**HEART FAILURE MAY BE REAL A CHALLENGE TO PERCUTANEOUS PFO CLOSURE**

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Background:

Heart failure (HF) is known to increase the perioperative risk of noncardiac surgeries.1 However, data is limited on the effects of HF in patients who undergo percutaneous patent foramen ovale (PFO) closure.2-3 One important outcome of percutaneous PFO closure is the presence of residual shunt as it is associated with an increased risk for stroke.4 This study aims to identify risk factors for residual shunt following percutaneous PFO closure within the HF population.

Methods:

Single-center retrospective analysis of 137 patients who underwent percutaneous PFO closure from January 1, 2009, to December 31, 2020. Pre and post procedure echocardiograms were evaluated. PFO closure failure was defined as one or more bubble(s) seen in the left heart within 3 beats of the cardiac cycle, as per the current guidelines. Systolic and diastolic dysfunction were defined per 2017 American Society of Echocardiography guidelines. Survival analysis using a Cox regression model was performed to assess for associations between HF etiology, echocardiographic parameters found in HF patients, and the risk of PFO closure failure.

Results:

Systolic dysfunction was found in 15 patients (11%) and diastolic dysfunction was found in 10 patients (7%). Of these, 7 patients from each group resulted in percutaneous PFO closure failure, respectively. The independent (statistically significant, P < 0.05) predictors of PFO failure were systolic dysfunction (Relative Risk, RR, 5.6, 95% CI 1.66-18.68), diastolic dysfunction (RR 6.78, 95%CI 2.1-21.57), non-ischemic cardiomyopathy (RR 13.36, CI 3.13-56.13), whereas elevated left atrial filling pressure (LAFP) was marginally significant (RR 0.07, 95% CI 0.92-6.73) (Figure 1).

Conclusions:

Systolic dysfunction is associated with 5.6 times higher risk of PFO closure failure and diastolic dysfunction is associated with 6.8 times higher risk of PFO closure failure. Larger studies are needed to investigate further the significance of LAFP in association with PFO closure failure.

**Figure 1:** Univariates Survival Analyses: Cox Regression Model

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| --- | --- | --- | --- |
| Predictor Variable | Relative Risk (RR) | RR 95% Confidence Interval | P-value |
| Ischemic Cardiomyopathy | 2.32 |  | 0.2811 |
| Non-ischemic Cardiomyopathy | **13.36** | **3.13-56.13** | **0.0004** |
| Systolic Dysfunction | **5.61** | **1.66-18.68** | **0.0052** |
| Right Ventricular Dilatation | 1.65 |  | 0.3310 |
| Diastolic Dysfunction | **6.78** | **2.11-21.57** | **0.0013** |
| LAFP | **2.49** | **0.92-6.73** | **0.0726** |

\* 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, 0.05 ≤ P-value < 0.10 are in blue. 95% CI is for RR are shown only for the statistically significant predictor variables.

References:

1. Goldman L, Caldera DL, Nussbaum SR, Southwick FS, Krogstad D, Murray B, Burke DS, O'Malley TA, Goroll AH, Caplan CH, Nolan J, Carabello B, Slater EE. Multifactorial index of cardiac risk in noncardiac surgical procedures. *N Engl J Med*. 1977 Oct 20;297(16):845-50.
2. Bernhard Meier. Closure of patent foramen ovale: technique, pitfalls, complications, and follow up. *Heart*. 2005 Apr; 91(4):444-448.
3. 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.
4. 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.

