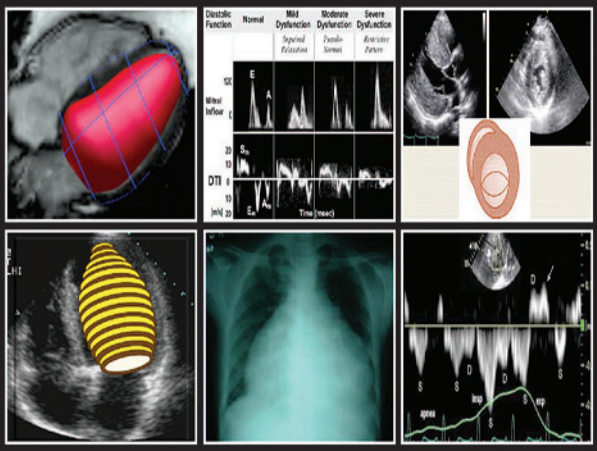
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SECOND EDITION

Rajesh Shah



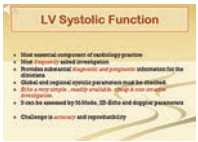
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Foreword
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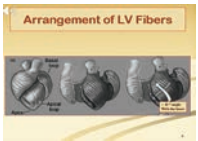
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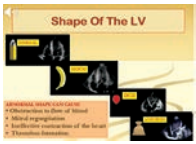
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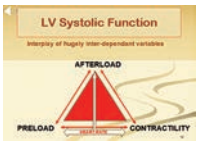
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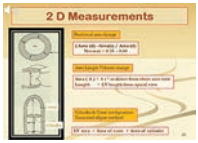
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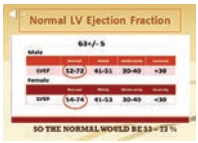
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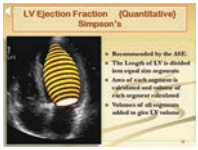
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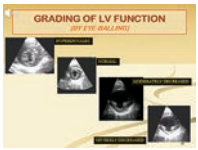
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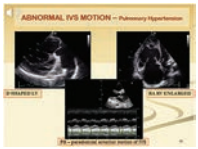
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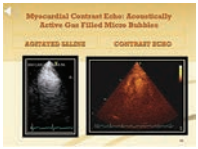
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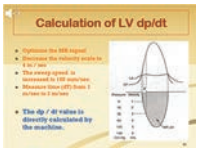
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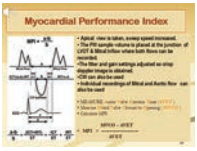
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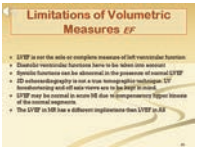
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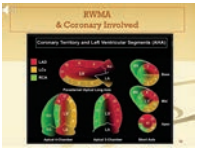
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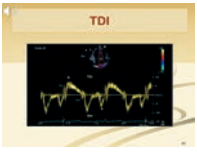
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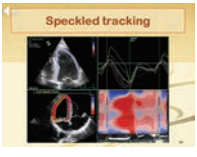
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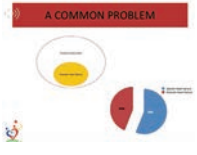


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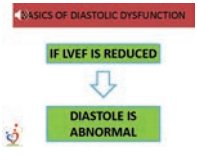


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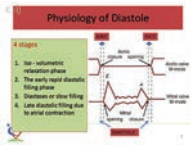
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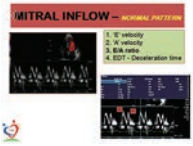
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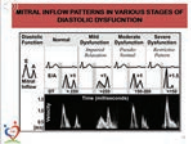
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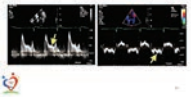
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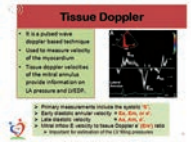


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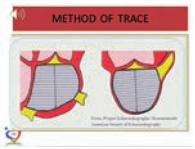


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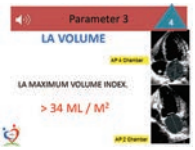
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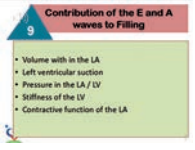


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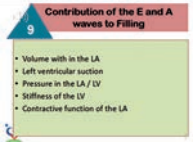

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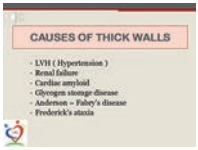
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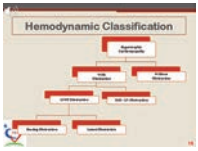
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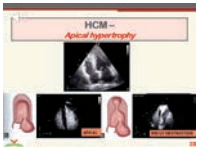
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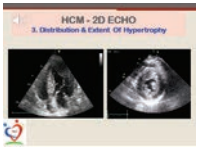
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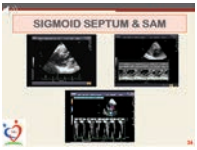
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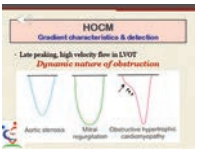
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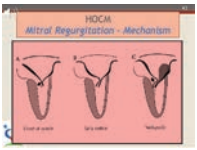
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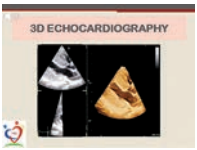
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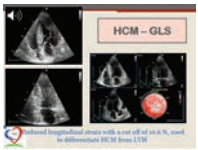
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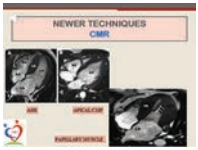
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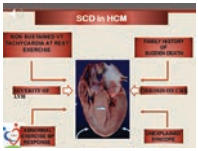
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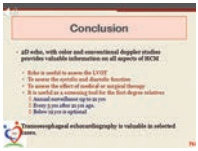
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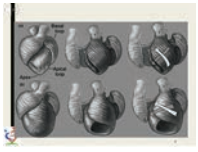


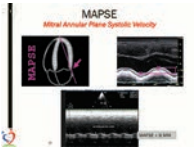
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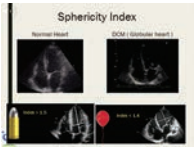
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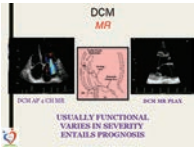

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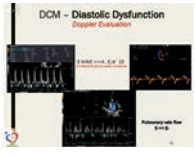
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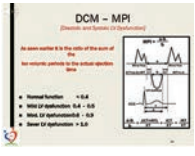
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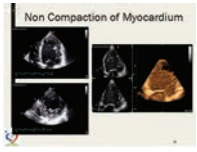
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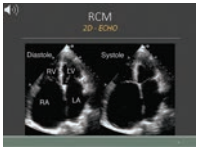


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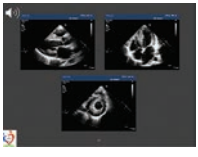
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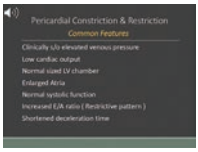
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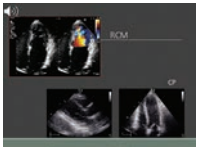
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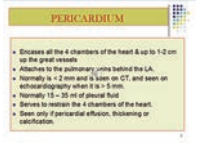


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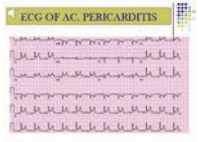


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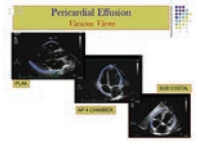
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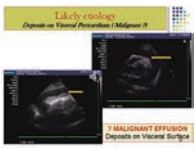
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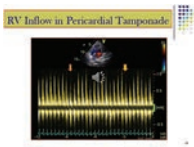
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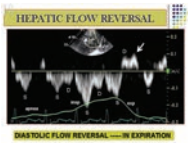
Slides 32 to 36



Slides 37 to 52



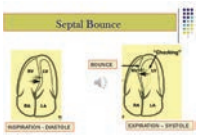
Slides 53 to 60



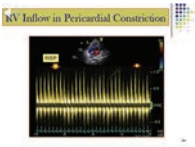
Slides 61 to 63



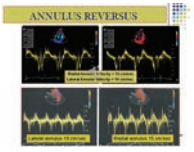
Slides 64 to 72



Slides 73 to 77



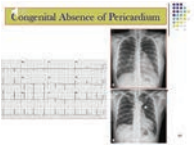
Slides 78 to 87



Slides 88 to 92

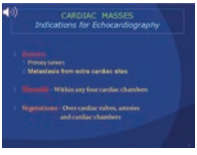


Slides 93 to 101

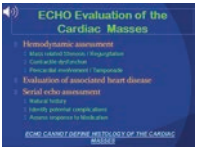


Slides 102 to 104

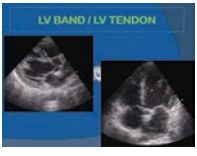
Cardiac Masses 21



Slides 1 to 4



Slides 5 and 6



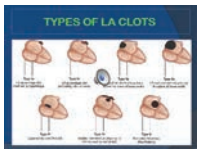
Slides 7 to 15



Slides 16 to 24



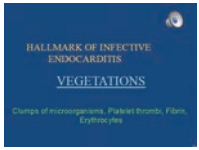
Slide 25



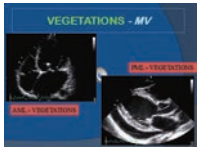
Slides 26 to 33



Slides 34 to 37



Slides 38 to 44



Slides 45 to 47



Slides 48 to 53



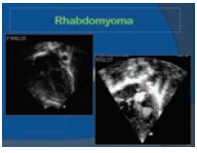
Slides 54 to 56



Slides 57 to 61



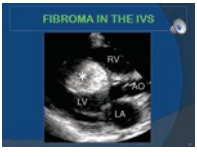
Slides 62 to 66



Slides 67 to 69



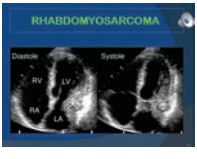
Slides 70 and 71



Slides 72 to 74



Slides 75 to 81



Slides 82 to 88



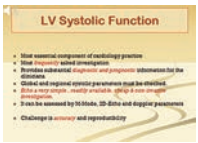
Slides 89 to 94

Illustrative Video Manual of Echocardiography

- Left Ventricular Systolic Function
- Left Ventricular Diastolic Function
- Hypertrophic Cardiomyopathy
- Dilated Cardiomyopathy
- Restrictive Cardiomyopathy
- Pericardial Diseases
- Cardiac Masses

Left Ventricular Systolic Function

Slides 1 and 2



These slides discuss the importance of left ventricular (LV) systolic function. It is the most important and most frequently asked for investigations, as it provides a great diagnostic and prognostic information of the global and regional systolic function. As always mentioned, 2D echocardiography is the most easily available non-invasive and a cheap method of estimation of the EF.

It can be assessed by the M-mode, the 2D echo and the Doppler parameters. The challenge always being the accuracy and the reproducibility.

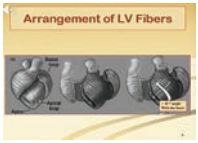
Slide 3



There are two basic LV functions; the systolic and the diastolic. Diastolic dysfunction is fast achieving importance, and according to latest statistic is seen in nearly 50% of the heart failure patients and should be recognized early. We will be dealing with it in the further presentations. The systolic function can again be global as in primary dilated cardiomyopathy or regional as in a post-infarct patient. The components of global systolic functions include the stroke volume giving us the idea of the pump function while the ejection fraction gives the idea of the ventricular function. The regional wall motion abnormality described by the 16/17 segment method as recommended by the American Echocardiography Society.

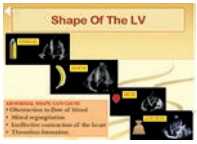
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Slides 4 to 6



These slides give an idea as to the arrangement of the myocardial fibers and the different types of cardiac motions. The myocardial fibers are oriented in a spiral fashion around the left ventricle. Contraction results in myocardial thickening and excursion of the endocardium toward the center of the ventricle. Simultaneous with this motion toward the center and cavity shrinkage, there is a twisting motion of the left ventricle, as if a towel is wringed. The third type of motion is the one in which the apex and the base approach each other, called the longitudinal motion.

Slides 7 to 10



These slides show the importance of the evaluation of the shape, size and function of the left ventricle, as all play an important role in the contractility. The slides also demonstrate the various shapes of the heart, with live videos. One thing should be kept in mind that the cardiac output could be normal even with poor ejection fraction.

Slides 11 and 12



These two slides show the interplay of the different factors that a affect the LV systolic function:
Less the preload (hypervolemia), less the COP, less the afterload (vasodilators) more the COP, higher the inotropic state (dopamine) higher the COP, and to some extent higher the HR, more the COP.

Slides 13 to 15



These slides show the various techniques of measuring the LV ejection fraction, and discuss, why echocardiography is the most practical way of going about it. Also, the different echocardiographic methods of determination of the LV ejection fraction are enumerated.

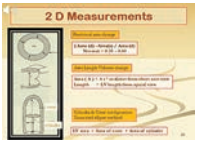
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Slides 16 to 26



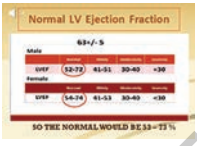
These slides all discuss and demonstrate the various M-mode methods of calculation of the ejection fraction right from fractional shorting, ejection fraction, mitral annular motion, the E-point septal separation (EPSS), slow closure of the aortic valve, and the aortic root motion. The last slide discusses the shortcoming of the M-mode echocardiographic methods.

Slides 27 to 31



These slides describe the 2D methods of ejection fraction calculation, which include the area and the volume measurements. These methods are not routinely used in clinical practice as they are based on assumptions of shape of the heart. A word about the sphericity index is also put in.

Slide 32



This slide gives the guidelines set up by the American Society of Echocardiography for the grading of ejection fraction.

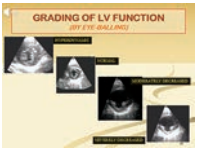
Slides 33 to 37



These slides describe with illustrations—the quantitative method of estimation of the ejection fraction, i.e. is the Simpson's single and biplane methods.

The proper technique is also illustrated, and the method to identify foreshortening is also described. The ASE approves this method.

Slides 38 to 40



These slides illustrate the grading of LV systolic functions on the basis of eye-balling. There are various video clips showing the different grades of ejection fractions on the basis of eye-balling, from hyper-dynamic to normal, moderate-to-severely reduced EF.

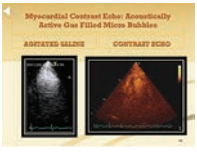
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Slides 41 to 47



All these slides demonstrate the limitations of the estimations of the LV ejection fraction. The most common causes are the non-ischemic wall motion abnormalities. Such as left bundle branch block, pacing rhythm, PVC'S, right volume overload, pericardial constriction, and postcardiac surgery.

Slides 48 to 51



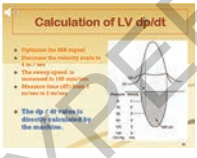
These slides enumerate the recent advances and methods that help us to improve the accuracy of estimation of the LV ejection fraction, like IV myocardial contrast and the 3D echocardiography.

Slides 52 to 59



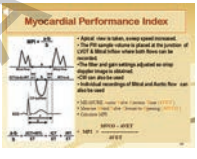
These slides give complete ideas as to the Doppler method of calculation of the stroke volume, cardiac output and cardiac index. The proper sight and method of LVOT diameter measurement and the placement of the sample volume for measuring the LVOT–VTI, are demonstrated.

Slides 60 to 62



These slides demonstrate the method of measuring the dp/dt, and the significance in the estimation of the LV systolic function.

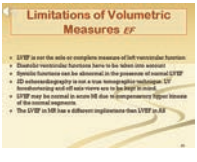
Slides 63 to 68



These slides give a complete account of the measurement of MPI, i.e. the myocardial performance index or the TEI index.

The clinical implications, the limitations have all been discussed.

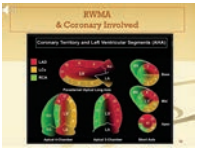
Slide 69



In this slide, all the limitations of the volumetric methods have been discussed.

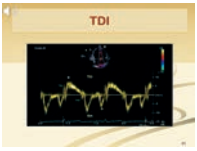
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Slides 70 to 78



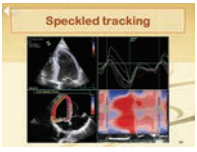
These slides discuss the regional or segmental LV dysfunction. These are mostly ischemic in origin and in the distribution of the coronaries. The 17-segment model has been discussed. The segmental abnormalities seen in anterior, inferior MI, the LV aneurysm, are all illustrated.

Slides 79 to 82



These slides show the usefulness of tissue Doppler in the evaluation of LV systolic functions, particularly the 's' waves. The differences between tissue Doppler and pulsed Doppler are also shown.

Slides 83 to 85

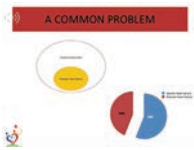


These slides show the recent upcoming, still not fully calibrated methods of LV systolic function evaluation like the speckled tracking, which can quantify regional dysfunction and also calculate the global longitudinal strain.

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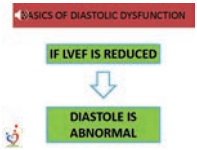
Left Ventricular Diastolic Function

Slides 1 to 3



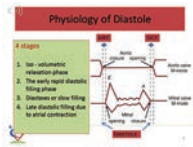
These slides discuss the prevalence of diastolic function, which unfortunately is high and not well recognized. Diastolic function can be with or without systolic function.

Slides 4 to 6



These two slides give the definition of normal and abnormal diastolic function. It is the ability of the ventricle to fill without increase in the atrial pressure.

Slides 7 to 15



All the four stages of diastole are described in detail. These being, isovolumic relaxation phase, the early rapid filling phase, diastasis and the late diastolic filling due to atrial contraction. There method of measurement is illustrated. The effect of respiration is also discussed.

Slides 16 to 20



All the slides describe the pathophysiology of diastolic dysfunction, how the re-modeling leads to diastolic dysfunction, the ultimate end result being increased LA and pulmonary venous pressure. The effect on compliance of the LV is described. Lastly, the symptomatology and the differential diagnosis of diastolic dysfunction are described.

Slides 21 to 23



These slides describe the in ow parameters and the clinical significance of each parameter.

Slides 24 to 26

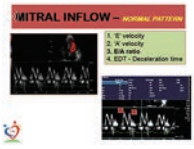


There are many parameters for the evaluation of the diastolic dysfunction, indicating the sensitivity of individual parameter. Only the parameters used in the recent guidelines have been discussed.

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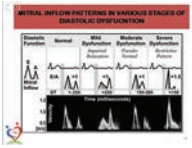
The reason for evaluation of diastolic function is also discussed.

Slides 27 to 29



Now the individual parameters are discussed. The technique of measurement, the significance, and the values in different stages of diastolic dysfunction are discussed. The factors affecting these parameters have also been enlisted.

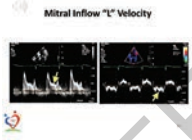
Slides 30 to 35



These slides discuss the second parameter, i.e. the mitral inflow, which is also one of the most important of all. The different entities to be measured like 'E' and 'A' waves, E/A ratio, DT and the 'A' wave duration are all illustrated. The effect of the different stages on these parameters is also shown.

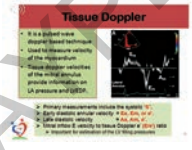
The influence of various factors on the values of these parameters is discussed.

Slide 36



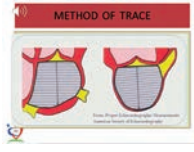
This slide discusses and illustrates the 'L' wave, which can be seen in the mitral inflow and the mitral annular tissue Doppler waves. It can be seen in diastolic dysfunction and also in other conditions discussed here.

Slides 37 to 43



These slides discuss the role of TDI (Tissue Doppler Imagining) in the evaluation of diastolic dysfunction. The normal relationship of the lateral and medial annulus velocities is illustrated. The mitral inflow 'E" wave to the TDI 'e" wave ratio is the most important in estimation the LA filling pressures, and is demonstrated in the different slides. Lastly, certain important facts and advantages of the tissue Doppler are enlisted in the last slide.

Slides 44 to 49



These slides discuss the next important parameter, i.e. the LA volume which has a lot of recognition these days for its prognostic implications. The two methods of estimation of the LA volume, as per the guidelines are shown. The clinical significance of increased LA volume is well discussed.

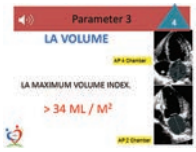
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Slides 50 to 55



These slides discuss the latest ASE guidelines for the evaluation of the diastolic dysfunction. The aims and the importance of the 2D image are emphasized. The use of minimal criteria, four to be exact are discussed.

Slides 56 to 59



These slides discuss the four parameters recommended by the ASE, for the evaluation of diastolic function in a case with normal ejection fraction.

Slides 60 and 61



These slides describe the use of these four parameters for the decision making, whether diastolic dysfunction is present or not. The algorithm for the same is described.

Slides 62 to 70



These slides give the algorithm for the evaluation of the grade of diastolic dysfunction in a patient with impaired systolic function. The important thing is that the grade Pseudo normal is no more used. At the end an example is presented for proper understanding.

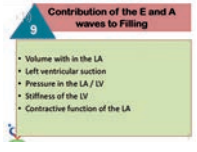
Slides 71 to 75



These slides discuss the intricate details of the diastolic dysfunction in conditions like atrial fibrillation, mitral annular calcification, ventricular pacing, etc.

The use of speckle tracking is also added in the evaluation of diastolic dysfunction.

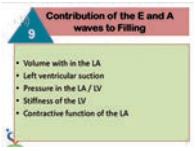
Slide 76



The slide discusses the pros and cons of the mitral inflow patterns and the contribution of each wave to the filling of the LV.

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Slides 77 and 78



These slides discuss the contribution of the different mitral inflow waves, i.e. E and A to the LV filling.

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- Essential plugins—Java & Flash player
  - If facing problems in viewing content—enable/re-install Java plugin on your web browser setting.
  - If Videos don't show up—enable/re-install Flash Player or manage Flash setting on your web browser settings.
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