







UDRUŽENJE KARDIOLOGA SRBIJE  
CARDIOLOGY SOCIETY OF SERBIA

# SRCE I KRVNI SUDOVI HEART AND BLOOD VESSELS

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Udruženje kardiologa Srbije  
Višegradska 26, 11000 Beograd  
Email: [srceikrvnisudovi.urednistvo@gmail.com](mailto:srceikrvnisudovi.urednistvo@gmail.com)  
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- izjavu da su rukopis pročitali i odobrili svi autori.

Rukopis rada i sve priloge uz rad dostaviti elektronskim putem na adresu: tanjapotpara@gmail.com. Prispjele rukopise uređivački odbor šalje recenzentima radi stručne procene. Ukoliko recenzenti predlože izmene i dopune, tada se recenzirani rukopis dostavlja autorima s molbom da tražene izmene unesu u tekst ili pak u protivnom da argumentovano izraze svoje neslaganje sa datim primedbama recenzenta. Konačnu odluku o prihvatanju rada za štampu donosi glavni i odgovorni urednik zajedno sa uređivačkim odborom.

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Časopis se štampa na srpskom jeziku, sa kratkim sadržajem prevedenim na engleski jezik. Inostrani autori mogu svoje članke, u celini, poslati na engleskom jeziku.

Molimo saradnike da svoje radove za časopis „Srce i krvni sudovi” pišu jasno, koncizno, racionalno, gramatički ispravno i u skladu sa sledećim uputstvima.

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Tekst rada kucati u programu za obradu teksta Word, latinicom, fontom Times New Roman i veličinom slova 12 tačaka (12pt). Sve margine podesiti na 25 mm, veličinu strane na format A4, sa levim poravnanjem i uvlačenjem svakog pasusa za 10 mm. Ukoliko se u tekstu koriste specijalni znaci (simboli), koristiti font Symbol. Stranice numerisati redom u okviru donje margine desno, počev od naslovne strane. Podaci o korišćenju literaturi u tekstu označavaju se arapskim brojevima u običnim zaokružnim zagradama, i to onim redosledom kojim se pojavljuju u tekstu. Rukopis rada dostaviti urađen po sledećem redosledu:

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- sažetak na srpskom jeziku,
- sažetak na engleskom jeziku, sa naslovom i institucijom odakle dolazi rad takođe na engleskom jeziku,
- tekst rada,
- tabele,
- opisi slika,
- posebno slike (grafikoni) ili fotografije.

**Naslovna strana.** Na posebnoj, prvoj stranici treba navesti sledeće:

- naslov rada bez skraćénica
- puna imena i prezimena autora (bez titula)
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- na dnu stranice navesti kontakt osobu, odnosno ime i prezime, adresu, broj telefona, faksa i e-mail adresu radi korespondencije

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Prikaz bolesnika, pregledni i specijalni članci treba da imaju nestrukturisan sažetak obima do 150 reči.

Na kraju sažetka dostaviti i 2-4 ključne reči.

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Originalni rad ne treba da prelazi 4000 reči.

Prikaz bolesnika čine: uvod, prikaz bolesnika, diskusija, literatura. Prikaz bolesnika ne treba da prelazi 1500 reči.

Kardiovaskularne slike (cardiovascular images) ne treba da budu struktuirane i ne treba da prelaze 500 reči.

Pregledni i specijalni članci ne moraju da budu struktuirani po prethodnom modelu. Pregledni i specijalni članci ne treba da prelazi 5000 reči.

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Ukoliko rad koji se navodi ima više od 6 autora, onda navoditi tako što se posle trećeg autora stavi: et al. Stranice se citiraju tako što se navode početna i krajnja stranica (npr. 134-138).

Primer za navođenje reference iz časopisa: Leal J, Ramon Luengo-Fernandes R, Gray A, Petersen S, Rayner M. Economic burden of cardiovascular diseases in the enlarged European Union. Eur Heart J 2006;27:1610-1619.

Primer za navođenje reference iz knjige: Nichols A, Rourke MH. Aging and hypertension. U knjizi: Hypertension. Urednici: Nichols A, Rourke MH. Lea and Febiger; London/Melbourne, 1990:257-299.

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**Slike (grafikoni)** se označavaju arapskim brojevima po redosledu navođenja u tekstu. Na posebnom listu dati naslov sa opisom slika (grafikona) i ukoliko se koriste skraćénice, iste treba objasniti u nastavku. Svaki grafikon treba dati na posebnom listu papira. Slike (grafikone) dati u formatu ppt, ai ili eps.

Fotografije se označavaju arapskim brojevima po redosledu navođenja u tekstu. Primaju se isključivo originalne fotografije (crno-bele ili u boji) na sjajnom, glatkom (a ne mat) papiru. Na poleđini svake fotografije treba napisati redni broj. Fotografije moraju da budu u tif, eps ili ai formatu, najmanje rezolucije 300dpi.

**Napomena.** Rad koji ne ispunjava sve gore navedene tehničke uslove neće biti poslat na recenziju i biće vraćen autorima da ga dopune i isprave.

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Heart and Blood Vessels is the official journal of the Serbian Cardiology Society and publishes Original articles, Case reports, Cardiovascular images, Review articles and Special articles. It is mandatory to enclose, along with the manuscript, a letter to the Editor-in-chief stating that the manuscript:

- has not been previously published or is currently submitted for review to another journal
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The manuscript with all appendices should be addressed to:

Tatjana Potpara

Editor-in-chief

and mailed to tanjapotpara@gmail.com

The Editorial Board will send it to reviewers for evaluation. Reviewers' comments will be forwarded to the author to either correct the original manuscript in accord with the suggestions or to express their opinion with adequate arguments in a letter to the Editor-in-chief explaining why they refrained from doing as reviewers deemed appropriate. The final decision will be made by the Editor-in-Chief together with the Editorial Board whether to accept the manuscript for publishing or not. For published manuscripts authors don't get fees, while copyright is transferred to the publisher. The journal is published in Serbian with summaries in English. Foreign authors can submit their manuscripts entirely in English.

We kindly request authors to keep their manuscripts for Heart and Blood Vessels clear, concise, rational, grammatically correct and in accord with the following instructions.

## GENERAL INSTRUCTIONS

Manuscript text should be prepared using a Word processing package, in Times New Roman font size 12. All margins set at 25mm of an A4 page, with no alignment and 10mm tab at the beginning of each paragraph. In case special signs are used, please use Symbol font. Keep page numbering in the footer, starting from the Title page. References should be marked by order of appearance in the text in Arabic numerals in round brackets. The manuscript should be submitted in the following order:

- Title Page,
- Abstract,
- Body of the text,
- Tables, Figures' descriptions,
- Figures or photographs.

**Title page.** A separate, first page should encompass the following:

- the title
- the name(s) of authors,
- the institution(s) and location of all authors (Please, index in Arabic numerals the different Institutions by order of appearance),
- short title,
- at the bottom of the page cite the corresponding author with his contact address, phone, fax number and email address.

**Abstract.** Next page should contain a 250 words abstract. Original papers should encompass: Introduction, Methods, Results and Conclusion. Structured form of abstracts is not mandatory for case reports, review and special articles, but should not exceed 150 words.

The text should encompass: Introduction, Methods, Results, Discussion, Conclusions, and References. Subtitles should be typed in regular font and bold. Short and simple sentences are advised. For medication, it is recommended not to use trade names, but their generic names. Abbreviations can be used in the text, but only when necessary and properly introduced. All results should be cited in standard SI units.

An original paper should be up to 4000 words.

A Case Report consists of an Introduction, Case presentation, Discussion and References. A Case Report should be up to 1500 words. Cardiovascular Images shouldn't be structured and should be up to 500 words.

Review and Special Articles don't have to be structured and shouldn't exceed 5000 words.

**References.** References should be marked in order of appearance in Arabic numerals. The number of quoted references shouldn't exceed 50 out of which 80% should be original articles. It is advised to avoid abstracts as references. When quoting papers that are accepted for publishing, however, not yet published, mark them as in press and enclose a printed proof of the manuscripts' acceptance. References are quoted according to Vancouver style based on the formats used by National Library of Medicine and Index Medicus. Journals' titles should be shortened in accord with Index Medicus (no full stops after the abbreviation). If the paper quoted has over 6 authors, after the third one, et al. should be used. Pages are quoted as first and last (i.e. 134-136).

Article citation example: Leal J, Ramon Luengo-Fernandes R, Gray A, Petersen S, Rayner M. Economic burden of cardiovascular diseases in the enlarged European Union. *Eur Heart J* 2006;27:1610-1619.

Book citation example: Nichols A, Rourke MH. Aging and hypertension. In: Hypertension. Editors: Nichols A, Rourke MH. Lea and Febiger; London/Melbourne, 1990:257-299.

**Tables** are marked in order of appearance in Arabic numerals. Tables should be prepared using a Word processing package, Times New Roman font size 12, single spaced with no indent. Each Table should have a title. If abbreviations are used in the Table, they should be defined in the explanatory footnote below. Each table should be presented on a separate page.

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Photographs are marked in order of appearance in Arabic numerals. Only original photographs are accepted (black and white or color) on glossy paper. The back of each photograph should have the number and an arrow marking the top. The photographs should be prepared in following format: tip, eps, or ai, with minimal resolution of 300dpi.

**Note.** A paper not fully compliant with all aforementioned rules and regulations, will not be forwarded to reviewers, but returned to authors for correction. The Editor-in-Chief and the Editorial Board can reject any manuscript they deem not in the scope of the journal or not acceptable in terms of baseline quality of publishing material, even prior seeking reviewers' opinion.

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## DOBRODOŠLICA

Drugi Kongres kardiovaskularnog imidžinga u Srbiji je od velikog značaja za Udruženje kardiologa Srbije, i predstavlja kontinuitet sa prvim kongresom, koji je sa velikim uspehom održan 2015 godine. Cilj ovog kongresa je da sadašnjim i budućim kardiolozima omogući najbolju edukaciju, kao i platformu za buduća istraživanja u svim mo-

dalitetima kardiovaskularnog imidžinga.

Radna grupa za kardiovaskularni imidžing razvila je snažnu međunarodnu mrežu, koristeći zajedničke aktivnosti sa EACVI i mnogim drugim inostranim udruženjima i u oblasti edukacije i u oblasti istraživačkog rada. Ovaj kongres, uz učešće priznatih eksperata i uvaženih profesora iz oblasti kardiovaskularnog imidžinga, je još jedan korak u unapređenju i učvršćivanju ove saradnje.

Važan deo našeg kongresa je prikaz originalnih radova, zbog čega će svi prihvaćeni apstrakti biti prikazani u formi moderiranih postera. Molimo Vas da posetite salu gde će biti postavljeni poster i razmenite ideje sa našim mladim kardiolozima-istraživačima. Učešće mladih istraživača iz oblasti kardiologije i radiologije će biti stimulirano i podržano kroz organizaciju različitih radionica, praktičnih sesija i kliničkih seminara.

Želeli bi i da se zahvalimo našim partnerima iz farmaceutske industrije koji su podržali ovaj kongres: Hemofarm Stada, GE, Galenika, Pfizer, Bayer, Genzyme, Amicus, Actavis, Alkaloid.

Beograd je poznat po svojoj bogatoj istoriji, kulturi, posebnom duhu i šarmu. Ponosni smo i srećni što Vas imamo za goste i nadamo se da ćete uživati u vremenu provedenom u našem glavnom gradu.

Dobrodošli u Srbiju, zemlju poznatu po velikim umovima koji su proneli slavu svoje domovine širom sveta. Lista naših znamenitih ljudi je velika, pomenimo samo neke od njih: Nikola Tesla, Milutin Milan-Ković, Mihajlo Pupin, Ivo Andrić, Mileva Marić Einstein, Nadežda Petrović, Vojvoda Živojin Mišić, Vojvoda Stepa Stepanović, Milunka Savić, Stevan Mokranjac, kao i naši savremenici Emir Kusturica i Novak Đoković.

Velika je čast za Udruženje kardiologa Srbije što će njeno visočanstvo, princeza Katarina Karađorđević biti pokrovitelj ovog kongresa koji promovira ono najbolje što pruža medicina kao profesija.

Hvala vam što ste uzeli učešće na drugom Kongresu Kardiovaskularnog Imidžinga u Beogradu 2017. i očekujemo Vas ponovo na sledećem kongresu 2019!

Prof. dr Ivana Nedeljković, FESC  
Predsednik Radne grupe za kardiovaskularni imidžing  
Udruženja kardiologa Srbije

## WELCOME ADDRESS

The Second Congress on Cardiovascular Imaging of Serbia is the Congress of great importance for our National Society and represents the continuation of great success of the First congress on Cardiovascular Imaging of Serbia held in 2015 aiming to provide the cardiologist of tomorrow with the highest quality education platform for education and research in all imaging modalities.

The Working Group on Cardiovascular Imaging of Serbia develops a strong international net-work, using joint activities with EACVI both for research and education, incorporating multimodality imaging project, in collaboration with other associations worldwide. Our meeting, with experts and distinguished international Professors, is one step further in this cooperation.

Our congress will focus on the clinical scenario demonstrating how multimodality imaging may affect clinical decision making and outcome, through the interaction with leading imaging experts from all over the world. An important part of the programme is the presentation of the original results and all posters will be moderated. Please make sure to visit the poster area and exchange the ideas with fellow investigators. The participation of young cardiologists and radiologists and researchers will be stimulated and supported through the organization of imaging campus, teaching session and clinical seminars.

We would like to thank our pharma industry partners who supported our congress: Hemofarm Stada, GE, Pfarmaswiss, Genzyme, Galenika, Pfizer, Bayer, Beolaser, Activavis, Amicus, Alkaloid,

Belgrade is famous for its great history, culture, special spirit and charm, so we are glad to have you as our guests and we hope that you will spend nice time in Serbian capital.

Welcome to Serbia, a country world-known for her great minds who brought fame and reputation to their homeland. The list is pretty long, but let me mention just a couple of them: Nikola Tesla, Milutin Milan-ković, Mihajlo Pupin, Ivo Andrić, Mileva Marić Einstein, Nadežda Petrović, Vojvoda Živojin Mišić, Vojvoda Ste-pa Stepanović, Milunka Savić, Stevan Mokranjac, and our contemporary Emir Kusturica and Novak Đoković.

It is a great honor for our Cardiology Society of Serbia to have Her Royal Highness Crown Princess Katherine Karađorđević as a patron of this particularly important meeting that promotes excellence of medical profession.

Thank you for being a part of The Second Congress on Cardiovascular Imaging in Belgrade 2017, and we expect you again at next CIS2019!



Associate Professor Ivana Nedeljković, MD, PhD, FESC  
President of the WG for cardiovascular imaging of the  
Cardiology Society of Serbia



## 1 Srčana insuficijencija, bolesti miokarda i perikarda, embolija pluća / Echocardiography in heart failure: opportunities and advantages

M. Dekleva

University Clinical Hospital Zvezdara

Cardiac imaging, in particular echocardiography, plays a central role in the diagnosis of heart failure (HF) and in guiding treatment. Transthoracic echocardiography (TTE) is a method of choice for assessment of myocardial systolic and diastolic function of left and right ventricle as well as the left atrium by all cardiac ultrasound imaging techniques including two dimensional echocardiography, pulsed and continuous wave Doppler, color flow Doppler, tissue Doppler imaging, contrast echocardiography and deformation imaging (strain and strain rate). Before clinical symptoms became apparent, TTE can detect asymptomatic structural or functional cardiac abnormalities. Demonstration of an underlying disease is central to the diagnosis of HF. Stress echocardiography may be used for assessment of inducible ischemia, in some valve heart diseases and in detection of left ventricular diastolic dysfunction.

Today echocardiographic criteria are crucial for separating patients with reduced, mid range and preserved left ventricular ejection fraction, as well for algorithm for HF probability in non acute setting. By Doppler echo indices it is possible to prevent or delay development of HF, follows the treatment and modified indication for cardiac device or resynchronization therapy.

## 2 One year follow-up of patients with continuous flow left ventricular assist device

E. Nestorović<sup>1</sup>, S. Putnik<sup>1</sup>, D. Terzić<sup>1</sup>, N. Milic<sup>2</sup>, M. Milosević<sup>1</sup>, A. Janjić<sup>1</sup>, A. Ristić<sup>3</sup>, D. Trifunović<sup>3</sup>, I. Nedeljković<sup>3</sup>, M. Banović<sup>3</sup>, M. Ristić<sup>1</sup>

<sup>1</sup>Department for Heart Transplant, LVAD and ECMO, Hospital for Cardiac surgery, Clinical Center of Serbia, Belgrade, Serbia, <sup>2</sup> Department for medical statistics and informatics, Medical Faculty University of Belgrade, Serbia, <sup>3</sup>Cardiology Clinic, Clinical Center of Serbia, Belgrade, Serbia

**Background:** The aim of this study was to assess echocardiographic parameters, functional capacity, renal and liver function outcomes of patients with advanced heart failure (HF) treated with continuous flow left ventricular assist device (CF-LVAD) at one year follow-up.

**Methods:** We prospectively analyzed 47 consecutive patients with advanced HF who received CF-LVAD at our institution from 2013 to 2016. Functional capacity, brain-type natriuretic peptide (BNP), echocardiographic parameters, renal and liver function outcomes were assessed at 3, 6 and 12 months. Overall survival at 1 year was evaluated.

**Results:** The overall 30 day, 6-months and 1-year survival for both bridge-to-transplantation and destination therapy patients were 89%, 85% and 80%, respectively. At 3 months after CF-LVAD implantation, we noticed significantly improvement in dimensions of LV (LVEDD, LVESD), LVEF, BNP, NYHA functional class, blood urea nitrogen and total bilirubin ( $p < 0.05$  for all), and they remained normal through all first year of follow-up. Improvements in

estimated glomerular filtration rate was significant after 3 months in group of patients with baseline renal dysfunction ( $p = 0.004$ ), with also no further change afterward.

**Conclusions:** Use of a CF-LVAD in advanced HF patients results in clinically improvements in functional capacity, cardiac, renal and liver function at one year follow-up.

**Keywords:** LVAD, outcomes, survival

## 3 Right or left ventricular dysfunction in chronic obstructive pulmonary disease?

A. Milovančević<sup>1</sup>, M. Kojičić<sup>1</sup>, A. Stojšić Milosavljević<sup>2</sup>, M. Stefanović<sup>2</sup>, A. Ilić<sup>2</sup>, S. Tadić<sup>2</sup>, S. Puškar<sup>1</sup>, I. Srdanović<sup>2</sup>

<sup>1</sup>Institut of Pulmonary Diseases of Vojvodina, Sremska Kamenica, Serbia, <sup>2</sup>Institute of Cardiovascular Diseases of Vojvodina, Sremska Kamenica, Serbia

**Background:** Right ventricular dysfunction is well known cause of morbidity and mortality in chronic obstructive pulmonary disease (COPD) patients. Since cardiovascular diseases (CVD) are a major cause of death in COPD patients recently there has been much interest in evaluating left ventricular (LV) function in COPD. However the prevalence of left ventricular dysfunction in COPD is still not well established.

**Purpose:** To assess the prevalence of right and left ventricular dysfunction in patients with COPD.

**Methods:** The prospective cohort included 120 male patients with chronic stable COPD with no history of CVD. In all patients spirometry and transthoracic echocardiography were performed. Patients were divided into four stages of COPD, according to the Global Initiative for Chronic Obstructive Lung Disease (GOLD) criteria.

**Results:** The mean value of forced expiratory volume in first second was  $54.7 \pm 27$ , 9% of the predicted value. Right ventricular systolic dysfunction (fractional area change (FAC)  $< 35\%$  and Tricuspid annular plane systolic excursion (TAPSE)  $< 17$  mm) was present in 22.8% only in severe stages of COPD (26% in stage III and 36.6% in stage IV). The overall prevalence of LV diastolic dysfunction was 23.3%: 16.7% in GOLD stage I, 26.7% in stage II, 23.3% in stage III and 26.7% in stage IV. The systolic LV dysfunction with  $EF < 45\%$  was diagnosed in 6.7% of cases and was present only in severe stages of COPD.

**Conclusion:** Chronic airflow limitation is associated with impairment of both right and left ventricular function. In contrast to right ventricular dysfunction left ventricular diastolic dysfunction is present even in mild COPD. Unrecognized ventricular dysfunction in COPD patients with no history of CVD highlights the need for echocardiography in these patients.

## 4 Plućna embolija – izazovi u lečenju

S. Ćirković<sup>1</sup>, Ž. Delić<sup>2</sup>, G. Grujić<sup>1</sup>, D. Jevremović<sup>1</sup>, Ž. Dimitrijević<sup>1</sup>, D. Glamočanin<sup>1</sup>, M. Todorović<sup>1</sup>

<sup>1</sup>OB Požarevac, <sup>2</sup>OB Vrbas

**Uvod:** Plućna tromboembolija je potencijalno životno ugrožavajuće oboljenje, kod četvrtine pacijenata manifestuje se iznenadnom srčanom smrću.

**Prikaz 1.** Pacijentkinja 48 god. hospitalizovana zbog gubitka svesti, zamaranja, malaksalosti; ima obilna



menstrualna krvarenja, krvarenje iz hemoroida. Obj. bleđa, tahikardična, hipotenzivna. UZ srca dilatirana DK, flotirajuća trombotična masa u predelu trikuspidne valvule, dužine 65mm. Uključena tromboliza -tPA 100mg/2 h. MSCT pulmoangiografija posle terapije- trombozne mase obostrano na račvi principalnih grana plućnih arterija koje delimično opstruišu lumen, izraženije desno. Tretirana heparinom, potom uključen DOAK – dabigatran.

**Prikaz 2.** Pacijent 51.god. na dan prijema intenziviranje izrazitog zamaranja, uz osećaj nelagodnosti u grudima pri najmanjem naporu. Hipertoničar, imao česte tromboflebitise, hereditet. Obj izrazito bled, tahikardičan, TA 115/85mmHg. MSCT pulmoangiografija - trombozne mase u obe plućne arterije sa propagacijom u sve lobarne grane i prisutnim ivičnim protocima. UZ srca dilatirana DK, SPDK 54 mmHg. Tretiran trombolizom tPA 100mg/2 h. Lečenje nastavljeno u tercijarnoj ustanovi - nefrakcionisanim heparinom, potom DOAK- apixabanom.

**Prikaz 3.** Pacijentkinja 66. god. operisana zbog vaginalne fistule posledice carcinoma grlića materice i zračne terapije. Postoperativno septično stanje, DVT; MSCT pulmoangiografija - tromboza PA u nivou račve sa propagacijom trombnih masa u obe grane PA. U gornjem režnju levog plućnog krila konsolidacija parenhima 65x 50 mm sa centralnom nekrozom. UZ srca je pokazao flotirajuću vegetaciju? Tu formaciju? vezanu za ZMK! Tretirana trostrukom antibiotskom terapijom, heparinima, suportivnom terapijom, lečenje završeno letalno.

**Zaključak:** Preporuke o lečenju PTE treba da nas usmere na pravilan odabir dijagnostičkih i terapijskih mogućnosti. Procena rizika od smrtnog ishoda i rizika od krvarenja su glavne determinante lečenja plućnog tromboembolizma.

## 5 Pseudoaneurizma leve komore u saglasnosti ehokardiografske dijagnostike i kompjuterizovane tomografije

S. Tomić, A. Nikolić, D. Unić-Stojanović, B. Borzanović, S. Dimitrijević, O. Đokić.  
*Institut za kardiovaskularne bolesti Dedinje, Beograd.*

Pseudoaneurizma leve komore (PAN) se retko sreće i nosi veliki rizik od rupture pošto njen zid čini perikard ili tromb.

U ovom radu, prikazujemo pacijenta sa postinfarktnom pseudoaneurizmom i teškom mitralnom regurgitacijom.

Muškarac, 64 godine, sa reinfarktornom inferolateralnog zida, dijagnostikovanom koronarnom bolešću, urađenom transtorakalnom ehokardiografijom (TTE) i multislice kompjuterizovanom tomografijom (MSCT). TTE opisuje PAN u poziciji bazalnog segmenta inferiornog zida i na prelazu prema bazalnom segmentu posteriornog zida. Parametri PAN i to dijametar otvora – vrata (Omax) iznosio je 8mm a paralelni maksimalni unutrašnji endsistolni dijametar (Dmax) 33 mm, pa je odnos Omax/Dmax 0.24 (prvi ehokardiografski kriterijum za PAN, mora biti manji od 0.5). Drugi ehokardiografski kriterijum, ekspaniranje prema spolja zida PAN u odnosu na intaktni zid leve komore tokom sistole, nije mogao jasno da se definiše. Treći ehokardiografski znak, kolor Dopplerom se registrovao sistolno – dijastolni protok u nivou vrata PAN sa maksimalnom brzinom

sistolnog protoka od 2.96 m/s (kod PAN maksimalna brzina protoka u ranoj sistoli je znatno veća 3-4 m/s dok je kod prave aneurizme znatno manja).

MSCT potvrđuje prisustvo PAN dijafragmalnog zida koja sa komorskom šupljinom komunicira preko otvora dijame- tra 6 mm a maksimalni dijametar PAN je 40 mm. Znači da je TTE u saglasnosti sa kompjuterizovanom tomografijom u postavljanju dijagnoze pseudoaneurizme leve komore iako prevladavaju mišljenja da transezofagealna ehokardiografija (TEE) obezbeđuje više tačnih informacija od transtorakalne u proceni posteriorne PAN leve komore.

## 6 Hipertrofična kardiomiopatija – stratifikacija rizika

Ž. Delić<sup>1</sup>, S. Ćirković<sup>2</sup>

<sup>1</sup>OB Vrbas <sup>2</sup>OB Požarevac

**Uvod:** Hipertrofična kardiomiopatija najčešća je kardiomiopatija, definisana je prisustvom zadebljanja zidova leve komore koje se ne može objasniti abnormalnim uslovima opterećenja. Većina bolesnika ima benignan klinički tok, ostali su izloženi riziku od iznenadne srčane smrti, poremećajima srčanog ritma - AF, progresiji bolesti u simptomatsku srčanu slabost.

**Prikaz slučaja 1.** Pacijentkinja stara 67 godina oseća povremene bolove u grudima, pretežno noću. Negira sinkope, pušač, nije bilo naprasne smrti u porodici. 2009. godine TFO prekinut u drugom minutu pri 7 METs-a, zbog dostizanja SMF, ST depresija inferolateralno; koronarografija bez angiografski značajnih stenoza. Od oktobra 2016. permanenta atrijalna fibrilacija. Obj. NYHA II, Fr oko 70/min, normotenzivna, sistolni šum prekordijalno, 3/6 kardijalno kompenzovana. UZ srca pokazao je asimetričnu hipertrofičnu kardiomiopatiju, maksimalne debljine zidova do 20mm, prisutan SAM, neznačajna opstrukcija u izlaznom traktu LK 20-34 mmHg (pri Valsavi) MR 2+, očuvana EF > 60%. CFR za LAD i RCA je pokazao očuvanu mikrocirkulaciju. Rizik od SCD je 1,66, ICD nije indikovano.

**Prikaz slučaja 2.** Pacijent star 48 godina doživeo je cerebrovaskularni insult, negira sinkopu, otac umro naprasno. Obj NYHA I, Fr oko 80/min – atrijalna fibrilacija, sistolni šum na vrhu, 3/6 normotenzivan, desnostrani piramidni deficit. UZ srca – ekscentrična hipertrofija LK, dilatirana LP, MR 2+, prisutan SAM, bez značajne opstrukcije, EF 60%. Rizik od SCD 4,6, ICD može biti indikovano.

**Zaključak:** Preporuka je da se petogodišnji rizik od iznenadne srčane smrti evaluira pri prvom pregledu, i reevalui- ra na 1-2 godine i uvek kada postoji promena u kliničkom statusu.

## 7 What do the pericardial diseases ESC guidelines 2015 tell us?

Delić Ž.<sup>1</sup>, Ćirković S.<sup>2</sup>

<sup>1</sup>Opšta bolnica Vrbas, <sup>2</sup>Opšta bolnica Požarevac

**Introduction:** Pericardial disease may be an isolated disease or part of a systemic disease.

**Case report 1:** A 69 old woman was admitted in our hospital because of repeated chestpain and fatigue, with shallow T waves over inferior and precordial leads. 2014. lobectomy pulmonum superior left was done, because of lung carcinoma, treated with complete radiotherapy and

two of the four proposed cycle of chemotherapy. Because of iatrogenic, postprocedural hypothyroidism she takes substitution with L thyroxin.

**Physical findings:** over lung fields sound attenuated, sinus tachycardia, apex heart murmur. RTG c / p : Lung fields were normal, normal hearth silhouette . Abdominal ultrasound with S6 liver hemangioma, and right pleural effusion. ECHO-presents of pericardial effusiom around all cavity, more in front of right hearth width 22 mm. Control ultrasound of pleural spaces show no effusion. Control ECHO after seven days - pericardial effusion in front of right cavities 0.62 mm. Chest CT with finding S2 right nodule, about 7 mm diameter, pericardial effusion - width 20 mm, and both sides pleural effusion - width 25 mm. In laboratory at the reception: elevated parameters of inflammation SE > 100, CRP 341, FIB 7.6, WBC 12.00, D dimer on day 3 of hospitalization 7892 and 6683 in control. Cardiospecific enzymes without rise, TNIU < 0.01 CKMB 62 CK 9. Lever enzimes peaceful. Blood gas analysis indicate partial respirator failure. Thyroid hormones were in the reference range.

She was treated empirically with triple antibiotics therapy, NSAID (Ibuprofen 600 mg + 600 mg + 600 mg ), but excluded, because of dyspepsia and upper stomach pain, despite maximal gastro IPP protection, Colchicine 0.5 mg 1x1 (TM <70 kg) bronchodilators, small doses of diuretics, covered with therapeutical doses of LMWH. With therapy, subjectively better, with the withdrawal of pleural and pericardial effusion. CRP was normalised.

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### **Praćenje efekta radioterapije i trastuzumaba u adjuvantnom pristupu lečenja HER2 pozitivnog karcinoma dojke na ejakcionu frakciju leve komore**

I. Krstić, M. Deljanin Ilić, S. Vrbić, D. Marinković  
*Institut za rehabilitaciju Niška Banja, Univerzitet u Nišu*

**Uvod:** Adjuvantna radioterapija je važna komponenta terapije žena sa ranim karcinomom dojke, Kombinovana sa trastuzumabom kod pacijentkinja sa HER 2 pozitivnim karcinomom dojke poboljšava preživljavanje ali nosi i rizik od pojave kasne kardiotoksičnosti.

**Cilj:** Praćenje efekta radioterapije i trastuzumaba u adjuvantnom pristupu lečenja karcinoma dojke na ejakcionu frakciju leve komore (EFLK) .

**Metod:** Kod 80 ispitanih pacijentkinja (prosečne starosti 57 godina) sa HER2 pozitivnim karcinomom dojke, koje su lečene u adjuvantnom pristupu trastuzumabom godinu dana, ehokardiografski je praćena EFLK na početku i na kraju terapije trastuzumabom. 73 pacijentkinje, koje su imale smanjenje EFLK, na osnovu primenjenjene radio terapije podeljene su na: grupu pacijentkinja koje nisu primile (23 pacijentkinje) i grupu pacijentkinja koje su primile radioterapiju (50 pacijentkinja), u ukupnoj standardnoj dozi od 50 Gy u periodu od 5 nedelja. Grupa pacijentkinja koje su primile radioterapiju podeljena je u dve podgrupe: podgrupa sa radioterapijom desne (25 p) i podgrupa sa radioterapijom leve dojke (25p).

**Rezultati:** Od 80 ispitanih pacijentkinja nakon zadnje terapije trastuzumabom, 73 je imalo smanjenje EF (od 67,93 %±6,1 na 62,36 %±5,78; P<0,0001). Na kraju terapije

trastuzumabom, u grupi od 50 pacijentkinja sa radioterapijom registrovano je smanjenje EFLK (od 68,78%± 6,32 na 61,91%±6,13; p=0,000; 6,8%), i ovo smanjenje EFLK je veće u odnosu na smanjenje EFLK registrovano u grupi pacijentkinja koje nisu primile radioterapiju (67,95%±6,2 na 63,00%±6,27; p=0,008, 4,94%). U grupi pacijentkinja koje su imale radioterapiju veće smanjenje EFLK je zapaženo kod pacijentkinja sa radioterapijom leve dojke (od 70.61%±6.1 na 62.72%±6.24; 7,89%), nego kod pacijentkinja sa radioterapijom desne dojke (od 66.95%±6.11 na 61.11%±6.04; 5,84%)

**Zaključak:** U grupi pacijentkinja sa karcinomom dojke koje su primale i radio terapiju i trastuzumab postoji veće smanjenje EFLK u odnosu na grupu pacijentkinja koje nisu primale radio terapiju. Pacijentkinje sa radioterapijom leve dojke imaju veće smanjenje EFLK u odnosu na grupu pacijentkinja sa radioterapijom desne dojke što sugerise mogući veći rizik za nastanak kardiovaskularnih komplikacija.

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### **Association of subclinical left ventricular dysfunction in type-2 diabetic patients with nighttime blood pressure pattern**

A. Stevanovic<sup>1</sup>, M. Dekleva<sup>2</sup>

<sup>1</sup>*Railway Health Care Institute,* <sup>2</sup>*University Clinical Center Zvezdara*

The authors aimed to discover subclinical left ventricular (LV) dysfunction in diabetic patients, and estimate risk stratification of patients according to LV dysfunction and nocturnal blood pressure (BP) pattern.

**Methods:** A total of 109 asymptomatic normotensive diabetic patients were divided into two groups according of ambulatory BP pattern: group of dippers (n=71) and group of non-dippers (n=38).

Conventional and Tissue Doppler (TDI) echocardiography as well as Global longitudinal strain (GLS) was performed in all patients. Comparisons between two study groups in clinical, laboratory and echocardiographic parameters were assessed. Follow up period for all patients was three years for adverse cardiac events.

**Results:** Value of GLS was significantly lower (-17,0±2,55 vs -18,1±1,56, p=0.009) and ratio of early diastolic velocities from mitral inflow and from annular TDI (E/Em) significantly higher (11,2±3,34 vs 9,4±2,37; p=0.001) in non-dipping group. Using the GLS cut-off value of -17% as index of LV systolic dysfunction in 29% of whole patients (32/109) decreased GLS values were found, even 45% in non-dippers (17/38) (p < 0.001). By multivariate model analysis, peak GLS and E/Em were two independent predictors for cardiac outcome.

**Conclusions:** Subclinical LV systolic dysfunction in non-dipping group is significantly common than in dipping group. GLS is a powerful parameter in early detection of subclinical systolic dysfunction and stratification of patients at higher risk for the future cardiac events.

## 10 Metastatski tumori srca

M.Tomić, G.Vukčević-Milošević, J.Kostić, G.Nikčević, M.Boričić, D.Trifunović, M.Petrović

Klinika za kardiologiju, Klinički centar Srbije, Beograd

**Uvod:** Tumori srca su retki, primarni se nalaze u 0,002-3%, a metastatski su znatno češći i nalaze se u 5-6% bolesnika. Dijagnostikovati tumore srca je često vrlo teško zbog nespecifičnih kliničkih simptoma koji su slični drugim kardiovaskularnim bolestima. S druge strane, hitna i precizna dijagnoza lokalizacije i tipa tumora je važna za adekvatno lečenje i prognozu bolesnika.

**Cilj rada:** Prikazati značaj ehokardiografije za brzu dijagnozu, jer pravovremena i precizna dijagnostika lokalizacije tumora, njegove veličine i vezanosti za određene strukture imaju veliku značaj za adekvatnu hirursku intervenciju i prognozu ovih bolesnika.

**Prikaz bolesnika:** Predstavljamo bolesnicu sa metastatskim tumorom srca koja je precizno dijagnostikovana transtorakalnim ehokardiografskim pregledom, potom uspešno operisana.

**Zaključak:** Prognoza bolesnika sa tumorima srca je loša ukoliko se ne operišu. Dostupnost ehokardiografije, njena laka ponovljivost, mogućnost da se pregled uradi pored bolesničke postelje, relativno niska cena pregleda, kao i dijagnostička tačnost, daju ehokardiografiji prednost u odnosu na druge metode.

## 11 Neuobičajena srčana morfologija, noncompaction CMP kao uzrok srčane insuficijencije

J. Pavić Poljak, A. Stojšić Milosavljević, D. Sakač, A. Vulin, I. Srdanović, M. Stefanović, A. Milovančev

Klinika za kardiologiju, Sremska Kamenica, Univerzitet u Novom Sadu

**Uvod:** Kardiomiopatije predstavljaju heterogenu grupu oboljenja sa različitim genotipskim i fenotipskim karakteristikama. Vremenom mogu dovesti do srčane insuficijencije i poremećaja ritma koji mogu biti opasni po život bolesnika.

**Prikaz slučaja:** Prikazujemo slučaj bolesnika starosti 68 godina, muškog pola, sa znacima i simptomima srčane slabosti uzrokovane neuobičajenom srčanom morfologijom. Bolesnik se unazad više godina leči inhibitorima angiotenzin konvertujućeg enzima (ACE inhibitorima) zbog povišenog krvnog pritiska. U elektrokardiogramu (EKG) se registruje sinusni ritam, frekvencija 74/min, dekstrogram, kompletni blok desne grane Hiss-ovog snopa. Ehokardiografski registrovana smanjena globalna sistolna funkcija miokarda leve komore (ejekciona frakcija 30%), koja je hipertrabekulirana i u predelu apeksa akinetična. U medijalnom delu leve komore se registruje hiperehogen, delom fibroziran, kalcifikovan, mišićni snop iz preseka 4 šupljine dimenzija 1,4x1,9cm, iz preseka 3 šupljine 1,9x1,8cm; uvećane su obe pretkomore. Magnetnom rezonancom srca se uočava dilatirana leva komora hipo do akinetičkog miokarda, snižene sistolne funkcije, ejakciona frakcija oko 40%. Desna komora veličinom na gornjoj granici, lako hipokinetičnog miokarda snižene sistolne funkcije. Gruba pločasto nodularna kalcifikacija u medijalnom inferoseptalnom segmentu leve komore. Pregledom se ne registruju znaci miokardne fibroze kao posledica ishemijskog procesa. Na optimalnu medikamentnu

terapiju za srčanu insuficijenciju bolesnik se oseća značajno poboljšano opšte stanja, bez simptoma te trenutno pripada po Nujorškoj srčanoj klasifikaciji (NYHA) II klasi.

**Zaključak:** Neuobičajena srčana morfologija je povezana sa disfunkcijom i desne i leve komore. Ova ehokardiografska slika najviše podseća na "noncompaction" kardiomiopatiju koju uvek treba uzeti u obzir kao moguću dijagnozu zbog potencijalnih komplikacija kao što su srčana insuficijencija, poremećaji ritma i iznenadna srčana smrt. Trenutno ne postoje definitivni dijagnostički kriterijumi za postavljanje dijagnoze ove bolesti, a ehokardiografija je osnovni dijagnostički metod.

## 12 Respiratorne komplikacije noncompaction kardiomiopatije

B. Dolamić<sup>3</sup>, A. Stojšić Milosavljević<sup>1,2</sup>, D. Sakač<sup>1,2</sup>, V. Čarapić<sup>1</sup>, N. Ivanović<sup>3</sup>, M. Macanović<sup>3</sup>

<sup>1</sup>Institu za kardiovaskularne bolesti Vojvodine, Sremska Kamenica, <sup>2</sup>Medicinski fakultet, Univerzitet u Novom Sadu, <sup>3</sup>Opšta bolnica, Sremska Mitrovica

**Uvod:** Noncompaction kardiomiopatija, poznata i pod nazivom „sunderasta kardiomiopatija“ se karakteriše prominentnim trabekulama leve komore i dubokim recesima između njih.

**Prikaz bolesnika:** Pacijentkinja, 48 godina starosti, 22.10.2015. godine je primljena u bolnicu u Sremskoj Mitrovici zbog lečenja bronhopneumonije. Od 2009. godine ima dijagnostikovanu noncompaction kardiomiopatiju, izolovanu formu leve komore (LK). Više puta je hospitalizovana zbog plućnog edema, ima hronični varikozni sindrom na obe podkolenice, 2015. godine je imala plućnu tromboemboliju (PTE). Leči se i od hipotireoze. Tokom navedene hospitalizacije dolazi do kardiorespiratornog aresta posle čega je uspešno reanimirana. Na CT-u grudnog koša uočen je subkutani emfizem, obostrani pneumotoraks, pneumomediastinum, pneumoperitoneum, jatrogena perforacija zadnjeg zida traheje i znaci PTE. Premeštena je na Institut za plućne bolesti Vojvodine u Sremskoj Kamenici. Perforacija traheje lečena je konzervativno uz postavljene torakalne drenove, a uz antibiotsku i ostalu terapiju se stabilizuje sa pulmonalnog aspekta. U septembru 2016. godine je primljena na Institut za Kardiovaskularne bolesti Vojvodine u Sr. Kamenici zbog ponovne dekompenzacije srca, kada je konstatovana teška mitralna regurgitacija i pad ejakcione frakcije LK sa 40 na 30%. Uradjena je kardiohirurška intervencija: anuloplastika mitralnog zalistka rigidnim ringom i šavna anuloplastika trikuspidalnog ušća. Postoperativni tok je protekao uredno i otpuštena je u dobrom opštem stanju.

**Zaključak:** Kod noncompaction kardiomiopatije se mogu očekivati epizode kliničkog pogoršanja zbog čestih epizoda kardijalne dekompenzacije. Multidisciplinarni pristup lečenja navedene bolesti i njenih komplikacija je moguć uz maksimalnu angažovanost velikog medicinskog tima.



### 13 Predictors of diabetes mellitus regulation four years after percutaneous coronary intervention

Ma. Ostojic, Ml. Ostojic, I. Nedeljkovic  
*Cardiology Clinic, Clinical Center of Serbia, School of medicine, University of Belgrade*

**Objective:** Diabetes mellitus (DM) is a prime risk factor for cardiovascular disease (CVD). The pathophysiology of the link between diabetes and CVD is complex and multifactorial. There is a growing need to emphasize early and vigilant risk factor management in patients with DM to help reduce their burden of cardiovascular-related mortality.

**Aim:** The aim of our study was to identify predictors of DM regulation in patients four years after percutaneous coronary intervention (PCI).

**Methods:** During 4 years of follow-up, we studied the relationship between control of diabetes mellitus and life style habits in 352 consecutive patients (mean age 63±9 years; 252 male) after PCI. At the end of study all patients underwent complete physical examination. They answered a questionnaire about their physical activity, socio-economic status, education and nutrition habits. All patients underwent laboratory examination (lipid status, fasting blood glucose) and evaluation of blood pressure, body-mass index (BMI) and smoking status. We look for predictors of DM regulation.

**Result:** Among 352 patients, there were 16.3% patient with DM with 12.2% of patients using oral hypoglycemic and 4.1% of patients using insulin (alone or in combination with tablets). In the univariate analysis frequent hospitalization (RR 2.6; CI 95% 1.34-24.2; p=0.027), regular control by principal practice doctor (RR 1.78; CI 95% 1.11-31.5; p=0.037) use of angiotensin II receptor blockers (RR 6.74; CI 95% 0.01-10.1; p=0.02) and everyday use of antidiabetic therapy (hypoglycemic tablets RR 4.12; CI 95% 1.28-66.8; p=0.001 and insulin RR 5.2; CI 95% 2.14-21.03; p=0.02) were predictors of good DM regulation in this high risk group of patients. The multivariate regression analysis shows frequent hospitalization (RR 1.74; CI 95% 1.54-21.1; p=0.009), regular control by principal practice (RR 2.32; CI 95% 1.09-9.06; p=0.042) and everyday use of antidiabetic therapy (hypoglycemic tablets RR 6.15; CI 95% 1.56-82.8; p=0.001 and insulin RR 6.7; CI 95% 2.51-25.23; p=0.001) as independent predictors of good control of DM.

**Conclusion:** Cardiovascular high risk patients with everyday hypoglycemic therapy, regular controls by general practitioner and frequent hospitalization have better control of diabetes mellitus four years after percutaneous coronary intervention.

### 14 Risk factors management four years after percutaneous coronary intervention

Ma. Ostojic, Ml. Ostojic, I. Nedeljkovic  
*Cardiology Clinic, Clinical Center of Serbia, School of medicine, University of Belgrade*

**Objective:** Percutaneous coronary intervention (PCI) is leading non-surgical method for treatment of patients with coronary artery disease (CAD). Secondary prevention is key component in long-term treatment to prevent recurrent cardiac morbidity and mortality.

**Aim:** The main objective of our study was to assess the risk factor regulation in patients four year after PCI.

**Methods:** We conducted observational study with 352 consecutive patients (mean age 63±9 years; 252 male) four years after PCI. All patients answered a questionnaire about their physical activity, socio-economic status, education and nutrition habits. Patients underwent laboratory examination (lipid status, fasting blood glucose) and evaluation of blood pressure, body-mass index (BMI) and smoking status. We observed regulation of risk factors four years after PCI.

**Result:** Mean systolic blood pressure was 130.5±19.5 mmHg and diastolic blood pressure was 80.9±10.9 mmHg. Slightly increased values for this high risk population of total blood cholesterol and triglyceride were observed (5.3±1.2 mmol/L and 1.9±1.2 mmol/L, respectively). There was high prevalence of obesity (63%) with mean BMI of 27.2±3.8 kg/m<sup>2</sup>. Type II diabetes mellitus was present in 16.3% of patients. Periodically chest pain was reported by 26.4% of patients. There was 18.6% of smokers and 57.1% of population has quit smoking. Dietary habit was present in 60.9% of population and 68.9% of patients practice moderately daily physical activity. Also, stress was present in 51.6% of population.

**Conclusion:** The biggest obstacle in secondary prevention in the group of patients after undergone PCI treatment was insufficient smoking cessation.

### 15 Parametri miokardne mehanike leve pretkomore kao potencijalni prediktori loše prognoze u toku šestomesečnog praćenja kod bolesnika lečenih primarnom PCI

G. Krljanac<sup>1</sup>, D. Trifunovic<sup>1</sup>, M. Asanin<sup>1</sup>, L. Savic<sup>1</sup>, D. Matovic<sup>2</sup>, G. Stankovic<sup>1</sup>, D. Rajić<sup>2</sup>, M. Srdić<sup>2</sup>, I. Mrdovic<sup>1</sup>

<sup>1</sup>Klinika za kardiologiju, Klinički Centar Srbije, Medicinski fakultet, Beograd, Srbija, <sup>2</sup>Klinika za kardiologiju, Klinički centar Srbije, Beograd, Srbija

Parameteri miokardne mehanike leve pretkomore (LP) mogu biti supstrat loše prognoze i pojave glavnih kardiovaskularnih događaja (MACE) definisanih kao smrtni ishod, reinfarkt, hitna revaskularizacija, ventrikularne aritmije (VT i/ili VF) i srčana insuficijencija koja zahteva rehospitalizaciju kod bolesnika lečenih primarnom perkutanom koronarnom intervencijom (PPCI). Cilj: Da se definišu parametri miokardne mehanike LP kao značajni prediktori za MACE tokom 6 mesečnog praćenja. Analizirali samo konvencionalne ehokardiografske parametre, strain leve pretkomore (S LA), strain rate leve pretkomore (Sr LA). Metod: Prospektivno je uključeno 100 konsekutivnih STEMI bolesnika lečenih PPCI. Echo pregled je rađen 4±2 dana (VIVID 9GE, Echo PAC Ver 113). Rezultati: 12/100 (12.0%) bolesnika je imalo MACE tokom 6 mesečnog praćenja. EF LK kao i volume index LP su značajno različiti kod bolesnika sa MACE. Prvi pozitivni pik S LAs i drugi pozitivni pik S LAa, strain rate parametar tokom sistole Sr LAs, i kasne dijastole (Sr LAa) su se takođe razlikovali između dve grupe (table 1). ROC analizom je dobijeno da su značani prediktori MACE bili S LAs (ROC 0.271; p=0.048, 95% CI 0.066-0.477), Sn 71%, Sp 72%, cut off 16.45%. Sr LAs (ROC 0.247; p=0.029, 95% CI 0.073-0.420) je imao manju Sn 57%, ali veću Sp 86%, cut off -0.755 s<sup>-1</sup>. Sr LAa (ROC 0.772, p=0.019, 95% CI 0.593-0.952), sa cut off -1.085 je imao bolju Sn 71% i Sp 80%. Zaključak: U šestomesečnom praćenju posle PPCI

parametri miokardne mehanike leve pretkomore mogu biti prediktori loše prognoze. Veće studije su potrebne da bi se definisali parametri koji imaju najveću moć predikcije.

	Sa MACE (n=88)	Bez MACE (n=12)	p
EF LK (%)	49.7±10.6	38.4±11.3	0.003
LP vol index (ml/m <sup>2</sup> )	18.65±6.21	23.32±6.48	0.039
S LAs (%)	20.54±7.99	14.61±6.57	0.035
S LAa (%)	11.50±6.00	7.82±4.22	0.036
Sr LAs (s <sup>-1</sup> )	1.15±0.44	0.81±0.24	0.023
Sr LAe (s <sup>-1</sup> )	-0.86±0.52	-0.65±0.31	0.253
Sr LAa (s <sup>-1</sup> )	-1.51±0.65	-1.03±0.47	0.034

## 16 Parametri miokardne mehanike kao potencijalni prediktori pojave ventrikularnih aritmija u STEMI

G. Krljanac<sup>1</sup>, D. Trifunović<sup>1</sup>, M. Ašanin<sup>1</sup>, L. Savić<sup>1</sup>, D. Matović<sup>2</sup>, G. Stanković<sup>1</sup>, D. Rajić<sup>2</sup>, M. Srdić<sup>2</sup>, I. Mrdović<sup>1</sup>

<sup>1</sup>Klinika za kardiologiju, Klinički Centar Srbije, Medicinski fakultet, Beograd, Srbija, <sup>2</sup>Klinika za kardiologiju, Klinički centar Srbije, Beograd, Srbija

Poremećaji miokardne mehanike mogu biti potencijalni prediktori loše prognoze i pojave ventrikularnih aritmija kod bolesnika sa STEMI. Cilj: Da se otkrije ehokardiografski parametri koji su prediktori loše prognoze i pojave ventrikularnih aritmija u šestomesečnom postinfarktnom periodu. U našoj studiji su se poredili konvencionalni eho parametri i parametri miokardne mehanike: strain (S), strain rate (Sr), post-sistolno skraćanje (PSS), indeks mehaničke disperzije (IMD), rotacija (ROT), torzija za 18 segmenata leve komore (LK) i za tri miokardna sloja (epi, mid, endo). Metod: prospektivno je u studiju uključeno 116 STEMI bolesnika lečenih primarnom PCI koji su bili na monitoringu tokom hospitalizacije i tokom šestomesečnog postinfarktne perioda. Pacijenti su podeljeni u dve grupe sa i bez aritmija, a kriterijumi su bili: sekundarna VF, sustained/non-sustained VT. Ehokardiografski pregled je urađen 4±2 dana (VIVID 9GE, EchoPAC Ver 113). Rezultati: 11/116 (9.5%) je imalo ventrikularne aritmije. Između dve grupe nije bilo značajne razlike u konvencionalnim eho parametrima: EF (43.9±14.6 vs. 49.0±10.7), WMSI (1.55±0.32 vs. 1.44±0.37), LA vol index (18.4±4.2 vs. 19.4±6.6), p=NS. Od parametara miokardne mehanike post-sistolno skraćanje (PSS) LS, na sva tri nivoa je bilo značajno veće u grupi sa aritmijama: epi (0.35 vs. 0.17, p=0.018), mid (0.33 vs. 0.16, p=0.023), endo (0.31 vs. 0.15, p=0.032). Globalni IMD cirkumferentnog S se razlikovao između dve grupe (p=0.044), kao i pik globalne rotacije baze (p=0.012), pik torzije LK u ranoj diastoli (p=0.013). Zaključak: Tokom 6 mesečnog praćenja posle STEMI, parametri miokardne mehanike (PSS, IMD, ROT, torzija) mogu biti bolji prognostički parametri za pojavu ventrikularnih aritmija u odnosu na konvencionalne eho parametre.

	Bolesnici bez aritmija (n=105)	Bolesnici sa aritmijama (n=11)	p
PSS epi	0.17±0.11	0.35±0.15	0.018
PSS mid	0.16±0.10	0.33±0.12	0.023
PSS endo	0.15±0.12	0.31±0.09	0.032
IMD CS (ms)	71.35±27.21	91.91±37.18	0.044
G ROT baza (°)	-4.74±3.5	-1.73±2.54	0.012
Pik torzije LK u ranoj diastoli (°)	6.63±3.41	3.31±4.29	0.013

## 17 Correlation between prognostic markers of stress echocardiography and severity of coronary artery disease in patients after primary PCI

N. Bosković<sup>1</sup>, M T. Petrović<sup>1</sup>, V. Giga<sup>1,2</sup>, I. Rakocević<sup>1</sup>, D. Trifunović<sup>1,2</sup>, S. Aleksandrić<sup>1</sup>, M. Tesić<sup>1,2</sup>, S. Dedić<sup>1</sup>, A. Vuković<sup>1</sup>, M. Dobrić<sup>1,2</sup>, I. Nedeljković<sup>1,2</sup>, I. Jovanović<sup>1</sup>, B. Beleslin<sup>1,2</sup>, A. Đorđević-Dikić<sup>1,2</sup>, J. Stepanović<sup>1,2</sup>

<sup>1</sup>Clinic for Cardiology, Clinical Center of Serbia, <sup>2</sup>School of Medicine, University of Belgrade, Belgrade, Serbia

**Background:** Stress echocardiography (SECHO) is important noninvasive tool for the detection of myocardial ischemia. The correlation of prognostic markers of SECHO (Duke treadmill score, MET (functional capacity), achieved target heart rate, heart rate recovery (HRR) with the angiographic severity of coronary artery disease (CAD) after primary percutaneous coronary intervention (pPCI) has not been completely documented. (clarified)

**Aim:** With this study we sought to evaluate the value of Duke treadmill score, MET, WMSI and HRR in patients with stable coronary artery disease and complete/incomplete revascularization of non-culprit lesions after successful pPCI.

**Methods:** Our study comprised of 214 patients successfully treated with pPCI. All patients performed stress echocardiography according Bruce protocol in order to assess residual ischemia in coronary artery other than treated vessel. Stress echocardiography was considered positive for ischemia in the case of new or worsening of preexisting wall motion abnormalities. Duke treadmill score, MET, as well as HRR in the first minute after exercise were calculated in all patients. Lesion severity of non-culprit coronary arteries was assessed by quantitative coronary angiography.

**Results:** Out of 214 pts 47 (21.9%) had positive test and were excluded from the further analysis. The remaining patients were divided in two groups: patients who had culprit-only lesion revascularization and negative stress echocardiography testing following pPCI (91 pts, 54.2%) and patients who had incomplete revascularization of non-culprit lesions (one vessel and multi vessels CAD) (76 pts, 45.8%). The average age of the pts was 59±9 years (110, 65.5% male). Between patients with complete and incomplete revascularization there was no statistically significant difference (p>0.05) in a Duke score, MET, WMSI, achieved targeted heart rate and risks factors for CAD (diabetes, hypertension, hyperlipidemia, family history of CAD and smoking). Nevertheless, patients with incomplete revascularization had lower HRR comparing to patients with culprit-only lesions (27.9±11.8 vs 33.1±13.5, p=0.011). Also there was significantly higher rate of male patients with incomplete revascularization comparing to complete revascularization (76.6% vs 56%, p=0.008). In multivariate analysis both HRR (OR 0.967 [95% CI 0.943-0.992], p=0.011) and male gender (OR 2.66 [95% CI 1.34-5.26], p=0.005) were independent predictors of angiographic severity of CAD.

**Conclusions:** These results suggests that of all prognostic markers of stress echocardiography lower HRR can point out to the more extensive CAD.

### 18 Ejekciona frakcija leve komore kao parameter veličine infarkta i prognoze kod bolesnika sa prvim infarktom miokarda sa ST elevacijom koji su lečeni primarnom perkutanom koronarnom intervencijom

J. Marić Kocijančić, S. Obradović, Z. Jović, P. Đurić, M. Spasić, R. Matunović, O. Gudelj

**Uvod:** STEMI lečen pPCI rezultuje niskim akutnim mortalitetom. Međutim, bolesnici posle STEMI su u visokom riziku od ponavljanih događaja (srčana insuficijencija, smt). Veličina infarkta je glavna determinanta dugoročnog morbiditeta i mortaliteta.

**Cilj:** Ispitati odnos ejekcione frakcije leve komore (EFLK) procenjene ehokardiografski i QRS skora kao elektrokardiografskog metoda za procenu veličine infarkta, kao i da li lokalizacija infarkta utiče na odnos ovih parametara. Takođe, ispitati povezanost EFLK i mortaliteta.

**Metode:** Istraživanje je obuhvatilo je 489 pacijenata sa dijagnozom prvog STEMI koji su lečeni pPCI, u Vojnomedicinskoj akademiji, od 2000. - 2016. godine. EFLK procenjena je ehokardiografski primenom Simpsonovog "bi plane" metoda. QRS skor izračunat je na EKG zapisu, 4-7 dana nakon pPCI, prema Selvester-om scoring sistemu, koji se sastoji od 54 kriterijuma i 32 boda. Na osnovu lokalizacije infarkta, odnosno infarktne arterije, ispitanici su podeljeni u 3 grupe: RIA, ACX i RCA grupa. Praćenje bolesnika je trajalo 6 meseci.

**Rezultati:** Očuvanu EFLK (>40%) imalo je 68,1 % bolesnika. QRS skor  $\leq 3$  (infarkt  $\leq 10\%$ LK) imalo je 57,7% bolesnika. EFLK je statistički značajno korelirala sa QRS skorom u ukupnoj ispitivanoj populaciji bolesnika ( $p < 0,001$ ) i u sve tri grupe bolesnika. EFLK je u multivarijantnoj analizi, bila nezavisni prediktor mortaliteta nakon 6 meseci ( $p < 0,05$ ).

**Zaključak:** U savremenoj kohorti bolesnika sa prvim STEMI koji su lečeni pPCI, procena EFLK 2D ehokardiografijom dobro korelira sa elektrokardiografskim merenjem veličine infarkta i korisna je u proceni prognoze nakon infarkta.

### 19 Long term prognostic value of negative stress electrocardiography and stress echocardiography in patients with pretest probability for coronary artery disease of 15-65%

V. Giga<sup>1,2</sup>, N. Boskovic<sup>1</sup>, A. Đorđević Dikić<sup>1,2</sup>, B. Beleslin<sup>1,2</sup>, I. Rakocevic<sup>1</sup>, M.T Petrovic<sup>1</sup>, M. Dobric<sup>1,2</sup>, M. Tesic<sup>1,2</sup>, S. Aleksandric<sup>1</sup>, S. Dedic<sup>1</sup>, D. Trifunovic Zamaklar<sup>1,2</sup>, I. Jovanovic<sup>1</sup>, I. Paunovic<sup>1</sup>, J. Stepanovic<sup>1,2</sup>

<sup>1</sup>Cardiology Clinic, Clinical Center of Serbia, <sup>2</sup>School of Medicine, University of Belgrade, Serbia

**Background:** Current guidelines recommend the use of stress with addition of imaging as preferable for the detection of coronary artery disease. However, stress electrocardiography could be used in patients with pretest probability for coronary artery disease (CAD) of 15-65%.

**Aim:** The aim of our study was to compare long term prognostic value of negative stress electrocardiography (SECG) and stress echocardiography (SECHO) in patients with chest pain and pretest probability of CAD of 15-65%.

**Methods:** We included in the study 676 patients (58±10 years, 56% females, 13% with diabetes) without known CAD and pretest probability of 15-65% who were referred

to exercise testing for the evaluation of chest pain. All the patients had interpretable ECG. The modality of test (SECG or SECHO) was used according to the decision of referring physician. Patients were followed for mean of 94±2 months for the occurrence of cardiovascular death, myocardial infarction and clinically indicated revascularization.

**Results:** Out of 676 patients 57 patients (8.4%) had positive test and were excluded from further analysis. Of the remaining 619 patients with negative finding, 418 (67%) underwent SECG, whereas 201 patients (33%) underwent SECHO. There was no difference in baseline characteristics between the groups. During the follow up period 42 patients (6.7%) had an adverse event (6 deaths, 11 myocardial infarction, 25 clinically indicated revascularization). There was no difference in events between groups (27/418, 6.4%) in SECG and (15/201, 7.5%) in SECHO group ( $p=NS$ ). Multivariate predictors of adverse events were presence of diabetes and male gender ( $p < 0.001$ , for both).

**Conclusion:** Patients with pretest probability for CAD of 15-65% and negative exercise testing have excellent long term prognosis irrespective of the modality of test (stress electrocardiography or stress echocardiography) used for the detection of myocardial ischemia. Male patients and patients with diabetes have more pronounced risk for the occurrence of adverse events.

### 20 The aVR lead ST-segment elevation during the exercise stress test

M.T. Petrovic, V. Giga, N. Boskovic, D. Trifunovic, I. Rakocevic I, S. Aleksandric, S. Dedic<sup>1</sup>, M. Dobric, M. Tesic, Nedeljkovic, B. Beleslin, A. Đorđević-Dikić, J. Stepanovic  
*Clinic for Cardiology, Clinical Center of Serbia, School of Medicine, University of Belgrade - Belgrade - Serbia*

**Background:** ST- segment elevation in lead aVR is an important predictor of acute left main (LM) coronary artery obstruction, but its predictive value in a setting of exercise treadmill testing is still unclear. The aims of our study were to assess the incidence and predictors of LM/ostial left anterior descending (LAD) coronary artery and/or ostial circumflex (Cx) artery stenosis in patients referred to exercise testing presenting with exercise-induced ST segment elevation in lead aVR.

**Methods:** Out of 9052 patients who underwent stress echocardiography testing from 2012 to 2016 in our laboratory, we identified 76 patients (55 men; mean age of 61±8.4 years), presenting with ST segment elevation in lead aVR during exercise. All the patients underwent coronary angiography. Significant LM/ostial LAD or ostial Cx stenosis was defined as narrowing  $\geq 50\%$  of diameter stenosis. We analyzed baseline clinical characteristics, hemodynamic response to exercise, rest and stress electrocardiograms as well as baseline and peak exercise echocardiography images in all patients. We calculated Duke treadmill score and changes in wall motion score index (delta WMSI).

**Results:** Significant LM/ostial LAD or ostial Cx stenosis was present in 26/76 patients (34%) with exercise-induced ST segment elevation in lead aVR. No significant coronary artery disease was found in 13% of patients. There were no statistically significant differences in majority of baseline clinical characteristics and hemodynamic response



between patients with and without significant LM/ostial LAD or ostial Cx stenosis. However, patients with LM/ostial LAD and ostial Cx stenosis were older ( $63 \pm 8$  years vs.  $60 \pm 9$  years,  $p=0.19$ ), with a lower Duke treadmill score ( $-7 \pm 6$  vs.  $-3 \pm 4$ ,  $p=0.004$ ) in comparison to those without significant LM/ostial LAD or ostial Cx stenosis, and they showed more severe wall motion abnormalities with exercise (delta WMSI  $0.61 \pm 0.32$  vs.  $0.40 \pm 0.27$ ,  $p=0.022$ ). Sensitivity of Duke score  $\leq -5$  in detection of significant LM/ostial LAD or ostial Cx stenosis was 65%, with specificity of 68% (AUC 0.706). Patients with aVR lead elevation accompanied by ST-segment depression in leads V3-V6, are most likely to have significant LM/ostial LAD/ or ostial Cx stenosis ( $p=0.023$ ) in conjunction with ST depression in leads D2, D3, aVF.

**Conclusions:** ST-segment elevation in lead aVR has limited sensitivity in a detection of significant LM/ostial LAD or/and ostial Cx stenosis. Nevertheless, if aVR elevation is accompanied by ST-segment depression in leads V3-V6, patients are most likely to have significant LM/ostial LAD or/and ostial Cx stenosis. Additionally, the Duke treadmill score can be calculated to help identify this subset of patients.

## 21 Primena neinvazivnih dijagnostičkih metoda u proceni ishemijske bolesti srca kod pacijenta sa blokom leve grane izazvanim opterećenjem

I. Rakočević<sup>1</sup>, N. Bosković<sup>1</sup>, M.T. Petrović<sup>1</sup>, V. Giga<sup>1,2</sup>, A. Đorđević Dikić<sup>1,2</sup>, B. Beleslin<sup>1,2</sup>, V. Vukčević<sup>1,2</sup>, G. Stanković<sup>1,2</sup>, J. Stepanović<sup>1,2</sup>

<sup>1</sup>Klinika za kardiologiju, Klinički centar Srbije, <sup>2</sup>Medicinski fakultet Univerziteta u Beogradu

Blok leve grane izazvan opterećenjem ili frekventno zavisni blok leve grane (EI LBBB) je redak fenomen koji se javlja kod 0.5-1.1 % pacijenata koji su podvrgnuti testu fizičkim opterećenjem. Etiologija nije potpuno razjašnjena ali može biti udružen sa valvularnim bolestima srca, kardiomiopatijama, poremećajima sprovođenja ili ishemijskom bolesti srca. U odnosu na frekvencu pri kojoj se javlja LBBB, frekvencija  $\leq 125$ /min korelira sa većom verovatnoćom za postojanje značajne koronarne bolesti. Senzitivnost neinvazivnih dijagnostičkih imaging metoda u proceni koronarne bolesti je limitirana u slučaju pojave LBBB. Prikazujemo slučaj bolesnika kod koga se registruje EI LBBB a kome smo na osnovu nalaza stresekokardiografskog testa (SEHO), multi-slajdsne CT (MSCT) koronarografije i testa koronarne rezerve protoka (CFR) indikovali invazivnu koronarografiju.

## 22 Global and regional longitudinal strain in prediction of moderate and severe silent myocardial ischemia in diabetes type 2 patients

I. Mitevska, E. Srbinovska, E. Antova, M. Bosevski  
University Cardiology Clinic, Skopje, Macedonia

**Aims:** We have evaluated whether global and regional longitudinal strain (GLS-RLS) could predict the presence of myocardial ischemia in asymptomatic DM type 2 patients (DMT2).

**Methods and Results:** 68 asymptomatic DMT2 patients without previously known CAD underwent one day SPECT

myocardial imaging for detection of myocardial ischemia. 52 patients underwent 2D echocardiography for 2D-STE analysis and subsequently coronary angiography in the presence of at least moderate ischemia involving  $>10\%$  left myocardium ( $SDS > 7$ ). All patients had normal rest wall motion and LVEF  $>50\%$ . We use 17 segment model for MPS quantitative analysis.

**Results:** Myocardial ischemia was found in 27 pts (39,7%). 11 had mild ischemia ( $SDS < 4-7$ ), 10 pts had moderate ( $SDS 7-10$ ) and 6 pts severe ischemia ( $SDS > 10$ ). Pts with moderate and severe ischemia had significantly lower GLS, comparing to the patients with normal MPS ( $-15,9 \pm 3,5$  vs.  $-20,7 \pm 2,3$ ,  $p=0,001$  respectively). There was 89% concordance with ischemia and reduced regional longitudinal strain location. CAD was detected in 15 out of 16 pts with moderate and severe ischemia. Myocardial ischemia in the LAD region was associated with GLS of  $-15+/-1.9\%$ , ischemia in the RCA region was associated with GLS of  $-16,7+/-1,5\%$ . Pts with ischemia in LCx region had average GLS  $6.1/-1,4$ . Six patients with impaired inotropic reserve with stress LVEF decrease  $>5\%$  had GLS  $-15,2+/-2,4\%$  vs.  $17,3+/-1,6\%$  comparing to the patients with preserved inotropic reserve.

**Conclusion:** Regional and global longitudinal strain are good predictors for the presence of moderate and severe myocardial ischemia, which could improve selection of asymptomatic diabetic patients for SPECT imaging.

## 23 Miokardni perfuzioni Tc-99m MIBI SPECT imidžing u proceni potrebe dalje revaskularizacione strategije u pacijenata sa graničnom stenozom koronarnih arterija

S. Lučić<sup>1</sup>, A. Peter<sup>1</sup>, S. Tadić<sup>2</sup>, S. Stojšić<sup>2</sup>, A. Stojšić-Milosavljević<sup>2</sup>, R. Jung<sup>2</sup>, M.A. Lučić<sup>1</sup>

<sup>1</sup>Institut za onkologiju Vojvodine, Sremska Kamenica, Novi Sad, <sup>2</sup>Institut za kardiovaskularne bolesti Vojvodine, Sremska Kamenica, Novi Sad

**Uvod:** Perzistirajuća klinička dilema da li je pacijente sa hemodinamski definisanom graničnom koronarnom stenozom potrebno tretirati konzervativno ili invazivnim pristupom, za cilj studije uslovlila je procenu potencijalnog dijagnostičkog doprinosa miokardne perfuzione scintigrafije (MPS) u procesu donošenja kliničke odluke.

**Materijal i metode:** Ispitivana grupa obuhvatila je 90 pacijenata (34 žene (37,8%) i 56 muškaraca (62,2%)), prosečne životne dobi  $59.78 \pm 9.2$ , u kojih je načinjena invazivna koronarna angiografija (CA) nakon epizode akutnog koronarnog događaja sa utvrđenom hemodinamski granično značajnom koronarnom stenozom sa 50-70% suženja lumena. Dvodnevni EKG-gejtovani Tc-99m-MIBI/SPECT MPS sa farmakološkim stres-testom načinjen je u periodu 1-3 meseca nakon CA sa ciljom procenom perfuzije irigacione regije granično stenoziranih koronarnih arterija. Miokardna perfuzija je evaluirana vizuelno i semikvantitativno sa softverskim paketom 4DMSPECT i rezultujućim skorovima za procenu perfuzije (SSS, SRS i SDS). U odnosu na lokalizaciju stenozе pacijenti (pts) su podeljeni u tri grupe - 47(52,2%) sa LAD, 22(24,4%) sa RCx i 21(23,4%) sa RCA graničnom stenozom.

**Rezultati:** U 78/90(86.6%) pts MPS je pokazao urednu perfuziju miokarda u posmatranoj irigacionoj regiji (SSS=0,



SDS=0), a u 12(13.4%) MPS je ukazao na prisustvo stresom indukovane ishemije posmatrane regije (SDS>2); od kojih je 5(42.6%) sa ishemijom u LAD, 3(25%) u RCx i 4(33.4%) u RCA irigacionoj regiji. Sledstveno je u 8/12(66.6%) pts načinjena implantacija stenta u granično stenoziranu koronarnu arteriju, a preostalih 4/12(33.4%) je konzervativno tretirano intenziviranjem medikamentozne terapije. Kontrolna MPS je načinjena u periodu od 6-9 meseci u svih 12 pts sa pozitivnim nalazom, rezultujući sa normalizacijom perfuzije u 5/8(62.5%) pts sa stentom i nepromenjenom ishemijom u 3/8(37.5%), dok je u grupi koja je tretirana isključivo medikamentozno, normalizacija uočena u 3(75%), a u 1(25%) nepromenjen nalaz.

**Zaključak:** MPS poseduje mogućnost da olakša proces donošenja kliničke odluke o načinu terapijskog pristupa granično značajnih koronarnih stenoza pružajući funkcionalnu informaciju procene perfuzije.

#### 24 Izolovan mišićni most: dijagnostički i terapijski izazov. Prikaz dva slučaja

I. Burazor, S. Stevović, M. Morača, A. Kovačević, S. Marković, M. Anđić, N. Jevšnik

*Odeljenje kardiološke rehabilitacije, Institut za rehabilitaciju Beograd*

Mišićni most predstavlja anatomska varijaciju čiji je klinički značaj, od uvođenja koronarografije do danas, predmet kontradikcije. Simptomi variraju od atipičnog bola u grudima do iznenadne smrti što je razlog intenzivnog istraživanja dijagnostičkog i terapijskog modaliteta. Najpouzdanije će kompjuterizovana tomografija koronarnih arterija (MsCT) definisati anatomska lokalizaciju.

Cilj rada je da prikazemo specifičnosti i izazove u dijagnostici i terapiji mišićnog mosta kroz prikaz dva bolesnika upućenih u naš centar.

Pacijentkinja stara 66 godina upućena je na kardiološku rehabilitaciju nakon preživelog akutnog infarkta miokarda i ordinirane fibrinolitičke terapije. Eho srca ukazao je na očuvanu kontraktilnu funkciju. Sprovedena je kardiološka rehabilitacija bazirana na fizičkom treningu. Upućena je na koronarografiju koja je pokazala uredan nalaz na koronarnim arterijama ali je verifikovan mišićni most na LAD. Pacijentkinja je u period praćenja bez tegoba, pored acetilsalicilineske ordiniran je beta blokator i antagonist kalcijuma.

Pacijent starosti 58 godina upućen je radi evaluacije nespecifičnog bola u grudima na test fizičkog opterećenja koji je bio pozitivan na ishemiju miokarda. Upućen je na koronarografiju koja je pokazala uredan nalaz na koronarnim arterijama ali je verifikovan mišićni most na LAD. Zbog učestalih nespecifičnih bolova u grudima u drugom aktu upućen je na MsCT kojim je vizualizovan mišićni most ali bez indikacija za rekoronarografiju.

**Zaključak:** Iako je izolovan mišićni most benignog karaktera kod simptomatskih pacijenta potrebna je adekvatna dijagnostička evaluacija, a terapija najčešće obuhvata beta blokatore i antagoniste kalcijuma. Upotreba nitarata je limitirana zbog povećanja pritiska u 'tunelskom' segmentu. Ako terapijski odgovor izostane, implantacija stenta ili hirurgija mogu predstavljati izbor.

#### 25 Perfuziona scintigrafija miokarda u proceni postojanja koronarne bolesti srca kod pacijenata sa tipom 2 dijabetesa i ne- dijabetičara

A. Peter<sup>1</sup>, S. Lučić<sup>1</sup>, S. Tadić<sup>2</sup>, S. Stojičić<sup>2</sup>

<sup>1</sup>Centar za nuklearnu medicinu, Institut za onkologiju Vojvodine, Sremska Kamenica, Srbija, <sup>2</sup>Institut za kardiovaskularne bolesti Vojvodine, Sremska Kamenica, Srbija

**Uvod:** Koronarna bolest srca (KBS) je vodeći uzrok morbiditeta i mortaliteta kod pacijenata sa i brojne studije pokazuju da pacijenti sa dijabetesom imaju četiri puta veću mogućnost za razvoj KBS nego opšta populacija. Pravilan skrining i dijagnoza su od ključnog značaja.

**Cilj rada:** Procena prisustva moguće KBS analizom nalaza perfuzione scintigrafije miokarda kod pacijenata sa tipom 2 šećerne bolesti i ne-dijabetičara sa kliničkim znacima angine pektoris.

**Materijal i metode:** Pacijenti sa kliničkim znacima angine pektoris i prethodno urađenim ergometrijskim testom opterećenja podeljeni su u dve grupe prva sa diabetes mellitusom tipa 2 i drugu grupu činili su pacijenti bez postojeće šećerne bolesti. Svima načinjena je stres perfuziona scintigrafija miokarda sa niskim ergometrijskim i dodatnim farmakološkim opterećenjem po dvodnevnom protokolu.

**Rezultati:** Pacijenti sa diabetes mellitusom tip 2 bilo je 20 (ergometrija bila je pozitivna u 8 (40%), negativna u 6 (30%) i granična u 6 (30%). Pacijenata bez šećerne bolesti bilo je 20 (ergometrija pozitivna u 7 (35%), negativna u 7 (35%) i granična u 6 (30%). Rezultati perfuzione scintigrafije miokarda su u grupi pacijenata sa šećernom bolesti bili pozitivni u pravcu postojanja KBS kod 12 pacijenata (60%) i negativni u 8 (40%), dok je u grupi pacijenata bez šećerne bolesti nalaz bio pozitivan u 7 pacijenata (35%) i negativan u 13 (65%).

**Zaključak:** Prevalenca KBS veća kod pacijenata sa šećernom bolešću u poređenju sa onima bez, a stres perfuziona scintigrafija miokarda je značajna dijagnostička metoda za skrining odnosno dijagnostiku koronarne bolesti srca kod pacijenata sa šećernom bolešću.

**Ključna reč:** perfuziona scintigrafija miokarda, diabetes mellitus, koronarna bolest srca.

#### 26 Cut-off value of non-invasive coronary flow velocity reserve measurements after intravenous infusion of dobutamine for diagnosis of functional significant myocardial bridging on left anterior descending artery

S. Aleksandric, A. Đorđević-Dikić, J. Stepanovic, V. Giga, M. Dobric, M. Banovic, M. Tesic, M. Petrovic, N. Boskovic, B. Beleslin  
*Cardiology Clinic, Clinical Center of Serbia, School of Medicine, University of Belgrade*

**Background:** Previous studies showed that non-invasive coronary flow velocity reserve (CFVR) measurement by transthoracic Doppler echocardiography (TTDE) during inotropic stimulation with dobutamine, in comparison to vasodilation with adenosine, provides more reliable functional evaluation of myocardial bridging (MB). However, the adequate cut-off value of CFVR for diagnosing functional significant MB has not been fully established.

**Purpose:** The purpose of the study was to evaluate the adequate cut-off value of TTDE- CFVR after iv.infusion of dobutamine (DOB) for diagnoses of functional significant MB.

**Methods:** This prospective study included 44 patients (30 males, mean age 56±9 years) with angiographic evidence of isolated MB of the LAD and systolic compression ≥50% diameter stenosis. Exercise stress-echocardiographic test (SE) for detection of myocardial ischemia and TTDE-CFVR in the distal segment of LAD during iv. infusion dobutamine (DOB:10-40µg/kg/min) were performed in all patients.

**Results:** Exercise-SE was positive for myocardial ischemia in 8/44 (18%) of patients. CFVR during peak DOB was significantly lower in SE-positive group in comparison to SE-negative group (2.01 ± 0.16 vs. 2.54 ± 0.47, p<0.001). Using exercise-SE test as a gold standard for detection of myocardial ischemia, a receiver-operating curve identifies the optimal CFVR DOB cut-off value <2.2 (AUC 0.85, 95% CI: 0.73-0.97, p=0.004) with a sensitivity of 100%, a specificity and 71%, a positive predictive value of 47%, and a negative predictive value of 100%, for the presence of functional significant MB. The overall diagnostic accuracy of TTDE-CFVR measurements during dobutamine infusion was 80%.

**Conclusion:** A cut-off value <2.2 of CFVR obtained by TTDE is useful for diagnosing functional significant MB.

## 27 Data mining generated insight into the effect of Echocardiographic Parameters on in-hospital outcome of patients with acute myocardial infarction treated with primary percutaneous coronary intervention

M. Sladojević<sup>1</sup>, S. Tadić<sup>1</sup>, M. Stefanović<sup>1</sup>, A. Ilić<sup>1</sup>, T. Popov<sup>1</sup>, A. Stojšić-Milosavljević<sup>1</sup>, I. Srdanović<sup>1</sup>, S. Sladojević<sup>2</sup>  
<sup>1</sup>*Clinic of Cardiology, Institute of cardiovascular diseases Vojvodina, Sremska Kamenica, Serbia,* <sup>2</sup>*Information and communication systems department, Faculty of technical sciences, University of Novi Sad*

**Aims:**The aim of this study is to develop an in-hospital mortality prediction model for acute myocardial infarction with ST elevation (STEMI) patients after percutaneous coronary intervention (PCI) by performing data mining techniques on echocardiography parameters (EPs).

**Methods and results:**A total of 1495 patients (aged 61.29±11.70 years, 65.2% males), diagnosed with STEMI, hospitalized at the Institute of Cardiovascular Diseases Vojvodina, between December 2008 to December 2011. Each patient was initially described using 50 EPs. Various data mining algorithms were evaluated and the most successful was chosen.

In-hospital mortality was 8.96%. The best prediction results were achieved using Alternating Decision Tree (ADTree) classifier, 91.034% accuracy (AUROC 0.864). ADTree identified a subset of 8 key EPs: left ventricular ejection fraction (LVEF), left ventricular stroke volume (LVSV), left ventricular stroke volume index (LVSVI), aortic leaflet separation diameter (AOVs), aortic velocity time integral (AOVTI), systolic right ventricle diameter (RVs), mitral regurgitation (MR).

**Conclusion**The ADTree is a highly accurate graphical model, suitable for expert interpretation, yet relatively simple - it contains 31 nodes and 21 leaves. The model might prove very helpful in the decision-making process and optimizing treatment strategy in selected high risk STEMI patients.

## 28 TIA caused by contrast echocardiography in patient with platypnea-orthodeoxia

G. Lončar,<sup>1,2</sup> L. Payot<sup>1</sup>, M. Dubois<sup>3</sup>, N. Cvetinović<sup>2</sup>, D. Tončev<sup>2</sup>  
<sup>1</sup>*Institut de Cardiologie Centre Hospitalier Universitaire Pitié-Salpêtrière, Paris, France,* <sup>2</sup>*Cardiology Department, Heart Failure Unit, Zvezdara University Medical Center, Belgrade, Serbia,* <sup>3</sup>*Pneumologie, Centre Hospitalier Universitaire Pitié-Salpêtrière, Paris, France*

Platypnea-orthodeoxia syndrome (POS) is a rare clinical disorder characterized by dyspnea caused by the upright position and relieved at recumbent position. Few cases of POS and stroke were reported in literature and the association between stroke and POS with evidence of patent foramen ovale (PFO) is rare. Stroke may occur in patients with cardiac shunt who undergo contrast echocardiography. We present a patient with POS who experienced transitory ischemic attack (TIA) most likely caused by injection of agitated saline microbubbles during screen for PFO. No case report of TIA/stroke during contrast echocardiography in patients with POS has previously been published.

## 29 Profesionalni vozač – faktor rizika ishemijske bolesti srca?

S. Popin,<sup>1</sup> T. Momčilov Popin<sup>2</sup>, Z. Keča,<sup>2</sup> A. Stojšić Milosavljević<sup>2</sup>  
<sup>1</sup>*Medicinski Fakultet Novi Sad,* <sup>2</sup>*Klinika za kardiologiju Sremska Kamenica*

**Uvod:** Profesionalni vozači (PV) su izloženi većem broju nepovoljnih faktora koji se mogu odraziti na radnu sposobnost. Kardiovaskularna oboljenjasa značajno smanjuju ili dovode do gubitka radne sposobnosti PV.

**Cilj rada:** je da se utvrdi u kojoj meri posao PV dovodi do nastajanja faktora rizika (FR) ishemijske bolesti srca (IBS), učestalosti kao i njihove udruženosti; kakva je povezanost FR sa kategorijom motornog vozila kao i karakteristikama IBS, koronarografskim nalazom kao i nalazom ehokardiografije i da li se porodice PV razlikuju po stepenu funkcionalnosti u odnosu na porodice zdravih osoba.

**Materijal i metode rada:** Istraživanje je sprovedeno u periodu od 01.02.2015. do 01.02.2016. u ambulantomama primarne zdravstvene zaštite Učestovalo je 228 muškaraca starosti od 35-57 godina. Ispitivanu grupu su činili PV, sa novootkrivenom IBS (114); dok je druga grupa bila kontrolna zdravih muškaraca (114). Korišćen je upitnik FACES IV i Opšti upitnik za prikupljanje sociodemografskih podataka. Podaci su statistički obrađeni korišćenjem t-test-a i Pirsnov test-a ("Statistica 10").

**Rezultati:** Najveći broj bolesnika imao je kao prvu manifestaciju IBS akutni infarkt miokarda (AIM) sa ST elevacijom 56,14% (64/114), 3,51% (4/114) AIM bez ST elevacije i 40,35% anginu pektoris (46/114). Najveći broj ispitanika upravljalo je teretnim vozilom 65% (74/114), dok je 20% (23/114) upravljalo poljoprivrednom mašinom, a 11% (13/114) autobusom. Stres je zastupljen kod vozača kamiona u 70,27% (52/74), hipertenzija kod 61,40% (70/114), dok je 61,40% (70/114) ispitanika je bilo gojazno. Multiple signifikantne promene na LAD, RCx i ACD su nađeni kod 41,28% (45/109) ispitanika, a izmenjena funkcija leve komore (EF < 45%), uz prisutnu hipokineziju ili akineziju zidova leve komore zapažena je najčešće kod vozača teretnih

vozila 60,81% (45/74). Porodice ispitanika karakteriše: nedostatak bliskosti, problemi komunikacije i nizak stepen zadovoljstva, što bitno utiče na samu prognozu i ishod bolesti.

**Zaključci:** Potrebno je odgovarajućim merama primarne i sekundarne prevencije uticati na smanjenje FR, rano otkrivanje, sprečavanje progresije bolesti, u cilju zaštite zdravlja profesionalnih vozača i ostalih učesnika u saobraćaju

**Ključne reči:** profesionalni vozači, ishemijska bolest srca, faktori rizika, porodica.

### 30 Test vijabilnosti miokarda i uloga medicinske sestre

S. Marković, M. Pivljanin, J. Đurović  
*Kabinet za ergometriju, Klinika za kardiologiju, Klinički centar Srbije*

Infarkt miokarda je ograničena ishemijska nekroza mišićnog tkiva srca uzrokovana naglim i dužim prekidom koronarne cirkulacije.

Test vijabilnosti se radi u cilju otkrivanja živog tkiva u zoni disfunkcionalnog miokarda.

Postojanje vijabilnog miokarda ima dijagnostički, prognostički i terapijski značaj.

Za izvođenje testa vijabilnosti je potreban timski rad. Samu proceduru izvodi lekar specijalista kardiolog, uz asistenciju dve više medicinske sestre.

Uloga sestre: priprema pacijenta, priprema materijala, izvođenje procedure, zbrinjavanje pacijenta.

### 31 Primena neinvazivnih testova u ispitivanju ishemijske bolesti srca i uloga medicinske sestre

M. Pivljanin, J. Đurović, S. Marković  
*Kabinet za ergometriju, Klinika za kardiologiju, Klinički Centar Srbije*

**Uvod:** Znacaj stresne ehokardiografije kao tehnika koja pruža dodatne dijagnostičke i prognostičke informacije o bolesniku sa ishemijskom bolešću srca uvedena na Institut za kardiovaskularne bolesti u Beogradu KCS 1986 god.

**Cilj rada:** Princip neinvazivnih testova za procenu značajnosti koronarne stenozе je da delujući putem smanjenja ponude ili kombinacijom oba dovede do destabilizacije odnosa ponude/potražnje miokarda za kiseonikom i izazivanja miokardne ishemije. Test fizičkog opterećenja (TFO) i dobutamin (Dob) infuzija deluju povećanjem zahteva miokarda za kiseonikom, dok dipiridamol (Dipi) i adozin infuzija deluju predominantno smanjenjem ponude kiseonika.

Kombinacijom testova iz ove dve grupe, tj. istovremenim povećanjem zahteva i smanjenjem ponude može da se izazove ishemija miokarda koja nije mogla biti dokumentovana primenom samo jednog testa. Kombinacija testova su Dipi+Tfo, Dipi+Dob, Dipi+atropin, Dob+atropin. TFO se može izvoditi na pokretnoj traci ili na ergo biciklu u sedecem ili ležećem položaju. Stres ehokardiografski protokol obuhvata kontinuirano elektrokardiografsko (12 odvoda), ehokardiografsko, hemodinamsko i praćenje subjektivnih simptoma pre, u toku i posle testa. Kriterijumi za prekidanje testa su: bol u grudima, značajna depresija ST segmenta u

EKG-u, dostignuta submaksimalna frekvencija, sistolna hipotenzija ili hipertenzija, poremećaji ritma i zamor.

**Zaključak:** Prednosti stresne ehokardiografije su visoka dijagnostička tačnost (70-95 %) i neinvazivnost, uz nisku cenu i visoku dostupnost u kardiološkim centrima.

### 32 Stres i njegov uticaj na pojavu miokardne ishemije

J. Đurović, M. Pivljanin, S. Marković  
*Kabinet za ergometriju, Klinika za kardiologiju, Klinički centar Srbije*

Najnovija istraživanja u koronarnih bolesnika potvrdila su ranija zapažanja da je psihički stres okidač miokardne ishemije.

Cilj je bio da se ispita udruženost mentalnog stresa sa pojavom miokardne ishemije kod bolesnika sa dokazanom koronarnom bolešću.

**Metoda:** Mentalni stres test smo radili prema u svetu prihvaćenom protokolu Prof. dr Krantz. U izvođenju ovog testa učestvuju naučnoistraživački tim koga čine: lekar kardiolog, psihijatar, dve više medicinske sestre.

**Zaključak:** Psihosocijalni programi kao što su redukcija i racionalizacija stresa u okruženju i socijalna podrška, redukcija percepcije stresa preko bihevioralnih treninga izgledaju obećavajuće kao terapijske mogućnosti.

### 33 Stres ehokardiografija sa ergospirometrijom : Novi test u proceni dijastolne funkcije kod bolesnika lečenih barijatrijskom hirurgijom

K. Matejić Gaćeša, M. Ristić, M. Banović, I. Nedeljković  
*Kabinet za ergospirometriju, Klinika za kardiologiju, KCS*

**Uvod:** Poremećaj dijastolne funkcije predstavlja jednu od čestih posledica morbidne gojaznosti, dok redukcija telesne težine nakon barijatrijske hirurgije može da dovede do značajnog poboljšanja. Ehokardiografija u mirovanju kao i ergospirometrija (CPET) ne mogu precizno da otkriju promene u dijastolnoj funkciji. Međutim kombinacija stress ehokardiografije i CPET (ESE-CPET) mogla bi da postane zlatni standard u proceni dijastolne funkcije kod bolesnika lečenih barijatrijskom hirurgijom.

**Cilj:** Ispitivanje značaja kombinovanog ESE-CPET u proceni dijastolne funkcije kod bolesnika lečenih barijatrijskom hirurgijom.

**Metod:** Ispitali smo 50 bolesnika (74% žene, starosti 39.2±9.9 god) koji su lečeni barijatrijskom hirurgijom (laparoscopic gastric bypass). Svim bolesnicima je urađen EHO srca u mirovanju kao i ESE-CPET pre i 6 meseci nakon hirurške intervencije. Sistolna funkcija je procenjena Simsonovom metodom, a dijastolna funkcija je procenjena prema preporukama. Merenja su rađena u mirovanju, pre ESE-CPET, i odmah nakon završetka testa. Korišćen je maksimalni Bruce protokol na pokretnoj traci uz udah-udah analiza gasova. Merena je potrošnja kiseonika VO<sub>2</sub> na anaerobnom pragu (VAT) kao i vršna potrošnja kiseonika (PeakVO<sub>2</sub>) i ventilatorna efikasnost (VE/VCO<sub>2</sub> slope).

**Rezultati:** Srednji BMI je bio 44± 11 kg/m<sup>2</sup> pre operacije. Srednja vrednost gubitka TT nakon 6 meseci je bila 35.8±11.0 kg. Parametri sistolne ifunkcije su bili nepromenjeni. LVEF je bila 63.5±5.6% pre , a 64.9±8.5% nakon operacije. Značajne



promene registrovane su tokom testa, dok se dijasolni parametri u mirovanju nisu menjali (E/A), deceleraciono vreme (Dt) i odnos E/E' ostali su nepromenjeni. Došlo je do porasta VAT (VO<sub>2</sub>) (17±2 ml/kg/min vs 19±3 ml/kg/min) i peak VO<sub>2</sub> (19±4 ml/kg/min vs 24±5 ml/kg/min) 6 meseci nakon hirurgije (p<0.0001) koje se može objasniti poboljšanjem dijasolne funkcije. Takođe maksimalni E/A nije se menjao, dok je E/E' značajno poboljšan (11.99±3.3 vs 8.66±2.1) što je potvrda poboljšanja dijasolne funkcije

**Zaključak:** Barijatrijska hirurgija značajno poboljšava dijasolnu funkciju i funkcionalni kapacitet 6 meseci nakon hirurgije. Kombinacija stress ehokardiografije i CPET predstavlja veoma korisnu metodu u proceni dijasolne funkcije

### 34 The role of stress echo ergospirometry in patients with hypertension

M. Ristić, K. Matejić Gaćeša, M. Banović, N. Radivojević, I. Nedeljković

*Kabinet za ergospirometriju, Klinika za kardiologiju KCS*

**Background:** Impairment of diastolic function (DF) is a common consequence of hypertension and it influences exercise tolerance even in the presence of good left ventricular (LV) systolic function. However, simple evaluation of patients according to resting echo parameters is not often related to symptoms and this limitation was overcome by diastolic stress echo. Since CPET has been proposed for evaluation and stratification of patients with known diastolic heart failure (DHF) in pts with normal ejection fraction (LVEF). The value of combined diastolic stress echo and CPET in detection of DHF still remained unknown.

**Objective:** To determine the value of combined stress echo CPET in detection of DHF in patients with hypertension, exertional dyspnea with normal resting LV systolic and diastolic function and to promote it as a novel test.

**Methodology:** The study included 87 pts with hypertension without DHF, but with exertional dyspnea and normal LV systolic function at rest. All pts underwent combined stress echo CPET (supine bicycle, ramp protocol with 15W/min increments). M-mode and 2-D echo measurements at rest (including systolic and DF assessment), continuous echo monitoring (to exclude myocardial ischemia) and DF assessment at the top of the exercise, have been performed. We measured transmitral flow with pulsed doppler, and annular mitral velocities (e' and a' using TDI) according to guidelines. Thus, we calculated E/e' as a main determinant DF.

**Results:** Diastolic heart failure (E/e' ≥15) was found in 8/87 pts (9.2%) during combined CPET stress echo test. Patients with diastolic dysfunction were older (p=0.004), and had lower peak VO<sub>2</sub> (p=0.012), and VO<sub>2</sub> at anaerobic threshold (p=0.025), lower workload (p=0.026), and higher VE/VCO<sub>2</sub> slope (p<0.0001), and lower ΔpetCO<sub>2</sub> (p<0.0001) in comparison to pts without DHF. However multivariate analysis showed that only VE/VCO<sub>2</sub> was independent predictor of DHF stress echo CPET (p=0.002; RR 1.46; 95%CI: 1.15 -1.86). We also showed the strong correlation between VE/VCO<sub>2</sub> slope and E/e' (r=0.70; p=0.0001). Value of VE/VCO<sub>2</sub> best predictive for DHF in this group of pts according to ROC curve was 32.94 (Sn 100%, Sp 90%)

**Conclusion:** Combined CPET stress echocardiography used for the first time as a new test improves detection of DHF in patients without signs of DHF at baseline echo, and with normal

baseline LV function and exertional dyspnea. Educated medical nurse represents one of the most important part of the team

### 35 Coronary Slow Flow Phenomenon: Syndrome Y

J. Stepanović, M.T. Petrović, I. Rakočević, N. Bošković, V. Giga, S. Aleksandrić, I. Nedeljković, D. Trifunović, A. Đorđević-Dikić, B. Beleslin, D. Orlić, M. C. Ostojić  
*School of Medicine, University of Belgrade, Clinic for Cardiology, Clinical Center of Serbia*

Coronary Slow Flow Phenomenon (CSFP) was first described by Tambe et al. in 1972, and is defined as delayed opacification of coronary vessels during angiography without any evident obstructive disease.

„Primary” or „idiopathic” CSFP should be delineated from „Secondary” coronary slow flow. Quantitatively, it is measured as increased Thrombolysis in Myocardial Infarction (TIMI) frame count. TIMI frame count, introduced by Gibson, is a reproducible index of coronary flow and represents the number of cine frames required for contrast to reach a prespecified distal coronary artery landmark.

The pathogenesis of CSFP is still not well understood.

The patients, 53-years of age, presented with a first episode of chest pain was described as a pressure-like sensation in the center of his chest, lasted 30 minutes, with typical irradiation, after exaggerated supper and associated with shortness of breath and diaphoresis.

He was a smoker, but reported no history of diabetes, dislipidemia,

Ten years cardiovascular risk score is 18%.

The next day, was examined in cardiology. Heart rate 68 beat/min, blood pressure 140/100mmHG and serum cardiac biomarkers were normal. Admission ECG revealed elevation ST segment V1-V3 and a prolonged QT interval. Cardiac biomarkers were within normal limits. The next day patient had repeated chest pain ....

Transthoracic 2D echocardiogram showed normal left ventricular function with no wall motion abnormalities or left ventricular hypertrophy. A diagnosis of non-ST elevation myocardial infarction was made, and the patient was started on the appropriate acute coronary syndrome medications.

Left heart catheterization was done the following day and revealed normal coronary arteries with slow flow noted in LAD and RCA.

The patient was given the diagnosis of coronary slow flow phenomenon and started on Sortis 10mg, Aspirin 100mg.

On six months following the patient reported that he had been chest pain-free.

In conclusion, there is a need for further extensive studies regarding the detailed pathogenesis and never effective treatment modalities for this unique phenomenon with potential to ameliorate the poor quality of life of patient with CSFP.

### 36 Relation of the heart rate recovery and silent ischemia in patients with type 2 diabetes.

J. Stepanović<sup>1,2</sup>, N. Bošković<sup>2</sup>, V. Giga<sup>1,2</sup>, M.T. Petrović<sup>2</sup>, D. Trifunović Zamaklar<sup>1,2</sup>, M. Dobrić<sup>1,2</sup>, M. Tešić<sup>1,2</sup>, I. Nedeljković<sup>1,2</sup>, S. Aleksandrić<sup>2</sup>, D. Orlić<sup>1,2</sup>, J. Šaponjski<sup>1,2</sup>, A. Đorđević Dikić<sup>1,2</sup>, B. Beleslin<sup>1,2</sup>, M.Č. Ostojčić<sup>1</sup>

<sup>1</sup>School of Medicine, University of Belgrade, <sup>2</sup>Clinic for Cardiology, Clinical Center of Serbia

**Background:** Silent myocardial ischemia (SMI) is presence of ischemia without chest pain detected by electrocardiograms (EKGs), EKG Holter monitoring, exercise stress test, myocardial perfusion imaging or magnetic resonance imaging. It is more prevalent in patients with diabetes mellitus (DM). Heart rate recovery (HRR) after the exercise stress testing is proven predictor of hard cardiac events. Nevertheless its role in prediction of SMI in patients with DM is still unclarified.

**Purpose:** We sought to evaluate if HRR after the exercise stress testing may predict the presence of SMI in patients with type 2 diabetes mellitus.

**Methods:** Out of 3011 patients that performed exercise stress testing in our laboratory from 2015-2016, we identified 98 consecutive patients with type 2 DM. The silent myocardial ischemia was defined as a presence of a ST segment depression more than 1mm or new/or worsening of preexisting wall motion abnormalities during the stress echocardiography test without the chest pain. The Bruce protocol was followed. Duke treadmill score, achieved metabolic equivalents (METs), target heart rate as well as HRR were calculated in all patients. Heart rate recovery was defined as the difference in heart rate between peak exercise and 1 minute later. For the patients undergoing stress echocardiography a value  $\leq 18$  bpm was considered abnormal and a value  $\leq 12$  bpm was considered abnormal for EKG treadmill testing.

**Results:** The SMI was present in 30/98 patients (30.6%). Between diabetic patients with and without SMI there was no statistically significant difference ( $p > 0.05$ ) regarding gender, age, body mass index, smoking, hypertension, hyperlipidemia, family history, prior myocardial infarction and functional capacity (METs achieved during the stress test). Nevertheless, patients with SMI and diabetes comparing to patients w/o SMI had lower maximum heart rate ( $133.4 \pm 18.9$  vs  $141.1 \pm 15.9$ ,  $p = 0.039$ ), lower values of HRR ( $25.1 \pm 11.8$  vs  $41.5 \pm 11.8$ ,  $p < 0.001$ ), and lower Duke score (median of 2 vs. median of 7,  $p < 0.001$ ). Target heart rate was achieved in 14 patients with SMI comparing to 53 patients without SMI (46.7% vs 77.9%,  $p = 0.002$ ).

In multivariate analysis HRR (OR 0.87, 95% of CI was 0.813-0.931), Duke score (OR 0.726, 95% of CI was 0.592-0.884,  $p = 0.001$ ), maximum heart rate (OR 1.08, 95% of CI was 1.016-1.166,  $p = 0.016$ ) and target heart rate (OR 0.05, 95% of CI was 0.009-0.976,  $p = 0.048$ ) were independent predictors of silent myocardial ischemia. Area under receiver operating characteristic curve for HRR was 0.845 with cut off value of 30 (Sn 74 %, Sp 84%).

**Conclusion:** Heart rate recovery after the exercise stress testing is the strongest predictor of silent myocardial ischemia in patients with type 2 diabetes mellitus. In

addition lower values of Duke score and maximum heart rate as well as percentage of achieved target heart rate can help to select these patients.

### 37 Echocardiographic parameters and clinical outcome after inferior myocardial infarction in patients with one-vessel and multi-vessel coronary artery diseases

Oalđe LS<sup>1,2</sup>, Pletikosić I<sup>3</sup>, Stojšić-Milosavljević A<sup>1,2</sup>, Radišić B<sup>1,2</sup>, Dejanović D<sup>1,2</sup>, Crnomarković B<sup>1,2</sup>, Srdanović I<sup>1,2</sup>

<sup>1</sup>Institute for cardiovascular diseases Vojvodina; <sup>2</sup>Medical school, University of Novi Sad; <sup>3</sup>General hospital, Subotica

**Introduction:** In our paper we wanted to test if there were statistically significant differences in some echocardiographic measurements and disease outcome between patients with single and multi-vessel coronary artery disease in inferior myocardial infarction with ST elevation treated with pPCI.

**Methods:** It is a retrospective analysis of the echocardiographic measurements and disease outcome after 3 and 6 months after myocardial infarction between patients divided into two groups - those with single ( $n = 30$ ) and patients with multi-vessel coronary artery disease ( $n = 50$ ), in the period from June 2012 - August 2014, treated with pPCI at the Institute for Cardiovascular diseases of Vojvodina.

**Results:** Left ventricular ejection fraction was in both groups 53%. Between the groups there was statistically significant difference ( $p < 0.05$ ) in the diastolic dysfunction of the heart. The difference in the number of patients within the group of disease outcome after 3 months is statistically significant at  $p < 0.01$ . It is also obtained a significant difference between the patients who were not hospitalized and who were electively hospitalized compared to diastolic dysfunction.

**Conclusions:** The research showed that there were more patients with multiple vessel coronary artery disease that were electively hospitalized, had symptoms and fatal outcome compared to those with single-vessel disease. From echocardiographic parameters statistically significant difference between the groups was observed in diastolic dysfunction of the heart.

### 38 Risk stratification for decision making in asymptomatic patients with severe valvular aortic stenosis

E. Antova, E. Srbinovska, M. Bosevski, I. Mitevska  
*University Clinic of cardiology, Skopje, Macedonia*

**Aim:** The goal was to assess the significance of the exercise test (ET) parameters as predictors of occurrence of symptoms and the significance of the Nt - proBNP value in asymptomatic ptc with severe AS (ASAS).

**Material:** 58 ASAS ptc with normal left ventricle function  $EF > 50\%$ , monitored for 02-36 months with median follow up period of  $19.5 \pm 10$  months.

**Results: Echocardiography:** LVEDd (mm)  $50.9 \pm 5.5$ ; LVEDs (mm)  $29.3 \pm 5.5$ ; EF (%)  $69.5 \pm 5.2$ ; AV\_Vmax (m/s)  $4.3 \pm 0.5$ ; AV\_Max Grad (mmHg)  $75.5 \pm 20.6$ ; AVA (cm<sup>2</sup>)  $0.7 \pm 0.2$ ; IVSd (mm)  $14.6 \pm 1.8$ ; LVPWd (mm)  $11.5 \pm 1.8$ . Ptc with AVA  $< 0.7$  cm<sup>2</sup>

had 6.7 times greater chances to get abnormal systolic blood pressure (SBP) response during ET vs ptc with  $AVA \geq 0.7 \text{ cm}^2$ . 25% have annual progression rate of the  $AV\_V_{\max} \geq 0.3 \text{ m/sec/year}$ . Median Nt - proBNP in ASAS ptc was  $404 \pm 425 \text{ (pg/ml)}$

**Exercise Test:** (symptom limited, modified standard Bruce protocol treadmill test performed to ptc  $\text{age} \leq 70$ ): 44 ptc (76%) had positive ET and 14 ptc (24%) had negative ET.

There is statistically significant (SS) negative correlation between higher values of Nt-proBNP and small SBP increase during ET ( $r = -0.21$ ,  $p = 0.03$ ). Nt-proBNP has SS positive correlation with: occurrence of ST-segment depression during ET ( $r = 0.28$ ,  $p < 0.03$ ) and occurrence of positive exercise test ( $r = 0.38$ ,  $p < 0.003$ ). Out of 44 ptc with positive ET, symptoms occurred in 27.3%. Event free survival was found in less than 5% of ptc with symptoms at ET and in 50% of ptc without symptoms at ET. 69% of ptc had abnormal SBP response during ET (if the increase of SBP was less and/or equal to 20 mmHg or in case of SBP drop) and 31% had normal SBP response during ET (where BPS increase is greater than 20 mmHg). After 36 months, only 21% of the ptc with abnormal SBP response to ET will have event free survival vs. 75% of the ptc with normal SBP response to ET.

**Conclusion:** in addition to the echo parameters, Nt-proBNP from serum and ET parameters in real ASAS ptc with severe AS have enormous predictive significance in revealing of the risk group that will experience rapid worsening and possible death in order to refer them to AVR in time.

### 39 Infektivni endokarditis kod pacijenta sa prolapsom mitralne valvule i idiopatskom trombocitopenijskom purpustom

N. Janković, D. Simić, D. Đikić, M. Petrović, I. Bilbija  
*Klinika za kardiologiju, Klinički centar Srbije; Klinika za kardiologiju, Klinički centar Srbije*

Muškarac M.S. 63 godine hospitalizovan je zbog simptoma i znakova srčane insuficijencije. Od ranije je znao za prolaps mitralne valvule. U mladosti operisan melignim melanomom na levoj natkolenici (Clark III, Breslow II) kada je registrovana trombocitopenija, u daljem toku kompetno hematološki ispitana i postavljena dijagnoza hronične idiopatske trombocitopenijske purpore i antifosfolipidnog sindroma.

Godinu dana pred prijem imao je intermitentnu subfebrilnost do  $37.4^\circ\text{C}$  čijoj pojavi je prethodilo vađenje i pravka karijesnih zuba. U međuvremenu je lečen na Klinici za pulmologiju zbog visoke febrilnosti i simptoma respiratorne infekcije, koji su shvaćeni kao intersticijska bronhopneumonija i fibroza sa pojavom bicitopenije ( $\text{Tr } 17 \times 10^9/\text{L}$ ,  $\text{Er } 2.9 \times 10^{12}/\text{L}$ ,  $\text{Hgb } 77 \text{ g/L}$ ).

Transtorakalnim i transezofagusnim EHO pregledom registrovano je da je prednji mitralni kuspis miksomatozno izmenjen i zadebljao sa perforacijom listića na granici A3-A2 segmenta u visini posteromedijalne komisure gde se na kratkoj peteljci u lumenu leve pretkomore registruje jedna hiperhogeno zrnasta promena 4-5 mm koja može odgovarati vegetaciji i MR 3+ asimetričnog mlaza usmerena uz posterolateralni zid uvećane LP (4.2 cm), LK uvećana (EDD 6.4 cm, ESD 4.2 cm). U laboratorijskim analizama se registruju povišeni parametri zapaljenja (CRP 114 mg/L, SE 70 mm/h, fibrinogen 5.9 g/L). Uzete su hemokulture koje su ostale sterilne.

Zbog sumnje na infektivni endokarditis, po savetu infektologa pacijent je lečen trojnom antibiotskom terapijom (Ceftriaxon 2 gr i.v., Ciprofloksacin  $2 \times 100 \text{ mg i.v.}$ , Metronidazol  $3 \times 500 \text{ mg i.v.}$ ) u ukupnom trajanju od 4 nedelje.

Zbog postojanja trombocitopenije lečen je kortikosteroidnom (Pronison  $2 \times 20 \text{ mg}$ ), a zatim imunosupresivnom terapijom (Endoxan  $3 \times 50 \text{ mg}$ ) koja je inicijalno dovela do pada broja trombocita sa početnih  $44 \times 10^9/\text{L}$  na  $13 \times 10^9/\text{L}$  uz pojavu petehijalnog krvarenja po šakama. Nakon dve nedelje registruje se porast broja trombocita na  $110 \times 10^9/\text{L}$ , koji se u daljem toku održava uz primenu Pronisona 10 mg i Endoxana 50 mg. Pacijent je operisan 06. decembra 2016. u opštoj anesteziji, implantirana je biološka valvula. Postoperativni tok protekao bez komplikacija, bez perioperativnog krvarenja, a postoperativni EHO srca je pokazao da je biološka valvula zadovoljavajuće funkcije.

### 40 Infektivni endokarditis desnog srca, atipična prezentacija bolesti kod atipičnog bolesnika – prikaz slučaja

J. Đokić<sup>1</sup>, S. Hinic<sup>1</sup>, D. Popovic-Lisulov<sup>1</sup>, J. Saric<sup>1</sup>, V. Bisenic<sup>1</sup>, G. Antic<sup>1</sup>, N. Ninkovic<sup>1</sup>, S. Klasnja<sup>1</sup>, V. Mudrenovic<sup>1</sup>, I. Stankovic<sup>2,3</sup>, A. Đokovic<sup>1,2</sup>, B. Milovanovic<sup>1,2</sup>, M. Zdravkovic<sup>1,2</sup>

<sup>1</sup>Kliničko-bolnički centar Bežanijska kosa, Beograd, Srbija, <sup>2</sup>Medicinski fakultet Univerziteta u Beogradu, <sup>3</sup>Kliničko-bolnički centar Zemun

Infektivni endokarditis je infektivna i inflamatorna bolest endokardijuma koja najpre zahvata valularni sistem srca dovodeći do formiranja amorfnih vegetacija. Zbog raznovrsne kliničke slike koja se javlja na samom početku bolesti, dijagnoza se postavlja relativno kasno, te je i ishod uvek neizvestan. Infektivni endokarditis trikuspidne valvule je redak oblik bolesti i najčešće se javlja kod bolesnika sa implantiranim pejsmejerom, centralnim venskim katetrom, kod bolesnika sa urođenim srčanim manama a takođe je veoma čest kod intravenskih narkomana i bolesnika koji su inficirani virusom humane imunodeficijencije (HIV).

Mi smo prikazali bolesnicu S.D. u starosnoj dobi od 56 godina koja je primljena na odeljenje pulmologije sa kliničkim i radiografskim znacima obostrane pneumonije. Na prijemu visoko febrilna ( $tt$  do  $40^\circ\text{C}$ ). Febrilnost perzistira četiri nedelje pre prijema, zbog čega je više puta pregledana u internističkim ambulancama i dobijala peroralne antibiotike. U fizikalnom nalazu se registruje novonastali sistoni šum sa punktom maksimumom na Erb-ovoj tački, jačine 2/6. Eho-kardiografski se na trikuspidnoj valvuli opisuju dve homogene mase embolijskog potencijala sa pretkomoške strane oba veluma, dužine 1,18cm, pokretne sa protokom krvi. Bolesnica je prevedena na odeljenje kardiologije i otpočeta je antibiotska terapija prema važećim preporukama za lečenje infektivnog endokarditisa trikuspidne valvule. Iz hemokulture je izolovan *Staphylococcus aureus* i terapija je korigovana prema antibiogramu. Ponovljenim transtorakalnim ehokardiografskim pregledom kao i transezofagealnim pregledom se uočava prolaps prednjeg trikuspidnog listića, umerena do teška TR, ESPDK 77mmHg i teška plućna hipertenzija dok ruptura horde nije uočena. Na urađenom CT toraksa se opisuje difuzno, obostrano u svim lobusima apscedirajuće bronhopneumonije. U anamnestičkim podacima sem desnostrane totalne mastektomije urađene 2009.god.



bolesnica negira druge hronične bolesti, skorije hospitalizacije, primene parenteralne terapije kao i korišćenje narkotika. U krvi HIV, HbsAg i HCV su negativni. Kontaktirana je dežurna kardiološka ustanova ali je operativno lečenje bolesnice odloženo zbog hemodinamske nestabilnosti i diseminacije infektivnih embolusa u plućima. Ulazno mesto infektivnog agensa nije pronađeno ali je bolesnica pozitivno odreagovala na primenu intezivne i dugotrajne antibiotske terapije. U dogovoru sa kardiološkim bolesnica je otpuštena u stabilnom opštem stanju, uz savet da se nakon mesec dana javi u kardiološki centar radi donošenja odluke o operativnom lečenju.

Od velike je važnosti što ranije posumnjati na postojanje infektivnog endokarditisa i sprovesti odgovarajuće dijagnostičke procedure. To je retko oboljenje podmuklog početka i toka i ukoliko se ne leči uvek je smrtonosno. Za dijagnostiku, lečenje i određivanje vremena operativnog lečenja neophodan je multidisciplinarni pristup.

**Ključne reči:** infektivni endokarditis, trikuspidna valvula, transtorakalna ehokardiografija, transezofagealna ehokardiografija.

#### 41 Hirurške tehnike u rekonstrukciji mitralne valvule

S. Putnik, M. Matković, D. Savić, E. Nestorović, M. Čubrilo, N. Aleksić, N. Karamarković  
*Klinika za kardiologiju, Klinički Centar Srbije, Medicinski fakultet, Univerzitet u Beogradu, Srbija*

**Uvod:** Mitralna valvula predstavlja jednu od najzahtevnijih srčanih struktura za rekonstrukciju. Neizostavan deo hirurške rekonstrukcije sa klasom I indikacije je transtorakalni i transezofagealni ultrazvuk srca pre, za vreme i posle operacije.

**Cilj:** Predstaviti hirurške tehnike rekonstrukcije mitralne valvule sa osvrtom na ultrazvučnu dijagnostiku i njen značaj

**Metode:** Prikaz osnovnih oblika mitralne insuficijencije i stenozе, MRI i ultrazvučne dijagnostike. Pregled operativnih indikacija i odgovarajućih hirurških tehnika rekonstrukcije mitralne valvule. Sažetak ultrazvučnih pregleda neophodnih hirurgu za izbor procedure i postoperativno praćenje.

**Rezultati:** Prikaz rezultata rekonstrukcije mitralne valvule i analiza preživljavanja različitih hirurških tehnika.

**Zaključak:** Rekonstrukcija mitralne valvule predstavlja terapiju izbora za hirurško lečenje stečenih mitralnih mana. Izborom odgovarajućih hirurških tehnika dobija se dugotrajno rešenje mitralne mane bez upotrebe antiokagulantne terapije.

#### 42 Atrial fibrillation, prosthetic valve and renal infarction

S. Ćirković<sup>1</sup>, Ž. Delić<sup>2</sup>, N. Sretenović<sup>1</sup>, D. Blagojević<sup>1</sup>, D. Glamočanin<sup>1</sup>  
<sup>1</sup>OB Požarevac, <sup>2</sup>OB Vrbas

**Introduction :** In the long-term prophylaxis of thromboembolic complications of atrial fibrillation and prosthetic valve, use of oral anticoagulants are indicated.

**Case report :** A 66 years old female patient was referred for investigation of abdominal and lumbal pain of the right side. The patient had history of atrial fibrillation, mitral

valve replacement, tricuspid valve annuloplasty, arterial hypertension and decreased function of the thyroid gland. On examination, the blood pressure was 150/90 mmHg, the pulse about 90 beats per minute. The heart sound were normal, functional artificial valve, with a irregular rhythm. The remainder of the examination was normal. Results of laboratory tests were normal, except very low INR, and high azotemia. An echocardiogram showed functional artificial mitral valve, mild transmitral regurgitation, spontaneous contrast in the left ventricle. MSCT of the abdomen showed infarction due to thrombosis of the right renal artery right, at the origin saddle thrombus that partially includes and abdominal aortic lumen. The patient was operated (in tertiary center) on underwent thrombectomy, with aorto renalis by pass right, and thrombectomy transfemoral left. INR is regulated in the proposed therapeutic range.

**Conclusion:** Frequent oscillations of the International Normalized Ratio values outside the therapeutic range and resultant low Time in therapeutic Range increase the risk of thrombotic and bleeding events. A safe and effective use of vitamin K antagonists includes regular control indicator intensity of anticoagulant effect.

#### 43 Sifilisni aortitis- prikaz slučaja

O. Nedeljković-Arsenović<sup>1</sup>, M. Boričić-Kostić<sup>2</sup>, N. Janković<sup>2</sup>, I. Petrović<sup>2</sup>, D. Simić<sup>1,2</sup>, M. Petrović<sup>1,2</sup>

<sup>1</sup>Medicinski fakultet Univerziteta u Beogradu

<sup>2</sup>Klinika za kardiologiju KCS, Beograd

**Uvod:** Sifilis je stecena ili kongenitalna polno prenosiva zarazna bolest koju izaziva bakterija *Treponema pallidum*. Kardiovaskularni sistem je zahvacen u tercijarnom stadijumu, kada nastaju promene na aorti, u vidu aortitisa i luetičnih aneurizmi, najcesce na ushodnoj aorti. Prikaz slučaja: Bolesnik starosti 66 godina, visegodisnji pusac sa pozitivnom porodicnom anamnezom za KVB, bez drugih subjektivnih tegoba. Prva prezentacija bolesti je bio gubitak vida na levom oku kao posledica okluzije a. centralis retinae, radi cega je hospitalizovan na Klinici za ocne bolesti. Objektivno: bez promena na kozi i sluznicama, normalan disajni sum, na srcu akcija ritmicna uz cujan dijastolni sum nad Erbom, EKG: sinusni ritam, fr 63/min, znaci hipertrofije leve komore uz negativan T talas u inferiornim odvodima. Na teleradiografiji srca i pluca uocena je policiklicno prosiarena senka medijastinuma, pa je zbog sumnje na Tu pluca pacijent preveden na Institut za plucne bolesti i tbc. U sklopu planiranih dijagnostickih procedura urađen je transtorakalni ehokardiografski pregled- uocena je aneurizmataska dilatacija ushodne aorte promera oko 6cm uz jos jedno aneurizmatasko prosirenje aorte neposredno pre odvajanja truncusa brachiocephalicusa (TBC) sa prizidnom trombozom. Opisana je znacajna 3-4+ aortna regurgitacija. Dodatnim TEE pregledom videna je aneurizmataski dilatirana ushodna aorta, neravne i mekotkivno zadebljale intime, sto je imponovalo kao infiltracija zida. MSCT toraksa je potvrdio nalaz opisan na ehokardiografiji uz bulozni emfizem pluca. Pacijent je preveden na Kliniku za kardiologiju. Zbog sumnje na sifilis uzete su seroloske analize. Bolesnik je upucen na hemodinamsku obradu pre planirane hirurske intervencije. Na koronarografiji je videna disekcija ostijuma glavnog stabla leve koronarne arterije, stenozna LAD



50-70%, stenoza proksimalnog dela RCA 50%. Aortografija je pokazala aneurizmatiku dilataciju ushodne aorte uz 3+ aortnu regurgitaciju. Pacijent je preveden na Kliniku za kardiohirurgiju radi operacije aneurizme aorte, zamene aortnog zaliska i revaskularizacije miokarda. Nazalost, ishod je bio letalan. Naknadno dobijenim rezultatom serologije potvrđena je dijagnoza sifilisa. Zaključak: Sifilis je retka, ali nije iskorenjena bolest. Treba ga imati na umu u diferencijalnoj dijagnozi aneurizmatičke bolesti aorte.

**Ključne reči:** sifilis, aortitis, aneurizma aorte

**44 Transapical transcatheter aortic valve implantation in a patient with small body weight complicated by severe hypotension: an enigma successfully solved by echocardiography**

A. Lazarević<sup>1,2</sup>, T. Naganuma<sup>1</sup>, S. Mitomo<sup>1</sup>, H. Kawamoto<sup>1</sup>, T. Nakao<sup>1</sup>, H. Ishiguro<sup>1</sup>, S. Nakamura<sup>1</sup>

<sup>1</sup>Department of Cardiovascular Medicine, New Tokyo Hospital, Matsudo, Japan, <sup>2</sup>University of Banja Luka, Faculty of Medicine, Banja Luka, Republic of Srpska, Bosnia and Herzegovina

**Introduction:** Transcatheter aortic valve implantation is currently considered as an alternative treatment for older patients with severe aortic valve stenosis and increased surgical risk, but can be associated with multiple life-threatening complications.

**Case Report:** An 83-year-old lady with severe symptomatic aortic stenosis, body weight 29 kg and body surface area 1.1 m<sup>2</sup> underwent transcatheter aortic valve implantation via transapical access. Severe hypotension occurred before valve implantation, due to temporary distortion of the mitral valve apparatus by stiff wire leading to acute mitral regurgitation. This complication was immediately recognized by continuous transesophageal echocardiography and managed by simple wire retrieval instead to apply mechanical circulatory support. After rewiring and predilatation of the stenotic aortic valve a 23 mm balloon-expandable transcatheter stent-prosthetic valve was successfully implanted.

**Conclusion:** This case demonstrates that continuous imaging during TAVI is key to rapid diagnosis of life-threatening complications, associated with the procedure, especially during the early learning curve in transapical approach.

**45 Trombozirana aneurizma duktusa arteriosusa u odraslog pacijenta**

S. Tomić, Lj. Jovović, A. Nikolić, D. Unić-Stojanović, S. Mićović, O. Đokić

*Institut za kardiovaskularne bolesti Dedinje, Beograd.*

Aneurizma duktusa arteriosusa je retka ali potencijalno opasna komplikacija kod odraslih. Može biti spontana ili stečena kao posledica hirurškog zatvaranja prolaznog duktusa.

Prikazujemo slučaj spontane potpuno trombozirane aneurizme duktusa arteriosusa u odraslog pacijenta. Aneurizma je slučajno otkrivena. U detinjstvu je imao česte prehlade i povremeno upale pluća. Devet godina pre hospitalizacije, uočena je blaga dilatacija aorte na rentgenskom snimku i potvrđena transtorakalnom ehokardiografijom.

Ordinirajući pulmolog je, sedam godina kasnije, tokom lečenja hroničnog bronhitisa, insistirao na proveru stanja aorte. Skoro dve godine posle toga urađena je transezofagealna ehokardiografija (TEE) gde se u nivou luka na zidu uočava prizidni tromb u kraćem segmentu debljine 1.2 cm. Vizualizuje se i loptasta struktura (aneurizma) ispunjena trombotičnom masom (antero-posteriorna dimenzija opisane formacije je 5 cm).

**46 Mitralna regurgitacija kod bolesnika sa tesnom aortnom stenozom upućenih na zamenu aortnog zaliska: uticaj na ehokardiografski nalaz i postoperativni tok**

B. Vukobrat, S. Stanić, J. Janjićijević, I. Rakočević, V. Tutuš, M. Petrović, M. Boričić, M. Tomić-Dragović, G. Draganić, O. Petrović, I. Jovanović, I. Paunović, S. Putnik, BV Tešić, D. Trifunović- Zamaklar

*Klinika za kardiologiju, Klinički Centar Srbije, Medicinski fakultet, Univerzitet u Beogradu*

**Uvod:** Kod bolesnika sa tesnom aortnom stenozom (AS), zbog značajno povišenog intrakavitarnog pritiska i remodelovanja leve komore (LK) može se javiti mitralna regurgitacija (MR) i u odsustvu značajnih morfoloških promena mitralne valvule.

**Cilj:** Kod bolesnika sa AS upućenih na hiruršku zamenu aortnog zaliska, utvrditi učestalost pridružene MR, njen uticaj na preoperativni i postoperativni ehokardiografski nalaz i klinički status bolesnika.

**Metod:** Kod 100 konsekutivna bolesnika sa tesnom AS upućenih na operaciju analiziran je klinički status, preoperativni i postoperativni ehokardiografski nalaz.

**Rezultati:** MR  $\geq 2+$  je bila prisutna kod 48% bolesnika. Bolesnici sa MR $\geq 2+$  imalu su veći dijametar leve pretkomore (LP) ( $4.08 \pm 0.57$  vs  $4.63 \pm 0.60$  cm,  $p < 0.01$ ), veći dijasoljni ( $5.27 \pm 0.69$  vs  $5.66 \pm 0.76$  cm,  $p = 0.017$ ) i sistolni ( $3.38 \pm 0.73$  vs  $3.88 \pm 0.91$  cm,  $p = 0.008$ ) dijametar LK, češće trikuspidnu regurgitaciju umernog ili teškog stepena ( $p = 0.001$ ) i značajno viši indirektno procenjen sistolni pritisak u desnoj komori ( $34.64 \pm 7.4$  vs  $41.18 \pm 11.76$  mmHg,  $p = 0.024$ ). Postoperativno učestalost MR $\geq 2+$  iznosila je 18%, kod 45% bolesnika MR je ostala istog stepena, u 47.3 % bolesnika MR se postoperativno smanjila, a u 7.7% povećala. Bolesnici sa preoperativnom MR $\geq 2+$  postoperativno su imali i dalje značajno veći dijametar LP ( $p = 0.007$ ), dijasoljni ( $p = 0.012$ ) i sistolni dijametar LK ( $p = 0.006$ ) i nižu EF LK ( $p = 0.043$ ). Statistički značajni preoperativni prediktori postoperativne MR $\geq 2+$  bili su: preoperativna arijalna fibrilacija ( $p = 0.001$ ), preoperativna MR težeg stepena ( $p = 0.001$ ) i veći stepen morfoloških promena mitralnih listića ( $p = 0.007$ ).

**Zaključak:** Pridružena MR $\geq 2+$  kod bolesnika sa teškom AS upućenih na operaciju aortnog zaliska je udružena sa težim remodelovanjem LK, manjim reverznim postoperativnim remodelovanjem LK, češćom trkuspidalizacijom i većim stepenom plućne hipertenzije. Preoperativna arijalna fibrilacija, teži stepen preoperativne MR i teže morfološke promene mitralnog zaliska udruženi su sa perzistiranjem MR $\geq 2+$  i nakon hirurškog rešavanja AS.

#### 47 Uticaj lokalizacije infektivnog endokarditisa na kliničku sliku, komplikacije i prognozu bolesnika

S. Stanić, B. Vukobrat, A. Radenković, V. Tutuš, M. Petrović, M. Boričić, M. Tomić-Dragović, G. Draganić, O. Petrović, I. Jovanović, I. Paunović, S. Putnik, BV Tešić, D. Trifunović-Zamaklar  
*Klinika za kardiologiju, Klinički Centar Srbije, Medicinski fakultet, Univerzitet u Beogradu*

**Uvod:** Infektivni endokarditis (IE) uprkos velikom napretku dijagnostičkih i terapijskih procedura i dalje ima značajan morbiditet i mortalitet.

**Cilj:** Analiza povezanosti lokalizacije IE sa kliničkom slikom, komplikacijama i prognozom kod pacijenata upućenih na kardiohiruško lečenje.

**Metod:** Retrospektivna studija koja je obuhvatila 103 pacijenta sa IE hiruški lečenih u period od šest godina (2009-2014).

**Rezultati:** IE je najčešće zahvatio aortnu valvulu (AV; 46.6%), potom mitralnu (MV; 43.7%), a najređe trikuspidnu valvulu (TV; 3.9%). Bivalvularni IE (Bi Valv) je imalo 6 bolesnika (5.8%; pet bolesnika IE AV+MV, jedan bolesnik IE MV+TV). Stafilokok je bio najčešći uzročnik u bolesnika sa IE AV i IE MV (po 75.0%), dok su negativne hemokulture bile najčešće u bolesnika sa IE MV (33,3%) i bolesnika sa BiVal IE (50%). Kod najvećeg broja bolesnika (41.7%) ulazno mesto ostalo je nepoznato, a kada je poznato u sve četiri grupe to je bila stomatološka intervencija (AV 20.8%, MV 17.8%, TV 25.0%, BiValv 16.7%). Bez obzira na lokalizaciju IE, najčešća inicijalna prezentacija je nejasno produženo febrilno stanje (39% AV, 43% MV), zatim srčana insuficijencija (21.7% AV, 21.6% MV). Od komplikacija najčešća je bile srčana insuficijencija (42.3%), potom embolizacije (33.7%), perzistentna sepsa (20.6%), neurološke sekvele (20.6%) i akutna bubrežna insuficijencija (13.9%). Ehokardiografski vegetacije su detektovane kod bolesnika IE AV 78.7%, MV 97.6% i kod svih bolesnika sa IE TV i BiValv IE. Vegetacije su imale veliki embolijski potencijal u 55.8% IE AV, 86.8% IE MV i kod svih IE TV i Bivalv IE ( $p=0,004$ ). Intrahospitalni mortalitet kod IE AV i IE MV je bio sličan (10.6% i 11.1%). Kod IE TV i BiValv IE nije bilo smrtnih ishoda.

**Zaključak:** IE je i dalje bolest sa teškom kliničkom slikom, brojnim komplikacijama i nepredvidivim, često letalnim intrahospitalnim ishodom i kod hiruški lečenih bolesnika.

#### 48 Surgical treatment of an aortic dissection in a pregnant woman – case report

Preveden A<sup>1,2</sup>, Redžek A<sup>1,2</sup>, Stojšić-Milosavljević A<sup>1,2</sup>, Crnomarković B<sup>1,2</sup>, Oalđe LS<sup>1,2</sup>

<sup>1</sup> *Institute for cardiovascular diseases of Vojvodina, Sremska Kamenica*, <sup>2</sup> *University of Novi Sad, Medical faculty, Novi Sad*

**Abstract:** There are functional changes in organism during pregnancy, like an increase in heart rate and cardiac output, which increase hemodynamic stress on blood vessels, and can lead to development of an aortic dissection. In this paper we report a case of a 22-year-old pregnant woman, with history of arterial hypertension, who was admitted for an aortic dissection. She underwent urgent surgery, in which her ascending aorta was replaced with Bentall procedure. The baby didn't survive the operation, so on the next day the evacuation abortion was made. Ye-

ars later the patient stopped taking anticoagulant therapy and got thrombosis of the artificial aortic valve.

**Key words:** aortic dissection, pregnancy, anticoagulant therapy, thrombosis

#### 49 Acute chest pain: the major role of multidetector computed tomography – pulmonary embolism

M. Dujović, J. Tričković, N. Menković, A. Petković, D. Ćosić, D. Mašulović

*Clinical center of Serbia, Center for Radiology and MRI/MDCT Department,, Belgrade, Serbia*

**Introduction:** In patients with chest pain and cardiopulmonary symptoms, pulmonary embolism (PE) is a frequently suspected diagnosis which shouldn't be overlooked. Acute PE is the third cause of mortality by acute cardiovascular disorder. The diagnosis of acute PE mainly rests on the sequential utilization of clinical assessment, D-dimer measurement and multidetector CT pulmonary angiography (CTPA).

The aim of study was to show diagnostic value of a CTPA in detection of PE.

**Materials and methods:** We retrospectively analyzed CTPA examinations performed between 2014 and 2015 in 91 patients (pts) (60% women, median age 58.8) with clinical suspicion of PE based on the clinical symptoms (chest pain, dyspnea and haemoptysis), chest radiography and elevated D-dimer level (in 45 pts). The examinations were carried out on 64-detector CT scanner (GE LightSpeed) using a "pulmonary embolism" protocol and SmartPrep technique.

**Results:** PE was detected in 26 of 91 (28.6 %) analyzed patients. Embolic material was visualized in 16 pts (61.5 %) in main pulmonary artery and lobar pulmonary branches, in all 26 pts were demonstrated segmental and proximal subsegmental filling defects and in 14 pts peripheral subsegmental filling defects were shown. Based on CTPA, acute PE was diagnosed in 12 of 26 pts (46.1%), in the rest of patients (53.9%) a chronic form was found. Consecutive abnormalities of pulmonary parenchyma were detected in 78 % pts.

**Conclusion:** CTPA is reliable method that facilitates rapid and accurate diagnosis of PE and can provide information, in a single examination, for alternative diagnoses and prognosis.

#### 50 Acute chest pain: the major role of multidetector computed tomography - acute aortic syndrome

J. Tričković, M. Dujović, N. Menković, A. Petković, D. Ćosić, D. Mašulović

*Clinical center of Serbia, Center for Radiology and MRI/MDCT Department, Belgrade, Serbia*

**Introduction:** Nonspecific acute chest pain still remains a diagnostic challenge for physicians. Among number of differential diagnosis, the initial focus should be on ruling out three life threatening emergencies such as acute coronary syndrome (ACS), acute aortic syndrome (AAS) and pulmonary embolism (PE). Multidetector computed tomography (MDCT) plays a crucial role and has revolutionized the diagnosis of this three emergencies.

The aim of this study was to illustrate key findings on MDCT angiography in patients with AAS.

**Materials and methods:** We retrospectively analysed MDCT angiograms of 32 patients (mean age 63,1±4,3) with acute chest pain, suspected for AAS who underwent electrocardiographic (ECG) gated 64 MDCT angiography between September 2015 and October 2016.

**Results:** Aortic dissection was diagnosed in 12 patients (37,5%), 5 patients (41,6%) had Stanford type A and 7 patients had Stanford type B. The IMH was found in 6 patients (18,75%), while PAU was detected in 8 patients (25%). Combined IMH and PAU was detected in two patients. In four patients none of this given entities were found and one patient had all three entities.

**Conclusion:** MDCT angiography due to its rapid acquisition, availability, high sensitivity and specificity remains the technique of choice in diagnostics of acute aortic syndrome. Regardless the pivotal role of radiologists in assessment of these patients, given its medical emergency a multidisciplinary approach is still necessary to provide an optimal outcome.

#### 51 Uloga magnetne rezonance srca u postavljanju dijagnoze miokarditisa – prikaz slučaja

S. Hinic<sup>1</sup>, M. Popovic<sup>1</sup>, J. Đokic<sup>1</sup>, J. Saric<sup>1</sup>, S. Prijic<sup>2,3</sup>, B. Crnokrak<sup>1</sup>, B. Milovanovic<sup>1,2</sup>, A. Đokovic<sup>1,2</sup>, N. Ninkovic<sup>1</sup>, B. Todic<sup>1</sup>, M. Zdravkovic<sup>1,2</sup>

<sup>1</sup>Kliničko-bolnički centar Bežanijska kosa, Beograd, Srbija, <sup>2</sup>Medicinski fakultet Univerziteta u Beogradu, <sup>3</sup>Institut za majku i dete, Beograd, Srbija

Miokarditis je inflamatorno oboljenje srca koje se karakteriše prisustvom inflamatornog infiltrata u miokardu, kao i degeneracijom i nekrozom miocita na patohistološkom pregledu. Može se manifestovati na različite načine, od bola u grudima sa palpitacijama pa sve do ventrikularnih aritmija i kardiogenog šoka.

Prikazali smo pacijenta starosne dobi 26 godina, koji je hospitalizovan u Koronarnoj jedinici zbog preznogavanja i bola u grudima u vidu stezanja sa propagacijom u obe ruke. Četiri dana pre hospitalizacije, pacijent je pregledan na Infektivnoj klinici KCS zbog akutnog tonzilitisa i tada je uvedena antibiotska terapija (penicilin širokog spektra dejstva). Na prijemu je bio afebrilan, normalne saturacije kiseonikom i gasne razmene. Arterijski krvni pritisak je bio 125/85 mmHg, srčana fr 66/min. Radiografija srca i pluća je uredna. Elektrokardiografski je opisan sinusni ritam sa konveksnom elevacijom ST segmenta difuzno prekordijalno. U laboratorijskim nalazima se beleže povišene vrednosti zapaljenskih parametara kao i vrednosti kardiospecifičnih enzima. Transtorakalnim ehokardiografskim pregledom je viđena leva komora graničnih dimenzija, globalno hipokontraktilna, ejeckione frakcije 40-45%, kao i raslojen perikard iza posteriornog zida. Urađena je koronarografija na kojoj nisu viđene hemodinamski značajne stenozе na epikardnim arterijama. Na pregledu srca magnetnom rezonancom uočeno je postojanje edema miokarda cirkularno, lokalizovanog u bazomedijalnim segmentima, anteroseptalnim segmentima miokarda kao i u apikalnom segmentu. Uočeno je i late gadolinium enhancement (LGE) i pojačanje signala u istim segmentima u kojima se vidi edem. Perikard inflamatorno izmenjen u apikalnom delu, sa raslojavanjem. Na osnovnu primenjenih dijagnostičkih procedura postavljena je dijagnoza mioperikarditisa.

**Zaključak:** Pregled srca magnetnom rezonancom ima značajnu ulogu u kliničkoj praksi, jer omogućava da se potvrdi ili isključi sumnja na inflamatorno oboljenje miokarda kod pacijenata primljenih sa kliničkom slikom akutnog koronarnog sindroma.

**Ključne reči:** miokarditis, ehokardiografija, magnetna rezonanca, late gadolinium enhancement (LGE).

#### 52 Uloga magnetne rezonance u dijagnostikovanju aritmogene displazije desne komore – prikaz slučaja

S. Hinic<sup>1</sup>, J. Đokic<sup>1</sup>, M. Popovic<sup>1</sup>, J. Saric<sup>1</sup>, S. Prijic<sup>2,3</sup>, B. Crnokrak<sup>1</sup>, B. Milovanovic<sup>1,2</sup>, A. Đokovic<sup>1,2</sup>, N. Ninkovic<sup>1</sup>, B. Todic<sup>1</sup>, M. Zdravkovic<sup>1,2</sup>

<sup>1</sup>Kliničko-bolnički centar Bežanijskakosa, Beograd, Srbija, <sup>2</sup>Medicinski fakultet Univerziteta u Beogradu, <sup>3</sup>Institut za majku i dete, Beograd, Srbija

Aritmogena displazija desne komore je retko oboljenje srca koje se karakteriše zamenom miokardnih ćelija lipocitima i fibrocitima. Pacijenti sa ovim oboljenjem imaju visok rizik od iznenadne srčane smrti usled malignih aritmija.

Mi smo prikazali pacijentkinju u starosnoj dobi od 63 godine, primljenu u našu ustanovu radi evaluacije kardiološkog statusa. Prethodno hospitalizovana u regionalnom zdravstvenom centru zbog poremećaja srčanog ritma, gubitka svesti i uspešne kardiopulmonalne reanimacije. Elektrokardiografski je tada zabeležena non-sustained ventrikularna tahikardija po tipu bloka leve grane sa inferiornom osovinoom koja po konfiguraciji odgovara tahikardiji iz izlaznog trakta desne komore. Pacijentkinja daje podatke o ponovljenim palpitacijama a u medicinskoj dokumentaciji se opisuje jedna epizoda ventrikularne tahikardije pre 6 godina koja je uspešno medikamentno konvertovana. Na prijemu je kardiološki kompenzovana, hemodinamski i ritmogeno stabilna. Arterijski krvni pritisak je bio 130/75 mmHg, srčana frekvenca 66/min. Na prijemu EKG-u se beleži sinusni ritam, bez malignih poremećaja ritma. Radiografija pluća i srca uredna. U laboratorijskim nalazima vrednosti kardiospecifičnih enzima su bile u granicama referentnih vrednosti. Transtorakalnim ehokardiografskim pregledom (TTE) je viđena uvećana desna komora, zadebljalog zida i trabekularne građe. Urađena je koronarografija na kojoj nisu viđene hemodinamski značajne stenozе na epikardnim arterijama. Na pregledu srca magnetnom rezonancom viđena izrazito dilatirana desna komora, sa velikim zonama masne degeneracije miokarda u predelu slobodnog zida, narušene kinetike sa redukovanim ejeckionom frakcijom (42%), kao i zone fibroze u medioapikalnom septumu. Pacijentkinji je zbog ponavljanih aritmija, ali i promena viđenih na pregledu srca magnetnom rezonancom implantiran cardioverter defibrillator (ICD) u sklopu sekundarne prevencije naprasne srčane smrti. Genetička testiranja nisu obavljena.

**Zaključak:** Aritmogena displazija desne komore zaslužuje veliku pažnju kao i detaljnija naučna istraživanja sa obzirom na prognozu bolesti i nedostatak efikasne terapije. Pregled srca magnetnom rezonancom je veoma osjetljiv i specifičan način postavljanja tačne dijagnoze aritmogene displazije desne komore pa samim tim utiče na preživljavanje i ima ogroman prognostički značaj.



### 53 Uloga magnetne rezonance srca u dijagnostici apikalne hipertrofične kardiomiopatije - prikaz slučaja

S. Hinic<sup>1</sup>, M. Popovic<sup>1</sup>, J. Đokic<sup>1</sup>, J. Saric<sup>1</sup>, S. Prijic<sup>2,3</sup>, B. Crno-krak<sup>1</sup>, B. Milovanovic<sup>1,2</sup>, A. Đokovic<sup>1,2</sup>, N. Ninkovic<sup>1</sup>, B. Todic<sup>1</sup>, M. Zdravkovic<sup>1,2</sup>

<sup>1</sup>Kliničko-bolnički centar Bežanijska kosa, Beograd, Srbija, <sup>2</sup>Medicinski fakultet Univerziteta u Beogradu, <sup>3</sup>Institut za majku i dete, Beograd, Srbija

Apikalna hipertrofična kardiomiopatija je retka forma hipertrofične kardiomiopatije koja najčešće zahvata apeks leve komore.

Mi smo prikazali pacijenta starosne dobi od 47. godina koji je hospitalizovan u jedinicu intenzivne nege zbog nespecifičnih tegoba. Anamnestički negira bol u grudima, palpitacije i dispneju. Na prijemu je kardiološki kompenzovan, hemodinamski i ritmogeno stabilan. Arterijski krvni pritisak je bio 140/95mmHg, srčana frekvencija 51/min. Na prijemnom EKG-u se beleži sinusni ritam i negativan T talas u D1, aVL, V2-V6. Radiografija pluća i srca uredna. U laboratorijskim nalazima vrednosti kardiospecifičnih enzima su bile u granicama referentnih vrednosti. Transtorakalnim ehokardiografskim pregledom srca je viđena hipertrofija septum sa hipokinezijom apikalnog segmenta prednjeg, lateralnog i posteriornog zida kao i smanjena sistolna funkcija leve komore procenjena na 45-50%. Na 24-časovnom Holter monitoring-u nisu opisani maligni poremećaji ritma. Na osnovu elektrokardiograma i nalaza dobijenog ultrazvučnim pregledom srca postavljena je sumnja na apikalnu hipertrofičnu kardiomiopatiju i indikovano je MRI pregled srca. Na pregledu srca magnetnom rezonancom uočena je izolovana, asimetrična apikalna hipertrofija leve komore, najizraženije u apikalnom segment septum, koji je do 15mm (u bazalnom i medijalnom segment je do 9mm). Duž septuma uočeno je late gadolinium enhancement, pojačanje signala po tipu intramiokardne fibroze. S obzirom da je pacijent bio asimptomatičan, nastavljeno je praćenje pacijenta i za sada nisu indikovane dalje medicinske intervencije.

**Zaključak:** Pregled srca magnetnom rezonancom je referentna metoda za dijagnostikovanje retkih oblika hipertrofične kardiomiopatije kao što je apikalna hipertrofična kardiomiopatija. Pravilno dijagnostikovanje bolesti je od izuzetnog značaja s obzirom da može imitirati brojna druga oboljenja uključujući koronarnu bolest srca, apikalne tumore srca, apikalne trombozne mase kao i endomiokardnu fibrozu.

### 54 Cardial mass – spread of lung carcinoma

S. Cirković<sup>1</sup>, Ž. Delić<sup>2</sup>, Ž. Dimitrijević<sup>1</sup>, N. Sretenović<sup>1</sup>  
<sup>1</sup>OB Požarevac, <sup>2</sup>OB Vrbas

**Introduction:** Spread of tumour to the heart (metastases) from other primary sites is much more common than primary cardiac neoplasms. The commonest types included lung, breast, melanoma et lymphoma. Primary lung cancers often invade the heart locally, directly through the pericardium and they can also spread to the heart via the blood, lymphatic system or both; tumour deposits may involve any structure in the heart. In contrast, an extension to the left atrium from the pulmonary vein is very rare. The

echocardiographic texture of the tumour is often distinct from surrounding cardiac muscle.

**Case report:** A 71 years old male patient was known to have advanced lung carcinoma. MSCT of the chest showed the posterior segment of the right upper lobe oval sharply limited change to the nearby parenchyma, 9 cm in diameter, which continuously invades the right hilum and passes through the pulmonary vein and left atrium. Echocardiography showed a large tumorous mass in the left atrium during diastole, which has far into the left ventricle. The starting place is somewhere at the entrance to the pulmonary veins. Tumorous mass of its appearance and movement has a large embolic potential.

**Conclusion:** Lung tumors are the leading metastatic cancers that spread to the heart through direct invasion. Intracardial masses are rare echocardiographic findings. The differential diagnosis is quite broad - neoplasma, thrombus, vegetation, normal structure or artefact. A definitive diagnosis cannot always be made from echo appearance alone, a combination of other imaging modalities are required.

### 55 Assessment of left atrial appendage flow velocity might be a possible predictor of successful cardioversion in patients with non-valvular persistent atrial fibrillation - 10-year experience

M. Ranđelović, S. Apostolović, G. Koracević, Z. Perišić, M. Pavlović, S. Salinger, S. Ćirić-Zdravković, T. Kostić  
*Clinic for cardiovascular diseases, Clinical centre Nis, Serbia*

Large atrium are known to be an important factor for occurrence of persistent atrial fibrillation (PAF) but influence of atrial fibrillation on left atrial appendage flow in those patients remains doubtful. To evaluate the role of left atrial appendage flow velocity detected by transoesophageal echocardiography for prediction of cardioversion outcome in patients with non-valvular atrial fibrillation duration more than 48 hours we studied 78 patients with PAF (57 men and 21 women) in a 10-year period that were randomized for treatment including transoesophageal echocardiographic measurements at the beginning of the study before electrical cardioversion. Left atrial appendage (LAA) flow velocities were significantly higher in patients with successful cardioversion than in those with unsuccessful cardioversion (37.8 +/- 11.6 vs 19.9 +/- 0.5)(cm/s); (p<0.001) with its values always higher than 20 cm/s in patients with successful cardioversion. In conclusion we can suggest left atrial appendage (LAA) flow velocity higher than 25 cm/s may be a possible predictor of successful cardioversion of with persistent atrial fibrillation.

### 56 Magnetic resonance imaging in ischemic heart disease

M. Spirovski  
*Diagnostic Imaging Center, Oncology Institute of Vojvodina, Sremska Kamenica, Serbia*

Cardiac magnetic resonance imaging (MRI) is increasingly used in ischemic heart disease. According to ESC guidelines cardiac MRI is class I indication.

Role of MRI is detection of the coronary artery disease, assessment of hemodynamic relevance of coronary artery stenosis and prognosis.

Direct visualization of coronary arteries is feasible with MRI, it but is still limited in assesment of degree of stenosis. In clinical setting it is usually used for visualisation of coronary artery origin and malformations, and not for detection of stenosis. MRI is being used for evaluation of implications of coronary artery stenosis on myocardium.

Different MRI techniques provide information on perfusion defects, presence of ischemia, presence and extent of edema and assesment of wall motion abnormalities and right and left ventricular function. In infarction, accurate assesment of the size, location and transmuralty, miocardium at risk, myocardial salvage and other important prognostic factors such as presence and extent of microvascular obstruction and hemorrhage. Ventricular remodeling and complications including ventricular aneurysm, mural thrombus and ventricular wall rupture can be evaluated with MRI.

In addition, MRI allows differentiation between ischemic and non-ischemic cardiomyopathies.

### 57 Congenital heart disease: role of MRI in adult population

M. Spirovski

*Diagnostic Imaging Center, Oncology Institute of Vojvodina, Sremska Kamenica, Serbia*

The role of imaging in congenital heart disease (CHD) is to assess cardiac morphology and function, shunts, valves and hemodynamic implications. Imaging is important tool in preoperative planning. In postoperative follow up it is important to understand how these defects are repaired and to evaluate the impact on the cardiac function.

Transthoracic echocardiography is the first line imaging modality for known or suspected CHD in children and adults, followed by magnetic resonance imaging (MRI) in adults, according to American College of Radiology Appropriateness Criteria. Invasive diagnostic tests are nowadays adjunct to noninvasive imaging for hemodynamic measurements, interventions and preoperative evaluation.

MRI is noninvasive and radiation free imaging modality, it allows assesment of cardiovascular morphology and tissue characterization, accurate evaluation of biventricular function, flow measurements and shunt quantification.

Improvement in diagnosis and management of congenital heart disease led to significant decrease in mortality; today we have more adult CHD patients, who require frequent follow up imaging, so it is important to select the appropriate imaging method wisely to avoid radiation burden.

### 58 Uloga imidžing metoda u diferencijalnoj dijagnozi intrakardijalnih masa-prikaz slučaja

D. Vasić<sup>1,2</sup>, J. Petrović<sup>1,2</sup>, K. Anđelković<sup>1,2</sup>, V. Karadžić<sup>1,2</sup>, B. Orbović<sup>1,2</sup>, B. Ivanović<sup>1,2</sup>

<sup>1</sup>Klinika za kardiologiju, KCS, <sup>2</sup>Medicinski fakultet Univerziteta u Beogradu, Beograd, Srbija

Transtoraksna ehokardiografija je metoda prvog izbora kada se radi o dijagnostici intrakardijalnih masa, uz ograničenja zbog otežane vizualizacije manjih masa, svih srčanih šupljina i ponekad nižeg kvaliteta slike. Transezofagusna ehokardiografija predstavlja senzitivniji modalitet imidžinga kao i magnetna rezonanca koja ima visoku prostornu i

vremensku rezoluciju i mogućnost da se primenom kontrasta razlikuje trombotična masa ili vegetacija (avaskularne tvorevine) od tumora.

Prikazan je nalaz različitih imaging metoda kod pacijentkinje stare 37 godina koja je hospitalizovana pod sumnjom na infektivni endokarditis trikuspidne valvule. Pacijentkinja je hospitalizovana zbog jednomesečne febrilnosti. Lična anamneza je bila negativna za rizična ponašanja. Laboratorijskim analizama je potvrđen pozitivan zapaljenski sindrom. Uzete su hemokulture iz kojih je izolovan je streptococcus agalactiae. Ehokardiografskim pregledom je na bazi prednjeg trikuspidnog listića sa komorske strane viđena mekotkivna, vakuolizirana, razgranata masa, čiji se jedan krak pružao do pulmonalnog zaliska (4,0cm). Ostali nalaz je bio u granicama normale. Urađena je i transezofagusna ehokardiografija (TEE) kojim je viđena neuobičajeno velika tu masa (moguće vegetacija), nepravilnog oblika, nejednake debljine. Uočena su dva kraka, jedan dužine 3,8cm relativno tanak, koji dopire do RVOT gde je loptasto proširen do 1,1cm i drugi kraći krak (dužine do 2,5cm, debljine 0,6cm) koji se pruža u pravcu vrha desne komore. Nehomogena mekotkivna masa (vegetacija) vezana je po sredini prednjeg trikuspidnog listića jednom peteljkom dužine do 0,7 cm, debljine do 0,3cm. Magnetnom rezonancom srca je u desnoj komori, od prednjeg trikuspidnog listića, registrovana promena sa dva kraka, jednim usmerenim prema apeksu desne komore, dužine 45mm, a drugim prema plućnoj valvuli 37mm. Posle primene kontrasta promena nije značajno opacifikovana te prava priroda promene nije utvrđena. Diferencijalno dijagnostički je mogla odgovarati miksomu, trombotičnoj masi ili vegetaciji. Po započinjanju empirijske antibiotske terapije a potom prilagođene antibiogramu ostvarena je eufebrilnost Kontrolnim TTE i TEE pregledom registrovana je i dalje prisutna velika razgranata tumorska masa, neznajčajno manja nego pri prethodnim pregledima ali i dalje dopire do pulmonalnog ušća Zbog veličine mase upućena je na kardiohiruršku intervenciju - uklanjanje tumorske mase. Patohistološkim pregledom, makroskopski je uočeno beličasto smeđe tkivo, krte i delom trošne konzistencije a PH obradom da se radi o fragmentima tromba, pretežno građenog od fibrina sa malobrojnim granulocitima i po kojim eozinofilom. Na jednom od uzorka je uočeno i vezivo koje prekriva tromb.

Na osnovu prikazanog slučaja, može se zaključiti da su imidžing metode iako neophodne radi postavljanja dijagnoze prisustva intrakardijalnih metoda, često nedovoljne u utvrđivanju porekla intrakardijalnih masa (tromb, vegetacija, tumor), te patohistološka verifikacija ostaje neophodnost.

### 59 MDCT karakteristike aneurizme abdominalne aorte i njenih potencijalnih komplikacija

D. Čosić, N. Menković, A. Petković, M. Ilić, D. Zorić, J. Tričković, M. Dujović, D. Mašulović

*Centar za radiologiju, Klinički Centar Srbije, Medicinski fakultet, Univerzitet u Beogradu*

**Uvod:** Aneurizma abdominalne aorte (AAA) podrazumeva fuziformno ili sakularno uvećanje aorte u iznosu jednakom ili većem od 3cm. Najozbiljnija komplikacija AAA detektovana multidetektorskom kompjuterizovanom tomografijom (MDCT) je ruptura čiji je rizik direktno proporcionalan njenom

dijametri. Ostali MDCT znaci komplikacija AAA uključuju: znak preteće rupture, znak odložene rupture, aortoenteričnu i aortokavalnu fistulu, kao i fistulu sa levom renalnom venom i znake infekcije AAA.

**Cilj:** Cilj rada je da se dokaže senzitivnost MDCT u karakterizaciji kako same AAA tako i njenih potencijalnih komplikacija, koristeći multiplanarnu reformaciju (MPR) i tro-dimenzionalnu (3D) rekonstrukciju.

**Metod:** MDCT protokol pregleda AAA obuhvata nativan pregled, kao i skeniranje nakon aplikacije kontrastnog sredstva u količini od 1,5 ml/kg, brzinom od 4-5 ml/s, sa tehnikom praćenja kontrastnog sredstva čiji se denzitet meri u regiji od interesa (ROI), koji se nalazi u visini torako abdominalne aorte, koristeći multiplanarnu reformaciju iskrivljene ravni, projekciju maksimalnog intenziteta kao i tro-dimenzionalnu rekonstrukciju.

**Rezultati:** Standardan radiološki opis AAA prilikom MDCT pregleda trebao bi da obuhvata tačnu lokalizaciju, oblik, maksimalni transverzalni dijametar, dužinu, udaljenost od ishodišta renalnih arterija i volumen AAA. MDCT pregledom možemo detektovati i veličinu intraluminalnog tromba kao i potencijalne komplikacije: znake akutne rupture, preteću rupturu kao hiperatenuacijski znak polumeseca koji predstavlja krvarenje unutar tromba ili zida aneurizme, znak draperije koji ukazuje na slabost zida aneurizme i potencijalni rizik za rupturu, periaortalno povećanje denziteta masti, absces i prisustvo gasa kao znake infekcije i karakterističnu MDCT prezentaciju aortoenterične, aortokavalne i aorto-levo renalne fistule.

## 60 Essential Diagnostic Imaging of Acute Aortic Syndrome

D. Cvetkovic, M. Kocica, D. Savic, Lj. Soskic, M. Karadzic, F. Vucicevic, D. Lazovic, M. Grujic  
Clinic for Cardiac Surgery, UC Clinical Centre of Serbia

Acute aortic syndrome (AAS) is a term used to describe a variety of life-threatening aortic diseases that requires emergency surgery: aortic dissection, intramural haematoma and penetrating atherosclerotic ulcer. Prognosis depends upon rapid, accurate diagnosis and emergency treatment. The imaging armamentarium includes chest X-ray, transthoracic and transesophageal echocardiography (TTE and TEE), computed tomography (CT), magnetic resonance (MRI), and aortography. If acute aortic dissection (AAD) of the ascending aorta left untreated mortality rate is very high: 1-2% per hour within the first 48 hours, after onset of symptoms. With surgical repair early mortality rates is 10-25%. Time is the essence in AAD treatment algorithm. High level of clinical suspicion and carefully taken clinical examination, could dramatically reduce AAD onset-to-treatment interval, which is mayor determinant of morbidity and mortality. Further diagnostic tools should be used in extremely rational manner, to confirm diagnosis and spare a valuable time. Early diagnosis and surgical management are keys to survival.

In our institution, from 2003 to 2012, 372 patients underwent emergency operation for AAD. Diagnosis was made by clinical examination, chest radiography, TTE, CT and angiography. TEE was used to complete or refine diagnosis in the operating theatre. During this period of time, we have adopted a strategy of "the earliest possible surgery", reducing preoperative diagnostic algorithm on care-

full clinical examination and the least possible number of imaging tools. Average number of imaging tools per patient were 2.5(1-4) and mean admission-to-table time was 2.5(1-19) hours. Our results, comparable with leading centres, have justified this strategy.

**Key words:** acute aortic syndrome, aortic dissection, imaging

## 61 Cardiovascular imaging in a patient with two pseudoaneurysms after surgical treatment of bivalvular infective endocarditis

K. Anđelković<sup>1,4</sup>, D. Kalimanovska-Oštrić<sup>1,4</sup>, D. Zamaklar-Trifunović<sup>1,4</sup>, M. Boričić-Kostić<sup>1,4</sup>, N. Menković<sup>3,4</sup>, S. Matic<sup>1,4</sup>, V. Radojković-Radivojević<sup>1</sup>, V. Karadzic<sup>1,4</sup>, D. Marković<sup>2,4</sup>, S. Đorđević<sup>2,4</sup>

<sup>1</sup>Cardiology clinic, CCS, Belgrade, Serbia, <sup>2</sup>Clinic for cardiac surgery, CCS, Belgrade, Serbia, <sup>3</sup>Center for radiology and magnetic resonance, CCS, Beograd, Serbia, <sup>4</sup>School of Medicine, University of Belgrade, Belgrade, Serbia

Multivalvular endocarditis accounts for 15% of all cases and often results in severe and extensive cardiac lesions. In left-sided bivalvular endocarditis, the mitral lesion often follows primary aortic endocarditis. Occasionally, the infection can propagate into the mitral-aortic intervalvular fibrosa. Rupture of this zone may lead to a pseudoaneurysm of the left ventricular outflow tract (LVOT). It may perforate and communicate with the left atrium, causing shunting of blood from the left ventricle through the aneurysm into the left atrium.

We present a 45-yr-old lady admitted for treatment of infective endocarditis on her bicuspid aortic and mitral valve. Blood cultures grew *Staphylococcus lugdunensis*. Antibiotic treatment was initiated. Because of abrupt heart failure unresponsive to drug therapy she was scheduled for urgent cardiac surgery. A large paravalvular abscess was found, surgically treated before implantation of an artificial aortic (St Jude No 21) and mitral valve (ATS No 28). Antibiotic treatment was continued. The patient was afebrile and stable when routine echocardiography revealed atypical aortic regurgitation (AR). Detailed TTE and TEE exams described postoperative sequels as baggy pulsatile cavities of increasing dimensions in systole (area 2cm<sup>2</sup>) which communicate with the LVOT through a 1cm wide orifice and AR like flow in diastole. Postoperative MDCT confirmed the echo findings of two pseudoaneurysms – one behind and below the noncoronary sinus (21x27.4 mm in systole, 19x5.3 mm in diastole) and the other below the left coronary sinus (25x8x17.6 mm in systole, 25x8x17.6 mm in diastole). PET scan documented activity in the operated myocardial region increasing our dilemma whether to re-operate or continue close checkups. The decision was reached to continue regular echocardiographic and occasional CT follow-up since consulted international experts assessed even transcatheter interventions as unacceptably risky. Two years after the operation, our patient is without symptoms, in a stable state.

Cardiovascular imaging is very important for patients with infective endocarditis, either for establishing the diagnosis at the beginning of the disease or its' postoperative sequels.



## 62 Relationship between serum adiponectin levels and echocardiographic signs of coronary artery disease

S. Stojanovic<sup>1</sup>, M. Deljanin Ilic<sup>1</sup>, S. Ilic<sup>1</sup>, B. Ilic<sup>1</sup>, D. Petrovic<sup>1</sup>, S. Djukic<sup>2</sup>

<sup>1</sup>Clinic for cardiovascular diseases, Institute Niska Banja, <sup>2</sup>Clinic for Hematology, Clinical Centre Kragujevac

**Background:** Adiponectin seems to have anti-inflammatory, anti-atherosclerotic and vasoprotective actions, thus hypoadiponectinaemia contributes to the pathophysiology of the coronary artery disease (CAD).

**Purpose:** To examine the relationship between adiponectin levels with the echocardiographic signs of CAD in patients with stable CAD.

**Methods:** A total of 80 subjects were enrolled in the study, who were divided into two groups: CAD group (n=50 patients with CAD, after myocardial infarction and/or documented CAD) and control group (C group, n=30 healthy subjects). In all subjects serum adiponectin concentration was measured, and 2D echocardiography was performed. Criterion for CAD was the presence of baseline wall motion abnormalities (WMA). In all pts in CAD group coronary angiography was performed.

**Results:** Out of 50 patients in CAD group, 8 had no WMA, 26 had hypokinetic segments and 16 had akinetic segments. Coronary angiography confirmed the presence of CAD in all pts in CAD group. In C group WMA were not detected. Adiponectin level was significantly lower in CAD group compared to C group (1416.76±168.37 vs. 1777.08±195.04 pg/mL, p<0.001). Adiponectin level was higher in CAD pts without WMA, than in patients with hypokinesia (ns) and significantly lower in patients with akinesia than in pts with hypokinesia (P<0.05). A significant negative correlation was found between adiponectin level and presence of akinesia ( $\rho = -0.434$ , P<0.05). Adiponectin levels were distinguished as significant and independent predictors for CAD (OR 0.996, confidence interval CI 0.992-0.998, P<0.01) and akinesia (OR 0.996, CI 0.993-0.999, P<0.05). The value of adiponectin

≤ 1387.44 pg/mL was associated with a higher risk of WMA, particularly akinesia. Adiponectin level was significantly lower in subgroup of patients with multi-vessel CAD than in subgroups of patients with single- or double-vessel CAD (P<0.001, for all comparisons). A significant negative correlation was found between adiponectin level and number of coronary stenotic vessels ( $\rho = -0.564$ , P<0.01).

**Conclusions:** Results of our study show a negative and independent relationship between adiponectin level and echocardiographic signs of CAD. Hypoadiponectinaemia is associated with the presence and severity of CAD determined through WMA, as well as by coronary angiography.

## 63 Is left ventricular remodeling in ST-elevated myocardial infarction predictable by early echocardiography?

S. Tadic<sup>1,2</sup>, R. Jung<sup>1,2</sup>, A. Ilic<sup>1,2</sup>, A. Stojic-Milosavljevic<sup>1,2</sup>, J. Dejanovic<sup>1,2</sup>, M. Stefanovic<sup>1</sup>, S. Stojic<sup>1</sup>, M. Sladojevic<sup>1</sup>

<sup>1</sup>Institute of CVD Vojvodina, Sremska Kamenica, <sup>2</sup>Medical Faculty, University of Novi Sad, Serbia

**Objective:** Patients with ST-elevated myocardial infarction (STEMI) treated by primary angioplasty (pPCI) will develop postinfarctional remodeling in one third of the cases. The purpose of this study is to determine early echocardiographic predictors.

**Methods:** 210 patients with an anterior STEMI were included. All participants underwent echocardiography in the first 24hrs and again after 6 months, after which they were divided into two groups: remodeling (n=55; 26%) and non-remodeling (n=155; 74%). The criteria for remodeling was the increased left ventricular end-diastolic volume >20% after 6 months.

**Results and discussion:** The most powerful independent early predictors were: diastolic dysfunction in the first 24hrs (OR=27.7 95% CI, p<0.0001), increased diameter of the left atrium-LA (OR=5.0 95% CI, p=0.044) and Killip class 2-4 at admission (OR=3.4 95% CI, p=0.003), by multi-variant regression analysis. Also, strong predictors were incomplete ST-resolution-STR (OR 2.0 95% CI, p=0.024) and Wall motion score index (WMSI)>2 (OR 21.6 95% CI, p<0.0001), by univariate regression analysis. The group with remodeling had more frequent MACE during one year follow-up: repeated hospitalizations (61.8% vs 22.6%; p<0.0001), re-infarctions (20% vs 7.1%; p=0.007), repeated coronary angiography (45.5% vs 18.1%; p<0.0001), re-vascularizations ((30.9% vs 11%; p=0.001) and mostly re-hospitalizations due to heart failure (40% vs 2.6%; p<0.0001). Remodeling group had mortality rate of 5.5%.

**Conclusion:** For the patients with a first acute anterior STEMI, treated by pPCI, diastolic dysfunction, increased LA and heart failure on admission are the most powerful early independent predictors for postinfarctional left ventricular remodeling. Incomplete STR and WMSI>2 are strong predictors, too. Remodeling patients will have a more frequent incidence of MACE and mortality.

## 64 Atypical presentation of peripartum cardiomyopathy

Ilic A, Stojic-Milosavljevic A, Grkovic D, Stojic S, Stefanovic M, Tadic S, Miljkovic T, Bjelobrck M, Papovic J, Milovancev A, Jarakovic M, Ilic Dj

*Institute for Cardiovascular Diseases of Vojvodina, Sr. Kamenica, University of Novi Sad, Medical Faculty, Institute for Pulmonary Diseases of Vojvodina, Sr. Kamenica, Clinical Centre of Vojvodina, Novi Sad, Department of Obstetrics and Gynecology.*

**Introduction:** In some cases eclampsia (which is the main cause of mortality during pregnancy) may be associated with peripartum cardiomyopathy (the main cause of serious complications during pregnancy and postpartum period).

**Case report:** female patient 36 years old, in the 30<sup>th</sup> week of gestational (the first pregnancy), previously completely healthy, was admitted to the hospital due to syncope, convulsion and hypertension (160/100mmHg). The caesarean delivery was performed immediately. ECG and echocardiography were without pathological findings, but because of elevated troponin I (0,19) and NT proBNP (1500), CT coronary angiography was performed. The finding on the coronary arteries was completely normal. After improvement in clinical



symptoms, values of blood pressure and laboratory findings, patient was discharged. Three months later (in the meantime she didn't come for the routine clinical follow-up) she was again admitted to hospital due to dyspnoea, peripheral edema and palpitations. Symptoms had begun ten days before that. Physical examination indicated systolic murmur at the apex, signs of congestive heart failure. Laboratory analysis showed leukocytosis, anemia, increased liver enzymes AST (62), LDH (531), uric acid (548), CRP (7,5) and significant increase of NT proBNP (20975). Electrocardiogram pointed to tachycardia and T-wave inversion in standard and precordial leads.

Chest X-ray demonstrated enlarged heart without pathological changes in the lungs. The patient underwent an echocardiography exam which showed dilated left ventricle, global hypokinetic, with low ejection fraction (25%) and with large thrombus in the apex, with very high embolic potential. It also demonstrated moderate mitral regurgitation.

The patient was treated according to the Guidelines on acute and chronic heart failure with ACE inhibitors, beta-blockers, diuretics, mineralocorticoid receptor antagonists, also with anticoagulant therapy and replacement therapy of folic acid and iron, with addition of bromocriptine. Two months later she was symptomless, while echocardiography showed improvement in ejection fraction (45-50%), reduction of mitral regurgitation and complete resolution of the left ventricle thrombus.

Finally, about twelve months later, coming to a complete clinical, laboratory, ECG and echocardiography restitution.

**Conclusion:** If eclampsia occurs it is necessary to follow up the patient frequently not to miss the beginning of the systolic dysfunction of the left ventricle due to peripartum cardiomyopathy, which may be caused by eclampsia. It is also important to be aware that some cases need more time (not only six months) for complete restitution.



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