University Heart Journal
Vol. 15, No. 2, July 2019

EDITORIAL

Third and Fourth Heart Sounds: Clinical and Haemodynamic Significance

University Heart Journal 2019; 15(2): 40

The 3rd heart sound (S3) and 4th heart sounds (S4) are low pitched diastolic sounds best heard with the bell of the stethoscope. They are usually quite soft and difficult to hear. S4 may only be detected in phonocardiogram. **S3** is also known as **sound of distress** and **S4** as **sound of stress.** S3 and S4 gallop is the presence of S3 or S4 with tachycardia and summation gallop is the combined presence of S3 and S4 with tachycardia. S3 is produced during first rapid filling phase of ventricular diastole just after S2. It is mid-diastolic. S4 is produced due to augmented atrial contraction against stiff ventricle during the last rapid filling phase of ventricular diastole. It is absent in atrial fibrillation. It usually indicates reduced left ventricular compliance.

S3 in health and disease: Physiologic S3 is found in a perfectly healthy young person, under the age of about 20, or even upto 40 years of age. It can be heard in 80-90% in pregnant women & in 60% S3 develops before the 20th week of pregnancy. The differentials of S3 include widely split S2, OS, tumour plop and the pericardial knock.

S3 is extremely important in the diagnosis of congestive heart failure (CHF). It has been found to be the best predictor of mortality at 2.5 years in patients with coronary artery disease (CAD). The haemodynamic correlates of S3 include elevated LA pressure- generally in the range of 6-6.5(6.5+/-0.3) mm and LVESD 5.6+/-0.3 cm. The S3 that occurs in mitral regurgitation (MR) indicates severity of MR whereas its presence in AR is an indicator of LV dysfunction with increased ESD/volume. Persistent audible S3 in patients with heart failure is a sign of poor prognosis and is a predictor of recurrent hospitalization and increased mortality. In 90 patients undergoing elective left heart catheterization, the sensitivity of phonocardiographically recorded S3 for detecting LVEDP >15mm Hg and reduced LVEF <50% was 41% and 52% respectively and the specificity was 92% and 87% respectively.

Importance of S4: In contrast to S3, S4 is always pathologic. In a study of patients undergoing left heart catheterization, the sensitivity of S4 for elevated LVEDP and reduced LVEF was 46% and 43% respectively. Patients with an isolated S4 tended to have a higher prevalence of CAD compared to those who had no diastolic heart sound or those with an S3 alone. Haemodynamic hallmark of S4 includes: 1) Normal/mildly elevated LA mean pressure

2) reduced/shallow y descent

3) rapidly rising 'a' wave in LA pressure tracing.

Palpable and audible S4 with systemic hypertension indicates LVH. Presence of S4 in patients under the age of 40 years in patients with aortic stenosis correlates with peak systolic gradient of 70 mm Hg and LVEDP of 13mm Hg or greater. S4 is very rare in patients with volume overloaded ventricles except in acute MR and acute AR.

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