**VALVULAR REGURGITATION PREDICTS RESIDUAL SHUNT FOLLOWING PERCUTANEOUS PATENT FORAMEN OVALE CLOSURE**

# Kristen N. Brown, MD, Gleb R. Haynatzki, PhD, DSc, and Andrew Goldsweig, MD, MS, FACC, FSCAI, FSVM, RPVI

Division of Cardiovascular Disease and Biostatistics Department at the University of Nebraska Medical Center, Omaha, Nebraska

Background:

Residual shunt is associated with increased risk of recurrent stroke.1 Data is very limited regarding predictors of residual shunt following percutaneous patent foramen ovale (PFO) closure.2-5 This study aims to identify any valvular abnormalities which may predict residual shunt following PFO closure on preprocedural echocardiogram.

Methods:

Single-center retrospective analysis of 137 patients who underwent percutaneous PFO closure within the dates of January 1, 2009, to December 31, 2020. PFO closure failure was defined as residual shunt of one or more bubble(s) seen in the left heart within 3 beats of the cardiac cycle as per the current guidelines which identify the presence of PFO. Regurgitant valve lesions were defined according to the 2017 American Society of Echocardiography guidelines. Survival analysis using a Cox regression model was performed to assess for associations between echocardiographic parameters and the risk of PFO closure failure.

Results:

Valve lesions were found in 119 patients (86.9%). Of these, 31 (26%) resulted in percutaneous PFO closure failure. The independent (statistically significant, P < 0.05) predictors of PFO failure were moderate mitral regurgitation (MR) (Relative Risk, RR 10.33, 95% CI 1.86-56.35), tricuspid regurgitation (TR) (RR 1.85, 95% CI 1.16-2.95), mitral plus tricuspid regurgitation (RR 1.47, 95% CI 1.13-1.90), and mitral plus tricuspid plus aortic regurgitation (AR) (RR 1.36, 95% CI 1.07-1.71) (Table 1).

Conclusions:

Moderate mitral regurgitation is associated with a 10-fold higher risk of PFO closure failure. Tricuspid regurgitation is associated with a 1.85 higher risk of PFO closure failure. Multiple regurgitant valves result in a 1.4-1.5 times higher risk of failure.

**Table 1:** Univariates Survival Analyses: Cox regression model

|  |  |  |  |
| --- | --- | --- | --- |
| Predictor Variable  | Relative Risk (RR) | RR 95% Confidence interval  | P-Value |
| Mild AR | 2.18 |  | 0.185 |
| Moderate AR | 0.89 |  | 0.916 |
| Mild MR | 1.78 |  | 0.358 |
| Moderate MR | **10.33** | **1.86-56.35** | **0.007** |
| Severe MR | 4.85 |  | 0.175 |
| TR | **1.85** | **1.16-2.95** | **0.009** |
| MR & TR | **1.47** | **1.13-1.90** | **0.004** |
| MR, TR, & AR | **1.36** | **1.07-1.71** | **0.010** |

\* When two or more levels are shown for a particular categorical predictor variable, that means that each of these levels is compared with the reference, which is normally the lowest level, 0 or 1.

\*\* P-values < 0.05 (statistically significant) are highlighted in red. 95% CI is for RR are shown only for the statistically significant predictor variables.

References:

1. Deng et al. Residual Shunt After Patent Foramen Ovale Closure and Long-Term Stroke Recurrence: A Prospective Cohort Study. Ann Intern Med 2020; 172:717-725.
2. Achille Gaspardone et al. Predictors of residual right to left shunt after percutaneous suture-mediated patent foramen ovalis closure. *JACC* Vol 13. No 18. 2020.
3. Bernhard Meier. Closure of patent foramen ovale: technique, pitfalls, complications, and follow up. *Heart*. 2005 Apr; 91(4):444-448.
4. Kasner SE et al. Patent foramen ovale closure with GORE HELEX or CARDIOFORM Septal Occluder vs. antiplatelet therapy for reduction of recurrent stroke or new brain infarct in patients with prior cryptogenic stroke: Design of the randomized Gore REDUCE Clinical Study. *Int J Stroke*. 2017 Dec;12(9):998-1004.
5. Turc G et al; CLOSE Investigators. Closure, Anticoagulation, or Antiplatelet Therapy for Cryptogenic Stroke with Patent Foramen Ovale: Systematic Review of Randomized Trials, Sequential Meta-Analysis, and New Insights from the CLOSE Study. *J Am Heart Assoc.* 2018 Jun 17;7(12).

Aortic Rim

