**A THOROUGH ECHOCARDIOGRAPHIC ASSESSMENT PRIOR TO PERCUTANEOUS CLOSURE OF PFO IS THE KEY TO A SUCCESSFUL CLOSURE**

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Background:

Echocardiographic parameters have never previously been assessed to identify possible predictors of residual shunt following percutaneous non-sutured patent foramen ovale (PFO) closure.1-2 This study aims to identify possible echocardiographic predictors of residual shunt following percutaneous PFO closure as residual shunt has been shown to increasing the risk of stroke.3

Methods:

Single-center retrospective analysis of 137 patients who underwent percutaneous PFO closures within the dates of January 1, 2009, to December 31, 2020. The pre and the 30-day, 6 months, and 1 year post PFO closure echocardiograms were assessed, and parameters were collected. 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 which identify the presence of PFO. Survival analysis using a Cox regression model was performed to assess for associations between echocardiographic parameters and the risk of PFO closure failure.

Results:

Percutaneous PFO closure failure was found in 33 patients (24%). The independent (statistically significant, P < 0.05) predictors of PFO failure were higher PFO shunt grade 2-4 (Relative Risk, RR 11.51, 95% 2.64-50.97), shunt direction (RR 10.24, 95% CI 2.92-35.57), circular 3-dimensional PFO shape (RR 0.12, 95% CI 0.04-0.34), spontaneous bubbles across PFO (RR 0.18, 95% CI 0.04-0.78), whereas marginally significant (0.05 < P < 0.10) predictors include anterior aortic rim length by tunnel width (RR 0.72) and the presence of septal aneurysm (RR 2.57) (Table 1).

Conclusions:

Higher anterior-aortic-rim-by-tunnel-width ratio is associated with a decreased risk of PFO closure failure while septal aneurysm is associated with a higher risk of PFO closure failure. Left-to-right as well as bidirectional shunting is associated with 10.23 times higher risk of PFO closure failure. Shunting grade 2-4 is associated with 11.5 times higher risk of failure. Large studies are needed to further investigate the association of these echocardiographic parameters on PFO closure.

**Table 1:** Univariant analysis of echocardiographic parameters using Cox regression model.

|  |  |  |  |
| --- | --- | --- | --- |
| Predictor Variable | Relative Risk (RR) | RR 95% Confidence Interval | P-Value |
| CIRCULAR 3D Shape | **0.12** | **0.04-0.34** | **<.0001** |
| Tunnel Width/Tunnel Length | 1.16 |  | 0.3864 |
| Pre-shunting Grade 2 | **11.47** | **2.26-60.66** | **0.0037** |
| Pre-shunting Grade 3 | **10.69** | **2.14-53.49** | **0.0039** |
| Pre-shunting Grade 4 | **14.14** | **2.24-87.30** | **0.0043** |
| Pre-shunting grade (1vs234) | **11.51** | **2.64-50.97** | **0.0012** |
| Bidirectional shunting | **10.24** | **2.92-35.57** | **0.0003** |
| Anterior Aortic Rim | 0.98 |  | 0.6242 |
| Anterior Aortic Rim/PFO Tunnel Width | **0.72** |  | **0.0711** |
| Septal Aneurysm | **2.57** |  | **0.0631** |
| SpONTANEOUS BUBBLES | **0.18** | **0.04-0.78** | **0.0220** |

\* 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. Bernhard Meier. Closure of patent foramen ovale: technique, pitfalls, complications, and follow up. Heart. 2005 Apr; 91(4):444-448.
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. 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.