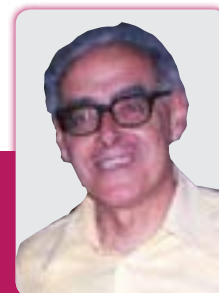


3<sup>rd</sup> Euro-Global Experts Meeting on

# Medical Case Reports

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### Indexes derived from the end systolic pressure volume applied to the study of heart failure

Based on the theory of large elastic deformation of the myocardium, a mathematical expression was derived for the non linear end systolic pressure volume relation (ESPVR). A rich collection of new indexes derived from the parameters describing the non linear ESPVR can be used to assess the ventricular function and the state of the myocardium. In particular relations obtained between ejection fraction (EF) and the new indexes derived from the non linear ESPVR give new insight into the problem of heart failure with normal or preserved ejection fraction (HFpEF) and can be used for prognostic, diagnostic and monitoring purposes. The figure shows how a relation between percentage occurrence of heart failure (HF) and EF (left side) has been extended to derive a relation between percentage occurrence of HF and SWR/SW (right side; SW=Stroke work, SWR=SWx-SW=Stroke work reserve, SWx is the maximum possible SW calculated from the area under the ESPVR). Five clinical groups are presented in the figure: Normal group (\*), aortic stenosis (o), aortic valvular regurgitation (+), mitral valvular regurgitation (^), miscellaneous cardiomyopathies (x). Notice that the normal group (\*) in both cases appear near the bottom of both curves with  $EF \approx 0.67$  and  $SWR/SW \approx 0.34$ . Similar relations can be obtained for other indexes derived from the ESPVR, which show the strong potential use that can be made of the ESPVR for clinical applications.

### Biography

Rachad M Shoucri has completed his PhD in Theoretical Physics in 1975 at Laval University, Quebec City, Canada. After graduation he has worked for five years at the Institut de Cardiologie de Quebec where he has developed interest in mathematical physiology. Since 1981, he is with the Department of Mathematics and Computer Sciences, Royal Military College of Canada, Canada.

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