

# Fibrosis ventrikel kanan berdasarkan magnetic resonance imaging pada defek septum atrium sekundum dengan penyakit vaskular paru = Right ventricular fibrosis based on magnetic resonance imaging in secundum atrial septal defect with pulmonary vascular disease

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## Abstrak

Latar Belakang: Fibrosis ventrikel kanan merupakan respons adaptif sekaligus maladaptif terhadap kelebihan beban di ventrikel kanan. Peranan fibrosis ventrikel kanan pada populasi hipertensi pulmonal (HP) akibat defek septum atrium (DSA) sekundum belum banyak diketahui.

Tujuan: Membandingkan derajat fibrosis ventrikel kanan pada pasien DSA sekundum yang sudah dan belum terjadi penyakit vaskular paru (PVP) serta menilai korelasi parameter fibrosis berdasarkan magnetic resonance imaging (MRI) dengan nilai pulmonary arterial resistance index (PARI), flow ratio (FR) dan rasio pulmonary vascular resistance/systemic vascular resistance (PVR/SVR) dari kateterisasi jantung.

Metode: Penelitian ini merupakan studi potong lintang pada pasien DSA sekundum dengan HP berusia 318 tahun yang menjalani kateterisasi jantung kanan dan pemeriksaan MRI untuk menilai fibrosis ventrikel kanan.

Hasil: Terdapat total 63 pasien yang ikut serta dalam penelitian. Sebanyak 92.1% pasien memiliki gambaran late gadolinium enhancement (LGE) di regio right ventricular insertion point dan 66.7% di septum interventrikular. Kelompok yang sudah mengalami PVP memiliki skor LGE, nilai native T1 dan extracellular volume (ECV) yang lebih tinggi dibanding kelompok yang belum (berturut-turut, 3 [1-4] vs. 2 [0-4];  $p = 0.001$ , 1192 [1043-1407] ms vs. 1118 [1019-1191] ms;  $p < 0.001$ ,  $43.7 \pm 5.5\%$  vs.  $38.1 \pm 4.6\%$ ;  $p < 0.001$ ). Skor LGE memiliki korelasi sedang terhadap PARI ( $r = 0.581$ ,  $p < 0.001$ ), PVR/SVR ( $r = 0.561$ ,  $p < 0.001$ ) dan FR ( $r = -0.490$ ,  $p < 0.001$ ). Nilai native T1 memiliki korelasi kuat terhadap PARI ( $r = 0.679$ ,  $p < 0.001$ ) dan PVR/SVR ( $r = 0.627$ ,  $p < 0.001$ ) serta korelasi sedang terhadap FR ( $r = -0.589$ ,  $p < 0.001$ ). Nilai ECV memiliki korelasi sedang terhadap FR ( $r = -0.440$ ,  $p < 0.001$ ), serta korelasi lemah terhadap PARI ( $r = 0.398$ ,  $p = 0.001$ ) dan PVR/SVR ( $r = 0.382$ ,  $p = 0.001$ ).

Kesimpulan: Pasien DSA sekundum yang sudah mengalami PVP memiliki derajat fibrosis ventrikel kanan yang lebih berat serta terdapat korelasi bermakna antara fibrosis ventrikel kanan dengan parameter kateterisasi jantung.

.....Background : Right ventricular (RV) fibrosis is both adaptive and maladaptive response to the overloaded RV. Its role in pulmonary hypertension (PH) caused by secundum atrial septal defect (ASD) is not well known.

Aim(s): This study aims to compare RV fibrosis in patients with secundum ASD who have and have not experienced pulmonary vascular disease (PVD) and to determine the correlation of RV fibrosis with pulmonary arterial resistance index (PARI), flow ratio (FR), and pulmonary vascular resistance/systemic vascular resistance (PVR/SVR) ratio.

Method(s): This is a cross-sectional study on patients aged 18 years with secundum ASD and PH, who underwent right heart catheterization (RHC) and cardiac magnetic resonance imaging (MRI) to assess RV fibrosis.

Result(s): There were a total of 63 patients participating in this study. The majority of patients showed late gadolinium enhancement (LGE) in the region of RV insertion point (92.1%) and interventricular septum (66.7%). The PVD group had higher LGE scores, native T1, and extracellular volume (ECV) (3 [1-4] vs. 2 [0-4];  $p = 0.001$ , 1192 [1043- 1407] ms vs. 1118 [1019-1191] ms;  $p < 0.001$ ,  $43.7 \pm 5.5\%$  vs.  $38.1 \pm 4.6\%$ ;  $p < 0.001$ , respectively). LGE scores had a moderate correlation with PARi ( $r = 0.581$ ,  $p < 0.001$ ), PVR/SVR ratio ( $r = 0.561$ ,  $p < 0.001$ ), and FR ( $r = -0.490$ ,  $p < 0.001$ ). RV native T1 showed a strong correlation with PARi ( $r = 0.679$ ,  $p < 0.001$ ) and PVR/SVR ( $r = 0.627$ ,  $p < 0.001$ ), and a moderate correlation with FR ( $r = -0.589$ ,  $p < 0.001$ ). RV ECV had a moderate correlation with FR ( $r = -0.440$ ,  $p < 0.001$ ), and weak correlations with PARi ( $r = 0.398$ ,  $p = 0.001$ ) and PVR/SVR ( $r = 0.382$ ,  $p = 0.001$ ).

Conclusion: Secundum ASD patients with PVD showed significantly higher degree of RV fibrosis. There is a significant correlation between RV fibrosis and hemodynamic parameters obtained from RHC.