per group. Logistic regression analysis was applied to define predictors of FFR significance. Odds ratios (OR) with respective 95% confidence intervals are reported.

Results: The presence of a single HRP feature in a lesion was similar between FFR significant vs non-significant (78% vs 72%, p = 0.66). The presence of ≥2 HRP features in a lesion was greater in FFR significant vessels (51% vs 25%, p = 0.01). Univariable predictors of FFR-significance included increasing total plaque burden (p = 0.002), increasing minimal luminal area (p = 0.002), ≥2 HRF features (p = 0.007), and presence of LAP (p = 0.05). On multivariable assessment, total plaque burden (Odds Ratio OR 1.06 (1.01–1.11), p = 0.01), decreasing minimal luminal area (OR 0.54 (0.41–0.81), p = 0.001), and ≥2 HRF (OR 3.91 (1.43–10.71), p = 0.008) remained independent predictors of significant invasive FFR.

Conclusions: The presence of ≥2 HRF features within a coronary lesion non-invasively identified on CTCA independently predict FFR significance.

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