

Is there an Intravascular Ultrasound luminal area threshold that Correlate with Fractional Flow Reserve, in Intermediate Coronary Artery Stenosis

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Background: Fractional Flow Reserve (FFR) of >0.8 or 0.75 is currently used to guide revascularization in lesions with intermediate coronary stenosis. Whether there is an intravascular ultrasound (IVUS) measurement which can reliably be used to predict when patients should undergo intervention is unclear.

Aim: To determine the minimal luminal area (MLA) obtained by IVUS that correlates with a $FFR < 0.8$ or < 0.75 in patients with intermediate coronary stenosis. Methods: The analysis included 92 intermediate lesions (84 patients) located in a vessel diameter >2.5 mm. All were evaluated by both FFR and IVUS. A positive FFR was considered present when it was < 0.8 and < 0.75 . IVUS MLA was correlated to the FFR findings in those intermediate lesions with 40-70% stenosis.

Results: The mean FFR value was 0.89 ± 0.08 . In 24 (26.1%) was 0.8 and in 17 (18.5%) < 0.75 . The mean MLA was 3.6 ± 1.1 mm², and the mean diameter stenosis by QCA was 47.5 ± 9.8 %. The analysis detected correlations between FFR and MLA IVUS of ($r = 0.34$, $p < 0.001$), minimal luminal diameter (MLD) by IVUS of ($r = 0.31$, $p = 0.004$), lesion length by IVUS of ($r = -0.5$, $p < 0.001$) and area stenosis by IVUS of ($r = -0.31$, $P = 0.01$). There was no significant correlation between FFR and minimal luminal diameter by QCA ($r = 0.19$, $p = 0.06$), diameter stenosis by QCA ($r = 0.08$, $p = 0.4$) and lesion length by QCA ($r = -0.14$, $p = 0.17$). ROC curve identified MLA < 2.8 mm² (sensitivity 79.7%, specificity 80.3%) to be the best cut-off values for an $FFR < 0.75$ and MLA < 3.2 mm² for $FFR < 0.8$ (sensitivity 69.2%, specificity 68.3%). For lesion with vessel reference diameter 2.5-3mm, 3-3.5mm and >3.5 mm the MLA cut-off for $FFR < 0.75$ were 2.57, 2.8 and 3.7mm² respectively.

Conclusion: Anatomic parameters of intermediate coronary lesions obtained by IVUS showed a significant correlation to the FFR values, they differ for different vessel sizes and may be used as an alternative to FFR in determining significant CAD that will require intervention.