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Ultrasound-Based Prediction of Unassisted AVF Maturation: A Comparative Study of UAB Versus NKF-KDOQI Criteria

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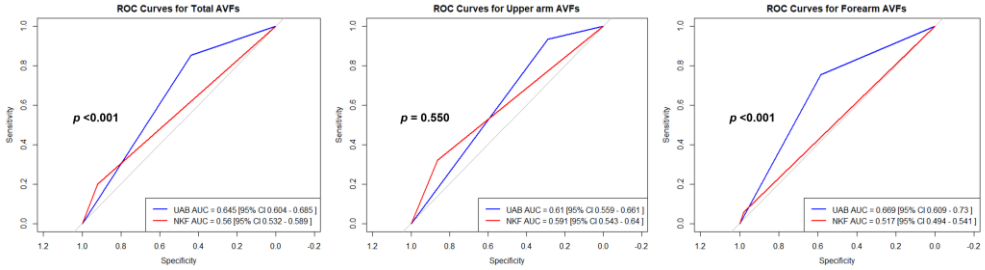
Objectives : The timely maturation of arteriovenous fistulas (AVFs) is vital for successful hemodialysis, reducing complications and reliance on catheters. This study compared the predictive performance of the University of Alabama at Birmingham (UAB) criteria with NKF-KDOQI guidelines for unassisted AVF maturation, focusing on differences between upper and forearm AVFs.
Methods : In a retrospective analysis of 560 chronic kidney disease patients undergoing AVF creation from January 2017 to March 2021, postoperative ultrasound measurements of outflow vein diameter and blood flow were recorded. The UAB criteria (≥4 mm diameter, ≥500 mL/min flow) were compared with NKF-KDOQI (≥6 mm diameter, ≥600 mL/min flow). Logistic regression identified independent predictors of unassisted maturation.
Results : Overall, 68.6% of AVFs matured without assistance, with upper arm AVFs at 70.6% and forearm AVFs at 66.3%. Although NKF-KDOQI showed a higher positive predictive value (0.85 vs. 0.77), UAB demonstrated a superior negative predictive value (0.57 vs. 0.35) and overall accuracy (AUC 0.645 vs. 0.560). Logistic regression revealed age (OR 0.986, 95% CI 0.973–0.999, p=0.038) and UAB positivity (OR 4.009, 95% CI 2.623–6.128, p<0.001) as the strongest predictors. In upper arms, both UAB (OR 4.571, 95% CI 2.200–9.499, p<0.001) and NKF-KDOQI (OR 2.181, 95% CI 1.087–4.374, p=0.028) were effective. However, in forearms, UAB was the key determinant (OR 4.266, 95% CI 2.453–7.419, p<0.001).
Conclusions : UAB criteria demonstrated superior performance in predicting unassisted AVF maturation, especially for forearm accesses, where NKF-KDOQI's predictive ability was nearly random. These findings underscore the importance of incorporating UAB-based ultrasound assessments into clinical practice for improved vascular access outcomes and patient care.

ROC Curves for Prediction of Unassisted Maturation.png



ROC Curves for Prediction of Unassisted Maturation.png

Univariate logistic regression			Multivariable logistic regression	
Variables	**Odd Ratio (95% CI)**	***p*-value**	**Odd Ratio (95% CI)**	***p*-value**
Age	**0.985 (0.973 – 0.998)**	**0.023**	**0.986 (0.973 – 0.999)**	**0.038**
BMI	0.972 (0.932 – 1.014)	0.190		
Sex (Male)	1.419 (0.988 – 2.040)	0.058		
DM	0.829 (0.578 – 1.189)	0.308		
HTN	1.030 (0.644 – 1.648)	0.902		
CAD	0.703 (0.450 – 1.097)	0.120		
AVF Location (Forearm)	0.819 (0.573 – 1.170)	0.272		
UAB = Yes	**4.462 (2.962 – 6.721)**	**<0.001**	**4.009 (2.623 – 6.128)**	**<0.001**
NKF-KDOQI = Yes	**2.902 (1.592 – 5.291)**	**<0.001**	1.808 (0.970 – 3.370)	0.062