

Ehokardiografija
Echocardiography

8.1.

2D I 3D EHOKARDIOGRAFIJA U DETEKCIJI KONGENITALNIH ANOMALIJA MITRALNE VALVULE

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Trodimenzijska (3D) ehokardiografija značajan je napredak u dijagnostici bolesti srčanih valvula. Bolji prikaz morfoloških promjena srčanih valvula i međusobnih kompleksnih odnosa daje 3D nego 2D ehokardiografija.

U prirodne anomalije mitralne valvule (MV) ubrajamo prolaps kuspisa, izolirani rascjep kuspisa, dvostruki otvor, supramitralni ring koji treba razlikovati od »cor triatriatum sinister«, Ebsteinovu anomaliju MV, mitralnu arkadu, MV u obliku padobrana, monokuspidnu valvulu i prirodnu MS.

Prirodne anomalije MV uzrokuju MR u 72% slučajeva, MS u 13% slučajeva i kombiniranu mitralnu grešku u 15% slučajeva.

U radu su 3D ehokardiografijom prikazani prolaps MV, rascjep mitralnog kuspisa i monokuspidna MV. Miksomatozne degenerativne promjene kuspisa glavni su etiološki čimbenik nastanka prolapsa, a prevalencija je 0,7% u zdravih tinejdžera, a prema Framinghamskoj studiji 2,4% u odraslih. Prolaps MV definiran je prolapanjem kuspisa u lijevi atrij najmanje 2 mm od ravnine anulusa prikazano u dugoj osi s ili bez zadebljanih kuspisa. Klasični prolaps MV definiran je kao zadebljanje kuspisa od 5mm, a neklasični je prolaps bez zadebljanih kuspisa.

Monokuspidna MV vrlo je rijetka kongenitalna anomalija. Može biti izolirana anomalija ili u kombinaciji s drugim prirodnim srčanim greškama. Prema literaturnim podacima do sada je u svijetu opisano 11 slučajeva. 3D ehokardiografija daje nam detaljan prikaz ove rijetke anomalije. Naša bolesnica ima samo prednji mitralni kuspis, dva papilarna mišića i korde tendineje koje se hvataju na prednji kuspis. Važno je razlikovati ovu anomaliju od MV u obliku padobrana kod koje nalazimo samo jedan papilarni mišić. U naše bolesnice funkcija monokuspidne MV je uredna uz trivijalnu MR.

Zaključak: Prednost 3D ehokardiografije je u boljem i preciznijem prikazu morfoloških promjena i međusobnih odnosa pojedinih dijelova mitralnog aparata. Prema našem saznanju 3D ehokardiografski prikaz monokuspidne MV prvi je u Hrvatskoj.

8.2.

CELIJAKIJA (GLUTENSKA ENTEROPATIJA) I DILATACIJSKA KARDIOMIOPATIJA

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Cilj rada: Poznata je udruženost celijakije ili glutenske enteropatije (GE) s šećernom bolesti tip I, IgA nefropatijom, sideropeničnom anemijom, autoimunim bolestima štitnjače, celijakičnim hepatitisom i herpetiformnim dermatitisom. S druge strane, udruženost dilatacijske kardiomiopatije (DK) s GE nije dovoljno istražena. Prema dostupnoj literaturi, prevalencija GE u bolesnika s DK-om iznosi 1,9–5,8%. Opisani su slučajevi poboljšanja funkcije miokarda nakon bezglutenske dijeta. Cilj ovog istraživanja bio je utvrditi prevalenciju GE u naših bolesnika s DK-om.

Materijal i metode: Tijekom dvogodišnjeg razdoblja analizirali smo 42 bolesnika s dijagnozom DK. U svih bolesnika neinvazivnom i invazivnom kardiološkom obradom isključena je ishemijska i valvularna bolest srca. Dijagnoza GE postavljena je serološki (protutijela na tkivnu transglutaminazu i endomizijska protutijela) te biopsijom sluznice dvanaesnika.

Rezultati: Od ukupnog broja bolesnika 28,6% (15) bile su žene, a 64,2% (27) muškarci. Prosječna starost je bila $59,5 \pm 12,5$ godina (Ž $58,5 \pm 16,5$; M $60,0 \pm 9,9$; $p=NS$). Prosječna ejection frakcija lijeve klijetke (LVEF) iznosila je 30,6% (Ž 29 ± 12 ; M 31 ± 13 ; $p=NS$). Devet bolesnika (21,4%) je imalo NYHA I stadij srčanog zatajivanja, 23 bolesnika (54,8%) je imalo NYHA II, 9 bolesnika (21,4%) NYHA III stadij, dok je jedan bolesnik (2,4%) imao NYHA IV stadij srčanog zatajivanja. Glutenska enteropatija je potvrđena u dva bolesnika (4,8%).

Zaključak: Prevalencija GE u naših bolesnika s DK-om slična je do sada objavljenim podacima. U bolesnika s potvrđenom GE započeli smo liječenje bezglutenskom dijetom, te je nastavljeno daljnje praćenje. DK udružena s GE predstavlja fatalnu bolest, u ranim stadijima liječivu bezglutenskom dijetom, stoga je važno u bolesnika s DK-om u multidisciplinarnom pristupu, razmišljati i o GE.

8.3.

ETIOLOGY DISTRIBUTION OF PATIENTS WITH ATRIAL FIBRILLATION BY ECHOCARDIOGRAPHY: RESULTS FROM A PROSPECTIVE STUDY IN 3343 ADULTS

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Background: Atrial fibrillation (AF) is the most prevalent sustained cardiac arrhythmia. It is a disease of the elderly and it is common in patients (pts) with structural heart disease. Hypertension, diabetes, coronary artery disease (CAD), heart failure (HF), and valvular heart disease (VHD) are recognized predisposing factors to AF. Objectives: To evaluate predisposing factors for development of AF in our hospital settings.

Methods: From June 2000 to January 2011, 3343 consecutive pts with AF were studied during echocardiographic check-up. According to the transthoracic echocardiography, pts were divided into groups based on dominative underlying heart diseases. Electrocardiographically documented AF was subdivided into two groups: transitory and chronic. Binary logistic regression was used to investigate relationship of gender, age, hypertension, diabetes and underlying heart diseases with the type of AF.

Results: The median age was 72 years, age range between 18 and 96 years. Chronic AF was observed in 69.9% pts. There were 48.3% of males. Hypertensive heart disease (HHD) was the most common underlying heart disease (38.5%) followed by dilated cardiomyopathy (DCM), 25.3%, CAD 14.7% and VHD 11.2%. Lone AF was diagnosed in only 29 pts, mostly in younger males (median age 48 years, range 29–60, men 71%). Hypertension and diabetes were found in 72.5% and 17.8% pts, respectively, but mostly in females. Total of 2,148 patients (63.8%) were diagnosed heart failure, either systolic or diastolic. Diastolic (HHD and CAD) and systolic heart failure (DCM) were the most frequent risk factors for AF. Almost 2/3 of pts with AF had HF and majority had preserved left ventricular ejection fraction (LVEF HF) (60.7%).

Conclusion: Hypertension was by far the most prevalent associated medical condition in pts with AF as well as diastolic (HHD and CAD) and systolic HF (DCM). AF without underlying heart disease was present in only 1%, mostly in younger pts with transitory AF. Chronic AF was predominant in groups with advanced cardiac remodeling such as DCM and VHD, mostly in elderly pts.

8.4.

CASE REPORT – INVASIVE THYMOMA WITH PERICARDIAL TAMPONADE AS INITIAL MANIFESTATION

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A 54-year-old women presented to our hospital with progressive shortness of breath, dry cough and chest pain. A chest X-ray, echocardiogram, and chest CT showed a mediastinal mass and massive pericardial effusion with signs of pericardial tamponade. The pericardial effusion was bloody. In that, malignant cell wasn't proved. Thoracotomy was performed to diagnose the mediastinal tumor. Pathological diagnosis after operation was thymoma with direct invasion to pericardium, aorta and pulmonary arteries. Thymoma is the most common tumor occurring in the anterior mediastinum, and its malignancy is defined by surgical evidence of invasion or the presence of intrathoracic or extrathoracic metastasis. The patient was treated with chemotherapy. Thymomas are routinely asymptomatic for prolonged periods of time. Symptomatic pericardial tamponade as initial manifestation due to a thymoma with a massive pericardial effusion is uncommon.

8.5.

INTRAKRANIJALNO KRVARENJE KAO PRVA KLINIČKA MANIFESTACIJA ENDOKARDITISA

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24-godišnji pacijent dolazi u bolnicu radi jake glavobolje, povraćanja i slabljenja vida. Neuroradiološkom obradom se potvrdi akutno intrakranijalno krvarenje nepoznate etiologije. Tijek liječenja se komplicira febrilitetom i pogoršanjem općeg stanja. Obzirom na sistolički šum nad prekordijem i pozitivne hemokulture, postavi se sumnja na endokarditis i da je intrakranijalno krvarenje moguće posljedica ruptur mikotične (septične) aneurizme. Transezofagusnom ehokardiografijom prikažu se vegetacije mitralne valvule sa funkcionalnom insuficijencijom, iz hemokulture se izolira *Abiotrofica defectiva*, tzv. »nutritional variant« streptokok (*Streptococcus defectivus*).

Tijek liječenja je nepovoljan unatoč intenzivnim mjerama, bolesnik upada u komatozno stanje i preminuo je dva mjeseca nakon prvih simptoma i dolaska u bolnicu. Obdukcijom se potvrdi edem i hematoma u mozgu, endokarditis mitralne valvule, hipertrofiju lijeve klijetke sa proširenjem cijelog srca, hidroperikard, obostrani hidrotoraks i edem pluća, ascites i kronični tumor slezene (histološki odgovara infarktu slezene sa centralnim apscediranjem). Ovim prikazom želimo upozoriti i podsjetiti na potrebu za temeljitom kardiološkom obradom u mlađih pacijenata koji dožive cerebrovaskularni incident, a osobito kod nejasnih i etiološki nerazjašnjenih pacijenata, na što upozoravaju i Smjernice za liječenje infektivnog endokarditisa: »Neurološke manifestacije razvijaju se u 20–40% svih pacijenata sa IE i uglavnom su posljedica embolizacije vegetacija. Moždani je udar vezan uz visoki mortalitet. Brza dijagnoza i početak odgovarajuće antibiotske terapije od velikog su značaja u prevenciji prve ili rekurirajućih neuroloških komplikacija....«

BRUCELLA ENDOCARDITIS OF BIVELAR AORTIC VALVE

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Case report: Brucellosis is infective disease caused by *Brucella* species. *Brucella* endocarditis is a rare, an underdiagnosed, fatal complication of brucellosis; it causes destructive valvular lesions. The mortality is high despite the use of antibiotics and surgery.

In our case report we present 38 years old farmer who has been diagnosed brucellosis eight months ago, by positive serology (ELISA) and history of direct contact with infected farm animals (sheep). At that time he had no symptoms whatsoever. Forty days prior current hospitalization at the Clinic for infectious diseases, the first symptoms occurred: malaise, chills and fever, cough, muscle, joint and chest pain. During diagnostic work-up, given history of chest pain and large heart shadow on chest X-ray, cardiologist was consulted. Transthoracal echocardiography (TTE) finding was conclusive; it revealed severe aortic insufficiency on the basis of chronic bacterial endocarditis of bivelar aortic valve. Transoesophageal echocardiography (TEE) confirmed earlier diagnosis made by TTE. The valve replacement surgery was indicated. On the fifth day of hospitalization patient's condition deteriorated with the signs of circulatory shock precipitated by paroxysmal supraventricular tachycardia. Patient spent two days in intensive care unit (ICU) and upon stabilization the valve replacement surgery was successfully performed at the Clinic for cardiovascular surgery. During early postoperative recovery patient had frequent episodes of malignant disorders of heart rhythm, mainly ventricular tachycardia and ventricular fibrillation which were resolved a few times by synchronized electrical cardioversion. On the eleventh postoperative day patient had AICD (automatic implantable cardioverter-defibrillator) implanted. Patient was discharged in stabile condition, a one month after initial hospitalization at the Clinic for infectious diseases.

EHOKARDIOGRAFIJA U IZABRANIM KLINIČKIM PRIMJERIMA

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Cilj je prikazati rjeđe kardiološke entitete iz kliničke prakse retrogradnom analizom 8 pacijenata iz naše privatne Kardiološke poliklinike uz primjenu neinvazivnih dijagnostičkih metoda, poglavito transtorakalne ehokardiografije te invazivne kardiološke obrade uz interventno liječenje i periproceduralnu farmakološku terapiju. Prikazani su pacijenti s miksomom atriya, tetralogijom Fallot, Ebsteinovom bolešću, aneurizmom ascendentne aorte uz Marfanov sindrom, desnostranim lukom aorte, istmičkom koarktacijom descendentne aorte, AV nodalnom kružnom tahikardijom (AVNRT) te koronarnom okluzijom. Učinjenom obradom je potvrđena visoka specifičnost i visoka senzitivnost transtorakalne ehokardiografije u dijagnozi miksoma atriya te njen izuzetno značajan doprinos u dijagnostici prirođenih srčanih grešaka i aneurizmatičkih promjena ascendentne aorte i stenotičkih promjena descendentne / koarktacije /. U dijagnostici aritmija je ehokardiografija služila isključenju drugih patomorfoloških i funkcijskih promjena srca. U koronarnoj ishemičkoj bolesti, poglavito nakon intervencijskog liječenja s ugradnjom potpornica, ehokardiografski je praćen učinak samog zahvata i pojava eventualnih komplikacija.

Prema našem iskustvu, ehokardiografija je nezaobilazna dijagnostička metoda u navedenim, iako rjeđim, kardiološkim entitetima.

SPECKLE TRACKING EXERCISE STRESS ECHOCARDIOGRAPHY

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We used 2D strain measurement to quantify segmental systolic function during exercise stress echocardiography in 11 pts with AP and positive/borderline ECG stress test/ group 1/ and in 14 pts without AP and with negative ECG stress test. /group 2/. Peak systolic strain rate, endsystolic strain were measured off-line at rest and immediate post peak stress. Segmental quantification was compared with wall motion analysis. SR criterion of ischemia was stress induced SR increase < 50%.

Pts with bad gray scale image, LBBB, severely depressed LV function and significant valvular heart disease were excluded.

Results: 2D SR could be adequately measured in 92% segments at rest and in 64% segments at post peak stress. Average 2D longitudinal and circumferential systolic strain parameters were significantly lower / $p < 0,01$ / in group 1 pts. Delta SR <50% was found in 10 pts of the group 1 and in 2 pts of the group 2. Wall motion analysis was positive in 4 pts of the group 1 /new or worsening wall motion abnormality/ and in none pts of the group 2

Conclusion: Speckle-derived strain is, especially at rest, despite some limitations /lower frame rate, image quality influence/ applicable method in detecting myocardial ischemia in practice.

RELATIONSHIP OF CARDIAC INVOLVEMENT WITH DISEASE ACTIVITY IN SYSTEMIC SCLEROSIS

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Objectives: Systemic sclerosis (SSc) is a generalized autoimmune, connective tissue disease characterised by widespread vascular lesions and excessive fibrosis of the skin and internal organs. Cardiac involvement, although often clinically occult, is common in SSc and is recognized as a poor patient prognostic factor. The aims of our study were: (i) to examine the cardiac involvement in SSc patients with preserved left ventricular ejection fraction (LVEF) by using conventional and pulsed-wave tissue Doppler echocardiography, and (ii) to investigate the relationship between cardiac abnormalities and disease activity (EUSTAR score).

Methods: We performed a case-control study which included 31 SSc patients with preserved left ventricular ejection fraction (LVEF) and no concomitant disease, and 32 matched healthy controls. All subjects were evaluated by conventional and pulsed-wave tissue Doppler echocardiography.

Results: SSc patients had significantly lower values of LV systolic (mean s' ; $p < 0.001$) and early diastolic (mean e' ; $p = 0.014$) myocardial velocities and higher Mit E/e' ($p = 0.001$) ratio despite no difference was demonstrated between the groups regarding LVEF ($p = 0.248$) and E/A ratio ($p = 0.312$). Evaluating RV there was no significant difference in systolic tricuspid annular velocity ($p = 0.105$) between the groups but peak early diastolic velocity was significantly lower ($p = 0.044$) and Tr E/e' was significantly higher ($p = 0.008$). EUSTAR score significantly correlated with Mit E/e' ($p = 0.006$), mean e' ($p < 0.001$), and mean s' ($p = 0.004$).

Conclusion: In our study, we confirmed that cardiac involvement is often in SSc. Also, PW TDI parameters of LV diastolic and systolic function were in strong association with EUSTAR score. These findings indicate that SSc patient with increased EUSTAR scores need detailed evaluation of cardiac status by using PW TDI.

8.10.

IMMEDIATE AV AND VV OPTIMIZATION PROMOTE EARLY ATRIAL REVERSE REMODELING IN CRT PATIENTS

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Purpose: Studies have shown that reverse atrial remodeling with subsequently improved atrial function occurs during period of several months after implantation of cardiac resynchronization therapy (CRT) device. The aim of this study was to determine whether these events might occur even earlier if immediate atrio-ventricular (AV) and interventricular (VV) optimization is performed.

Methods: 11 heart failure patients (8M/3F, age 67.5 ± 15.5 years) scheduled for CRT, who were in sinus rhythm, were consecutively included. Echocardiographically guided AV and VV optimization was performed immediately after CRT implantation. In order to find best AV and VV delays, serial LVOT and transmitral Doppler tracings and LVESV were obtained and velocity time integral (VTI) was calculated. Left atrial maximal (LAVmax) and minimal (LAVmin) volumes were measured by biplane area-length method, before and 4 weeks after CRT device implantation. Left atrial emptying fraction (LAEF), as a parameter of left atrial function, was calculated. Pearson correlation analysis was used to evaluate the findings.

Results: In 4 weeks period after CRT device implantation we have found statistically significant reduction in LAVmax (108.5 ± 56.5 ml before CRT vs. 84.5 ± 43.5 ml after CRT, $p=0,03$). Although LAVmin (70 ± 53 ml before CRT vs. 48 ± 38 ml after CRT, $p=0,08$) has shown tendency towards reduction and LAEF ($49.23 \pm 23.78\%$ before CRT vs. $54.77 \pm 21.96\%$ after CRT, $p=0,68$) towards improvement, this was not statistically significant.

Conclusion: In this small study we have demonstrated statistically significant reduction in LAVmax early after CRT device implantation. For LAVmin and LAEF we have not shown statistically significant improvement. Nevertheless, the finding suggests that LA remodeling might occur very early if immediate AV and VV optimization is performed. Larger studies are therefore necessary to evaluate left atrial remodeling and function early after CRT device implantation and optimization.

8.11.

THE ROLE OF STRAIN RATE IMAGING IN DIAGNOSING ACUTE MYOCARDITIS AS PROVEN BY IMMUNOHISTOLOGY

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Aim: To investigate the diagnostic accuracy of 2D strain rate imaging in patients with acute myocarditis (AMC) as confirmed by immunohistology.

Background: Making diagnosis of AMC remains challenging since none of routine non-invasive methods are reliable.

Methods: In 34 patients (41 (18–67) years) with suspected AMC, in whom endomyocardial biopsies had been taken, strain rate imaging was performed by speckle tracking analysis at initial presentation and at 3 months follow-up. According to the immunohistological findings (inflammation, myocyte lysis and viral genome detection) patients were divided into 3 groups: no inflammation (N), borderline myocarditis (BL) and AMC.

Results: No differences in conventional 2D echocardiography were found between the groups regarding the ejection fraction, end-diastolic and end-systolic diameter, and wall thickness. AMC and BL patients showed a significantly reduced longitudinal strain ($-10.24 \pm 4.12\%$, $p=0.005$ and $-8.51 \pm 4.88\%$, $p=0.008$) and strain rate ($0.79 \pm 0.27/s$, $p=0.006$ and $0.65 \pm 0.31/s$, $p=0.005$) without regional differences. According to the

ROC-analysis, a cut-off Strain value of below -14.7% yielded a sensitivity of 92% and a specificity of 89% in diagnosing myocarditis. AMC patients who showed an improved EF and LVEDD at 3 month follow-up had shown higher strain rate already at baseline ($1.02/s \pm 0.15/s$ vs. $0.56/s \pm 0.11/s$, $p=0.009$).

Conclusion: Strain rate imaging obtained by 2D speckle tracking can help to recognize myocardial dysfunction in patients with suspected acute myocarditis as proven by immunohistology, even in patients with preserved conventional echocardiography. This in differentiating the patients in of need further diagnostic procedures such as myocardial biopsies.

8.12.

CORRELATION BETWEEN DOPPLER DERIVED DP/DT AND SEVERAL ECHOCARDIOGRAPHIC PARAMETERS OF SYSTOLIC AND DIASTOLIC FUNCTION IN PATIENTS WITH ISOLATED CHRONIC MITRAL REGURGITATION

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Purpose: Aim of the study was to correlate Doppler derived dp/dt, which is thought to be less load dependant index of left ventricular (LV) systolic function (contractility), with several standard echocardiographic parameters for systolic and diastolic function in patients with isolated mitral regurgitation (MR) of various severities and variable degrees of LV dysfunction.

Methods: 25 patients with isolated chronic mitral regurgitation (mild to severe) were enrolled in this study. Standard transthoracic echocardiography examination and tissue Doppler imaging of septal mitral annulus was performed. LV dp/dt was calculated from the MR Doppler spectrum by rate-pressure-rise method. The value of dp/dt was correlated with LV systolic function parameters: ejection fraction by Simpson method, LV end-diastolic (LVEDd), LV end-systolic diameter (LVESd) and isovolumetric contraction velocity of the mitral annulus (IVCvel). LV dp/dt was also correlated with LV diastolic parameters: transmitral E wave velocity (MVEvel), E/E' and left atrium (LA) area.

Results: Statistically significant positive correlation was demonstrated for LV dp/dt and EF ($r=0.570$; $p=0.003$). Dp/dt negatively correlated with E/E' ($r=-0.470$, $p=0.047$) and LVIDs ($r=-0.487$, $p=0.013$), while no correlation between dp/dt and LVEDd, CDMI IVCvel, MVEvel and LA area was found.

Conclusion: In this patient population with isolated chronic mitral regurgitation of various severities, dp/dt significantly correlated with standard parameters of systolic function: LV EF and LVESd. Negative correlation between LV dp/dt and E/E' (as a marker of left ventricular end-diastolic pressure), which was also found, indicates that dp/dt is preload dependent index of LV systolic function. Larger studies are necessary for further evaluation of this finding.

8.13.

PITFALLS IN EVALUATION OF MITRAL REGURGITATION SEVERITY

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The severity of MR with multiple regurgitant jets is often underestimated on standard TTE examination, since all jets are usually not appreciated. On the other hand, of all Doppler methods only quantitative PW Doppler measurement is applicable in these patients since PISA is not as accurate and vena contracta works well only for single jets.

We present a 57-year-old patient with small and narrow central jet on TTE in whom TEE was performed because of loud apical holosystolic murmur and low effort tolerance in the presence of normal LV function, normal mitral valve and coronary artery anatomy. TEE disclosed two additional significant eccentric jets. Regurgitant volume of 55 ml/beat was calculated with quantitative PW Doppler method which corresponded to moderate to severe MR.

We stress again the importance of integrative approach in the assessment of MR severity, in which symptoms, physical examination and hemodynamic consequences of MR should not be neglected.