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Воведно

Почитувани колеги,

Во периодот од 30 мај до 1 јуни во Скопје со голем одзив и успешно се изведе Меѓународниот симпозиум Rhythm2025, во организација на Работната група за аритмологија, елетростимулација и елетрофизиологија при Македонското здружение по кардиологија. Овој број тематски е посветен на овој настан и трудовите презентирани на него.

Срдечно,

Проф. д-р Маријан Бошевски, FESC



Историја на електростимулацијата на срцето во светот и во Македонија History of electrostimulation in Macedonia

Лидија Попоска, УК за Кардиологија Скопје

Првите идеи за електростимулација на срцето, со што би се надминала спората срцева работа се поврзуваат најмногу со името на кардиохирургот Clarence Valton Lillehei (1918-1999), кој од самиот почеток на операциите на вродени срцеви мани, се соочувал со компликации од тип на ексцесивна брадикардија со ризик од асистолија, како последица на интраоперативно оштетување на гранките на His. Иако, кај половина од пациентите ова оштетување било транзитивно и се надминувало со електрода внесена во миокардот, фиксирана за кожата и поврзана со надворешен електростимулатор (1956-1957 година), сепак поврзувањето со електричното напојување, останало да биде проблем во однос на подвижноста на пациентот, а уште поголем проблем се јавувал при прекин на мрежата со електрична енергија.

Во октомври 1957 година на празникот „Ноќ на вештерките“ во Минесота, САД, заради голем дефект на електричната мрежа, во болницата во која оперирал Др. Лилехај, бил прекинат доводот на струја во времетраење од цели три часа. Агрегатите се вклучиле во единиците за интензивна нега, но не ги покривале болничките соби во кои биле сместени пациентите кои зависеле од електростимулација. Едно од децата со надворешен пејсмејкер починало, како последица на недостаток на електростимулација. Др. Лилехај овој момент го доживеал како предупредување и мотив да се обиде да најде подолготрајно решение за овој проблем. Му се обратил на младиот инженер Earl Elmer Bakken (1924-2018), кој веќе во Минеаполис имал мала фирма за одржување на медицинска опрема и апарати, а потоа почнал и да се занимава со конструирање на истите. Името на фирмата било „Medtronic“ – кованица од именките медицина и електроника.

Arne Larsson (1915-2001), се споменува како прв пациент кој добил имплантиран пејсмејкер 1958 година. Апаратот го имплантирал шведскиот кардиохирург Ake Senning (1915-2000). Arne Larsson во тек на првата хоспитализација, бил реанимиран по 30 пати на ден и состојбата била безнадежна. Првиот пејсмејкер кај него бил имплантиран абдоминално, со електроди внесени преку лева торакотомија. Батеријата траела само 3 часа. Веројатно била оштетена во тек на имплантацијата со електрокаутерот.

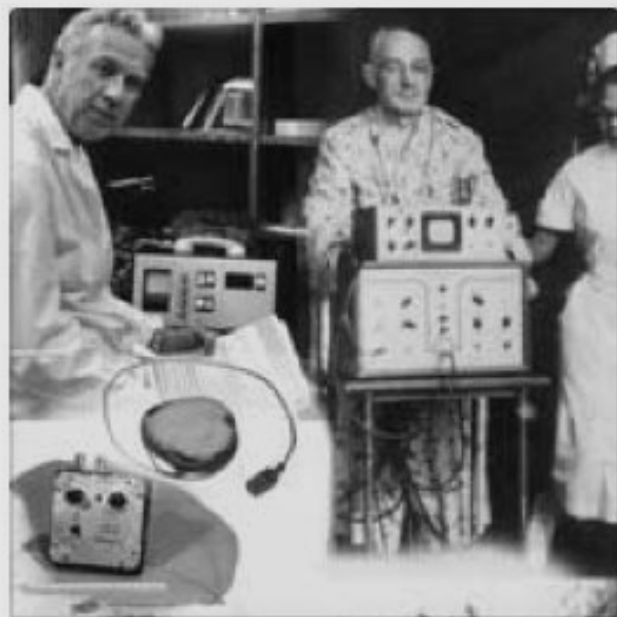


Ревијален приказ

Следниот ден кај пациентот бил имплантиран нов пејсмејкер, чија батерија траела една недела. Следните неколку години биле посветени на усовршување на електродите. Пациентот Ларсон, живеел уште 43 години, од првата имплантација. Во тек на неговиот живот доживеал 26 реимплантации на генератор, а го надживеал и својот доктор.



Слика 1: Dr. Lillehei со својот пациент со надворешен пејсмејкер (објавено во печат 1961 година)



Слика 2: Erl Bakken – електро-инженерот кој го пронајде првиот пејсмејкер што користи енергија од батерија.

Шеесетите години од минатиот век се периодот во кој методата на решавањето на спората срцева работа, со имплантација на вештачки генератор на импулси заживува во светот, во Австралија - прва имплантација 1961 година, во Холандија и Чехословачка – прва имплантација 1962 година, во Германија - прва имплантација 1963 година. Австралија прва почнува да произведува апарати со литиумска батерија, а во 1962 година, за прв пат се овозможува и трансвенозна имплантација на електродите – без потреба од торакотомија.

Прва примена на привремен пејсмејкер во Скопје, во рамки на тогашната Социјалистичка Федеративна Република Југославија, била во август 1973 година, а носител на идејата за потреба и воведување на електростимулацијата, како модус на лекување на брадиаритмиите бил Проф. д-р. Лазар Србиновски (1933-2010). По враќање од неговото стручно усовршување во Загреб и Белград, тој основа Единица за интензивна коронарна нега во рамки на одделот за кардиологија, кој бил дел од Интерните Клиники. Набрзо потоа д-р. Србиновски ја воведува како метода и трајната електростимулација на срцето- 25 Октомври 1973 година.



Ревијален приказ

Првата процедура е работена на хирушките клиники во соработка со торакалните хирурзи, кај пациент кој направил комплетен AV блок, по акутен инфаркт на миокардот во антеро-септалната регија. Во 1973 година биле имплантирани вкупно 3 пејсмејкери, сите од производителот General Electrics, од кои 2 со асинхрон режим на работа, а еден со синхрон режим на работа т.н. “on-demand”. Кај сите тројца пациенти, индикацијата била – комплетен AV блок.

Од 1975 година имплантациите на пејсмејкери се изведуваат во салите за катетеризација и кардиоангиографија на Институтот за радиологија. До 1980 година биле имплантирани вкупно 97 пејсмејкери. Местото на имплантација било претежно десно пекторално, заради близината на десната подклучна вена до десната преткомора. Покрај General Electrics, во овој период биле имплантирани пејсмејкери од производителите: Vitatron (потоа Medtronic) и Cordis.



Слика 3: Проф. д-р. Лазар Србиновски (1933-2010) доајен и основоположник на македонската кардиологија. Ја основал првата коронарна единица во Македонија.

Професор на Медицинскиот Факултет во Скопје.



Слика 4: Hyrel (Medtronic) еден од најстарите типови на пејсмејкери кои биле имплантирани во Македонија во седумдесеттите години од минатиот век.



Ревијален приказ

Во периодот што следи, имплантациите на пејсмејкери станале дел од рутинската работа на Клиниката за кардиологија. Во тимот за имплантација на пејсмејкери покрај Проф. д-р. Лазар Србиновски, се вклучиле Проф. д-р. Митко Каев, Проф. д-р. Лазар Лазаров, Проф. д-р. Сашко Кедев, д-р. Бранислав Милетиќ, д-р. Никола Ѓоргов, д-р. Владимир Бошков, д-р. Иван Трајков и д-р. Дејан Ковачевиќ.

На почеток на деведесетите години од минатиот век со голема помош од Проф. др. Wolfgang Reiser, на Универзитетската Клиника за кардиологија имплантиран е и првиот имплантибилен кардиовертер-дефибрилатор (ICD). Во истиот период беше воведена и методата на срцева ресинхронизациона терапија – имплантација на трокоморни (бивентрикуларни) електростимулатори, кај пациенти со срцева слабост.



Слика 5: Проф. д-р. Wolfgang Reiser, долгогодишен соработник и пријател на македонската кардиологија. Почесен професор на Медицинскиот факултет во Скопје. Основоположник на електрофизиологијата во Македонија.

Од 2000 година натака тимот на доктори вклучени во електростимулација на срцето се зголемува и почнува да едуцира кадри од државата, но и надвор од неа. Во одделот за аритмии, електрофизиологија и електростимулација на срцето се вклучуваат: д-р. Беким Поцеста, д-р. Лидија Попоска, д-р. Дејан Ристески, д-р. Јане Талески, д-р. Филип Јанушевски, д-р. Елма Кандиќ, д-р. Славчо Тодоровски, д-р. Игор Здравковски и д-р. Димитар Цветковски.



Ревијален приказ

Бројот на имплантирани апарати на Универзитетската Клиника за Кардиологија надмина 10.000 на крај на 2024 година. Годишно на Клиниката се имплантираат над 600 апарати, до кои над 100 се високо-волтажни апарати (кардиовертери). Амбулантата за технички контроли на имплантираните апарати работи 5 дена во неделата, а исто така последните 10 години е овозможено и следење од далечина на голем дел од пациентите со имплантирани електростимулатори.

Електростимулацијата на срцето претставува еден од најзначајните достигнувања во современата кардиологија. Таа овозможува ефикасно лекување на брадикардии, срцева слабост и тешки нарушувања на срцевиот ритам. Со имплантацијата на пејсмејкери и уреди за ресинхронизација, значително се подобрува квалитетот на живот и се продолжува животниот век на пациентите. Денес, електростимулацијата е незаменлив дел од модерната терапија на аритмии и срцева инсуфициенција.





BACK TO THE FUTURE. EASTERN EU COUNTRIES, A FAST TRACK TO NEW EP TECHNOLOGIES

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Cardiac electrophysiology procedures, from its humble beginnings until now, have grown from basic conventional EP procedures, with radiofrequency ablations (RF) of supraventricular tachycardias (SVT) only, all the way to diagnostic and ablation of complex cardiac arrhythmia, with the use of 3D mapping systems, single shot devices and different energy sources for ablation.

The EP procedures and the usage of these complex devices for ensuring more successful diagnostic procedure and also afterwards more precise target site



CRT VS LBBP LEARNING CURVE. SINGLE CENTER EXPERIENCE.

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Entering the fifth decade in cardiac pacing, the right ventricular apical pacing has still been the preferred site for ventricular stimulation probably because is easy reachable, accessible, stable, fast, safe or maybe that's the way they taught us how to do it their way. But from electromechanical, physiological, patho-anatomical point of view is deleterious, because it causes electrical and mechanical desynchrony of the heart, frequently leading to a reduced systolic left ventricular function. This so-called pacing induced cardiomyopathy has been associated with and increased risk for heart failure hospitalization, atrial fibrillation, and cardiovascular death. Following the recognition of these adverse effects of right ventricular pacinf, new pacing strategies to maintain or restore interventricular or intraventricular synchrony have been developed. These pacing strategies, so called physiologic pacing include biventricular, His bundle, Left bundle brunch pacing.

In my clinical practice in cardiac pacing I started with RVA pacing, but the width of the QRS taught me too look more on the septal site as the QRS was narrower, and looking just the electrical activation pattern I knew that it was the right way but still did not have the skills or tools to reach the His or the His-bundle, LBB area. Sometimes I had luck, but it wasn't that often. Since February 2024 we started the program of LBB area pacing with proctorship program and using various tools and this is the way I do it.



SUCCESSFUL ABLATION OF AVNRT IN A 71-YEAR-OLD WOMAN WITH WIDE COMPLEX TACHYCARDIA

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We describe the case of a 71-year-old woman presenting with palpitations and chest discomfort. Initial electrocardiogram (Figure 1) (ECG) revealed a wide complex tachycardia with right bundle branch block (RBBB) morphology and a single fusion beat. Conversion to normal sinus rhythm was achieved using the modified Valsalva maneuver, with the QRS morphology in sinus rhythm remaining consistent with the tachycardia (Figure 2). Electrophysiology study confirmed atrioventricular nodal reentrant tachycardia (AVNRT), and catheter ablation of the slow AV nodal pathway rendered the tachycardia non-inducible. At one-month follow-up, the patient remained asymptomatic, with no recurrence of palpitations or tachycardia.



CONDUCTION DISTURBANCES AFTER TAVI - ICVDV EXPERIENCES

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Transcatheter aortic valve implantation (TAVI) is the minimally invasive way of treating severe aortic stenosis. Complications of TAVI have been reduced over time with improvements in technology and increased operator experience, but heart conduction system damage is still common.

A persistent high degree atrioventricular (AV) block or an alternating bundle branch block are clear indications for a permanent pacemaker, but there are many patients with transient bradycardias, or with less severe conduction disturbances, for whom the optimal clinical pathway is less clear.

At the Institute for cardiovascular diseases of Vojvodina (ICVDV), 151 TAVI procedures were performed from 2022. to september 2024, excluding patients who already had a pacemaker. Patients were ECG monitored in the ICU from 24h to over 48h, but the ICU stay length was almost never due to conduction disturbances alone.

18 patients (11,9%) had a permanent pacemaker implanted after TAVI. A permanent pacemaker was most commonly implanted 48h after AV block development (38,9%), less commonly after 24h (33,3%), over 48h (22,2%), and in one patient (5,56%) the pacemaker was implanted in under 24h.

A new conduction disturbance of any kind was detected in 68 (45%) patients. New onset left bundle branch block (LBBB) was seen in 32 patients (21,2%), but only 4 patients (12,5% of those) required a permanent pacemaker. 20 (11,6%) patients had preexisting right bundle branch block (RBBB), with 40% of those (8) having at least transient high degree AV block. 20% of RBBB patients (4) required a permanent pacemaker.

Out of all patients that received a pacemaker, 10 (55,56%) had no conduction disturbances before TAVI, 3 (16,67%) patients had preexisting RBBB, and 3 (16,67%) patients had preexisting bifascicular block, and one patient had first-degree AV block or pre-existing LBBB respectively.

Our approach was consistent with current ESC guidelines, and our results are in line with previously published data. Further research is needed to more precisely and quickly identify patients who will require a permanent pacemaker



OUT OF RYTHM: A RARE CASE OF ASYSTOLIC VASOVAGAL SYNCOPE AND ITS LIFE-CHANGING RESOLUTION

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Patient presentation: A 28-year-old female patient was admitted to the neurology clinic presenting with sudden loss of consciousness. These episodes have been recurring for the past 8 years. A cardiological consultation was made. Witnesses reported that she appeared pale and unresponsive for approximately 15 seconds. She always regained consciousness spontaneously with confusion. There was no family history of cardiovascular disease or sudden cardiac death.

Initial work up: An EEG guided with an ECG was performed. During the EEG, a syncopal episode occurred during which the ECG (one lead) registered an asystolic episode. Because the EEG report was filled with artefacts, and the circumstances during its performance were unknown, it was deemed inconclusive. The patient was transferred to the cardiology clinic for further evaluation.

Diagnosis and management: It was decided to implant a loop recorder for further follow up. After the implantation procedure, while still on the operating table, the patient reported dizziness, followed by hypotension and an asystolic episode. The patient had 3 consecutive asystolic episodes, up to 15 seconds. Because of the recurrent nature and long duration of asystole, it was decided to proceed with pacemaker implantation. After appropriate preparation, a dual chamber pacemaker was implanted, positioned in the left deltopectoral region, with leads placed via left axillary vein.

Conclusions: This case highlights the clinical significance of asystolic vasovagal syncope, a rare but potentially debilitating condition. Timely recognition through detailed history, tilt-table testing, and appropriate monitoring is crucial for an accurate diagnosis. While conservative management remains the first-line approach, severe episodes refractory to lifestyle modifications may benefit from pacemaker implantation. In this case, the intervention successfully prevented further syncopal episodes, demonstrating the potential of advanced therapies to restore quality of life and prevent injury in affected individuals.



CATHETER ABLATION OF ISOLATED FREQUENT SYMPTOMATIC RIGHT SIDED PREMATURE ATRIAL CONTRACTIONS

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Case report:

A 59 year old female was admitted to our hospital on July 2023. due to frequent symptomatic premature atrial contractions (PACs).

Initial evaluation:

For the past 15 years she suffers from frequent palpitations, and quality of life was impaired. PACs were refractory on antiarrhythmic drugs (AA) class Ic and class III. On repeated 24 h ECG Holter monitoring she had over 20 000 PACs/24 h. Transthoracic echocardiogram, exercise tolerance test and cardiac magnetic resonance showed normal findings, without structural heart diseases.

Diagnostics and treatment:

Frequent PACs are usually symptomatic and without proper treatment could lead to PACs-induced cardiomyopathy. To date there are no guidelines or expert consensus providing recommendations for RF ablation of PACs. Recently, a several reports have shown safety and efficacy of RF ablation of PACs. Since the patient had frequent, symptomatic PACs refractory to AA drug therapy, we decided to perform catheter ablation of PACs source of origin.

Through right femoral vein we placed catheter in coronary sinus (CS, proximal bipole 9-10 at CS ostium, distal bipole 1-2). Using the P-wave morphology of ectopic PACs on surface ECG (negative ectopic P wave in lead V1, and inferior leads, Figure 1.) we concluded right sides origin. With Carto 3 mapping system and Pentaray mapping catheter (Johnson and Johnson, Biosence Webster) activation and voltage map of the right atrium was made (Figure 2. a), and showed earliest activation on the lateral wall of right atrium (LAT -45 msec, Figure 2.b). After few RF applications with contact force-sensing irrigated ablation catheter (Thermocool Smarttouch, Johnson and Johnson, Biosence Webster), (30 W, 60 sec) the PACs disappeared (Figure 3.)

Follow up:

The patient was discharged from the hospital 1 day after ablation. After 18 months of follow up there was no PACs on 24 h ECG monitoring.

Conclusion:

RF ablation of PACs in this patient was effective and safe. Frequent PACs, especially with short runs of atrial tachycardia are accompanied by bothersome symptoms, significantly affecting quality of life.



THE DIFFERENT FACES OF ATRIAL FIBRILLATION

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Introduction: Atrial fibrillation (AF) is the most common arrhythmia with a prevalence of 3% of the world population. The etiology is multifactorial, ranging from traditional cardiovascular (CV) comorbidities, structural heart disease but also other, untraditional factors that cause chronic inflammation and fibrosis that lead to generation of substrate for AF. This case series aims to highlight the multifaced nature of AF through presentation of three patients referred for catheter ablation with pulmonary vein isolation (PVI), all with very distinct underlying etiology.

Case series: The first case shows a 45-year-old male without comorbidities, with paroxysmal AF in the last two years. He works in special forces and the last 20 years has high intensity trainings as well as long-distance running for several times per week. The transthoracic echocardiography (TTE) revealed dilated left ventricle (LV) with and end diastolic dimension (LVEDd) of 64mm, with preserved systolic function (EF) 55%, normal diastolic function and increased left atrial volume index (LAVI). The patient was diagnosed with athletic heart. Second patient is a 76-year-old female, with a history of hypertension (HTA) and persistent AF. TTE revealed severe primary mitral regurgitation (MR) due to cleft of the anterior mitral leaflet with a jet area covering more than 70% of the left atrium (LA) with consequent pulmonary hypertension-systolic pulmonary artery pressure (sPAP) of 55mmHg. Third case reveals a 34-year-old male, with paroxysmal AF since 3 years ago, when he was diagnosed of myocarditis causing heart failure with reduced EF od 20%. At the time of PVI referral the patient had already fully recovered and presented with normal LV function with EF 60%, but still had frequent episodes of AF.

Conclusion: This case series illustrates the diversity of AF through three very distinct clinical contexts: an endurance athlete with exercise-induced cardiac remodeling, patient with severe MR and an individual with history of viral myocarditis. They all presented with the same arrhythmic phenotype, which underscores the importance of individualized evaluation and etiology-driven management



RIGHT SIDED INCISIONAL ATRIAL TACHYCARDIA ABLATION – A CASE REPORT

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Clinical presentation

The patient is a 52 year old male who underwent atrial septal defect (ASD) surgery at the age of 6. Known history of paroxysmal atrial flutter, which became persistent in the year 2022. Electrocardioversion was done in the march of 2023 due to worsening symptoms. The patient was in sinus rhythm until June of 2024, when he was referred to our center, the main symptoms being constant palpitations and poor tolerance of physical exertion.

Initial evaluation

On the initial examination in our outpatient clinic, the patient underwent an ECG which showed possible typical atrial flutter, with a heart rate of 65/min, with variable AV conduction. The main symptoms were constant palpitations, poor tolerance of physical exertion and shortness of breath, despite Amiodarone 200mg OD and Bisoprolol 5mg OD. Echocardiography was performed which showed a moderately enlarged left atrium (45mm), normal left ventricle size with an ejection fraction of 48%, mitral regurgitation 2+ and no residual interatrial shunting. MSCT coronarography showed healthy coronary arteries. An invasive EP study and ablation were indicated and hospitalization was scheduled.

Diagnosis and treatment

On admission to the cardiology clinic the patient underwent a transesophageal echocardiography exam to rule out left atrial appendage thrombus. The procedure was scheduled for the following day. Venous access was via the right femoral vein, two punctures were performed. A decapolar catheter was placed in the coronary sinus, showing proximal to distal activation, and the Pentaray mapping catheter was placed in the right atrium through the Vizigo deflectable sheath. A Carto activation map of the right atrium was made, showing a dual loop, scar dependant atrial tachycardia. The SmartTouch ablation catheter was then introduced through the Vizigo sheath, and after adequate heparinization, ablation was done in the mid zone of the ASD atriotomy scar, with an immediate tachycardia termination and sinus rhythm restoration. Due to typical atrial flutter being registered in earlier ECGs, CTI ablation was also done, achieving a bidirectional block. The patient was discharged the following day with a NOAC and Bisoprolol 2,5mg OD.

Follow up and conclusion

The follow up is scheduled 6 months after the ablation with a 24h holter ECG monitoring. The patient was contacted and asked about the symptoms. He is at the moment feeling better, with no palpitations and good exertion tolerance. In conclusion, incisional tachycardia should always be considered in patients with a history of heart surgery and the procedure should preferably be performed with an EP mapping system.



PVC BIGEMINY - SEARCHING FOR THE FOCUS

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Introduction: Idiopathic premature ventricular complex (PVCs) in patients without structural heart disease are predominantly of outflow tract (OT) origin, though they can also arise from fascicles, papillary muscles, valvular annuli, and the epicardium. Electrocardiographic (ECG) characteristics, such as QRS-morphology and axis, are instrumental in identifying the PVC origin, guiding catheter ablation (CA), which has become a widely used method for treating ventricular arrhythmias. Case presentation: A 33-year-old woman presented to our Clinic with palpitations, dizziness, fatigue, and hypotension for two weeks. Prior medical history includes PFO occluder implantation six years ago and a family history of PVC-bigeminy. The ECG findings showed PVC-bigeminy, QRS-pattern of LBBB, with transition in V3, inferior axis, rS-form in V1. A 24-hour ECG-Holter recorded 29% PVCs, including single beats, pairs, triplets, and cycles of PVC-bigeminy. Laboratory analyses and echocardiography (EF 69%) were normal. Flecainide 50mg b.i.d. was prescribed, and after three weeks, ECG-holter monitoring showed a 7% of PVCs. Despite 6 months of antiarrhythmic therapy (AAD), due to persistent symptoms and ECG showing PVC bigeminy, leading to the decision to undergo catheter ablation. The procedure was guided by the CARTO 3D-mapping system. The earliest activation site for the PVCs was located at the commissure between the non-coronary and left coronary cusps. After targeting this site with an irrigated ablation catheter, the PVCs were successfully eliminated.

Conclusion: Treatment is recommended for patients with symptomatic PVCs, particularly those with >25% PVC burden or impaired cardiac function. Ablation is recommended as first-line therapy for RVOT and fascicular PVCs. When PVCs arise from outside the RVOT, initial treatment typically involves AAD. However, if symptoms persist besides AAD treatment, CA remains the definitive solution. This case highlights the importance of timely intervention and the efficacy of CA in patients with refractory, symptomatic idiopathic PVCs.

Key words: PVC, Arrhythmias, Catheter ablation



SHORT-TERM VERSUS LONG-TERM ATRIAL FIBRILLATION AFTER CARDIAC SURGERY – IS THERE A DIFFERENCE IN OUTCOMES?

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Introduction: Postoperative atrial fibrillation (POAF) is a prevalent complication after cardiac surgery. Although considered a transient condition, its occurrence is associated with an increased risk of stroke, prolonged hospitalization, and increased mortality.

Objective: To assess the association between the duration of POAF and the occurrence of early in-hospital strokes, as well as the long-term occurrence of recurrent atrial fibrillation after cardiac surgery.

Materials and methods: From 01.01.2020 to 31.12.2022, 1643 cardiac surgeries were performed at the Zan Mitrev Clinical Hospital. In the study, we included all patients older than 18 years of age with newly occurring postoperative atrial fibrillation after any cardiac surgery. Patients with previous transient, persistent, and permanent atrial fibrillation and those without appropriate follow-up were excluded from the study. We retrospectively evaluated the medical records from the discharge letter and the findings from the outpatient examinations of the patients, from the day of surgery to at least one year after surgery. We divided the patients into two groups according to the duration of POAF: < 48 hours and ≥ 48 hours. Statistical analysis was performed in Excel with the Fisher Exact test, with $p < 0.05$ considered statistically significant.

Results: Early postoperative stroke occurred in 7 patients with POAF, with no statistically significant difference between the duration of AF (AF < 48 hours was 1.6% and AF ≥ 48 hours was 2% of patients, $p = 0.7$). Regarding the new onset of AF in the period up to 6 weeks and over 6 weeks, the results showed that a larger number of patients (13%) had new AF in the later postoperative period (after 6 weeks). Regarding the duration of AF, the results showed that there was no statistically significant difference between the recurrence of AF in short POAF < 48 hours and ≥ 48 hours in the first 6 weeks ($p = 0.62$) and after the first 6 weeks ($p = 0.39$).

Conclusion: The duration of POAF did not prove to be a significant risk factor for early stroke or recurrence of atrial fibrillation. However, POAF itself is a predictive factor for AF recurrence in the long term.

Keywords: postoperative atrial fibrillation, stroke, cardiac surgery



IMPLANTABLE CARDIOVERTER-DEFIBRILLATOR (ICD) FOR SECONDARY PREVENTION OF SUDDEN CARDIAC DEATH (SCD) IN PATIENT WITH ELECTRICAL INSTABILITY DID WE MAKE THE RIGHT DECISION?

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Introduction: Life-threatening ventricular arrhythmias, including sustained ventricular tachycardia (VT) and ventricular fibrillation (VF), are common in patients with heart failure (HF) and may lead to sudden cardiac death (SCD). Implantation of an ICD is considered the first-line treatment option for the secondary prevention of SCD due to VT/VF.

Case Report: A 64-year-old man with frequent episodes of VT in the last few months was admitted in our ICU because of new episode of VT detected in emergency ambulance. Previously, in 2023, heart failure with reduced ejection fraction was diagnosed, consequence of coronary artery disease. The first ECG in our hospital revealed RBBB with AV dissociation. Subsequently, the patient went in VT storm, terminated with intravenous antiarrhythmic therapy. Due to bradycardia with complete AV dissociation, antiarrhythmics and beta blockers were discontinued. On the fifth day, we decided to proceed with implantation of a single-chamber ICD instead of considering an elective implantation. Despite the optimal parameters of device and the re-introduction of beta blocker, the patient developed new VT storm. No shock delivery occurred, amiodarone and xylocaine were initiated. Heart failure treatment was intensified with caution and reprogramming of ICD was made, using ATP modality, without obtaining electrical stability. We proceeded with external cardioversion and flecainide was introduced. Unfortunately, there was no option for catheter ablation. The patient was hemodynamically instable, on mechanical ventilation and catecholaminergic support, but without any clinical improvement. The progressive deterioration of the condition culminated with a fatal outcome.

Conclusions: Patients with an ICD are at particular risk to develop electrical storm because they typically have a severely reduced left ventricular function and in the case of ICDs for secondary prevention a history of previous VT. Episodes of electrical storm in ICD patients are significantly associated with subsequent mortality.

Key words: implantable cardioverter-defibrillator, electrical storm



IMPLANTABLE LOOP RECORDERS – ICVDV EXPERIENCE

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Current ESC guidelines support implantable loop recorder (ILR) implantation for patients with recurrent syncope. They can also be implanted for atrial fibrillation (AFib) screening after cryptogenic stroke. At the Institute of cardiovascular diseases of Vojvodina, 79 ILRs were implanted between January 2017. and July 2023. For 60 patients (73,2%) the indication was recurrent syncope, for 18 (22%) it was cryptogenic stroke, while in 1 patient the indication was unclear. All patients were followed up for at least a year. In recurrent syncope patients, 14 (25%) were found to have an arrhythmia that required a pacemaker (13 patients, 23,3%) or implantable defibrillator (1 patient, 1,7%). 27 patients (43%) never had syncope again, while in 18 patients (30%) arrhythmic syncope was excluded after symptom recurrence. There was 1 complication (1,7%) – a subacute device pocket infection which required device removal after one month. We did not detect any atrial fibrillation in cryptogenic stroke patients. One patient had a significant bradycardia and had a pacemaker implanted. Our results in syncope patients are comparable to other published data. The choice of which cryptogenic stroke patients to diagnose with an ILR is an open question due to low diagnostic yield. Two scoring systems (HAVOC and BROWN ESUS-AF) have been developed, but are not widely used in clinical practice.



TO ICD OR NOT TO ICD? THAT IS THE QUESTION. A CASE OF AN ANABOLIC-STEROID-INDUCED HCM

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Introduction: Hypertrophic cardiomyopathy (HCM) is a disorder characterized by left ventricular hypertrophy, increasing the risk of arrhythmias and sudden cardiac death (SCD). While HCM is predominantly genetic, approximately 5–10% of cases are attributed to non-genetic causes, including drug-induced hypertrophy. Anabolic steroid use can induce a similar phenotype, complicating the risk stratification. The decision for ICD implantation is multifactorial, including a possible secondary HCM reversibility.

Case Report: A 36-year-old male athlete presented to our Clinic with chest discomfort and fatigue. His prior medical history includes mild LVH. His FH consists of an uncle with SCD. His ECG showed AF with signs of LVH, and the echocardiography was consistent with hypertrophy (PW=21mm). The patient was converted to sinus rhythm by electrical cardioversion. However, AF recurred within a few weeks. The patient was readmitted and coronary angiography was performed, showing no ischemia. During this hospitalization, the patient disclosed yearslong anabolic steroid use. The cardiac MRI confirmed hypertrophy with mild fibrosis but no LVOT obstruction, and the genetic tests for HCM were negative. His HCM Risk-SCD score was 5.2%. Given the potential for regression (~60–80% of steroid users), steroid discontinuation was encouraged. ICD placement was deferred due to the likelihood of hypertrophy regression, absence of high-risk arrhythmias (NSVT, syncope), preserved EF, and an intermediate HCM Risk-SCD-score, which does not mandate ICD implantation. AF ablation was postponed to reassess rhythm after hypertrophy reduction. The patient was started on anticoagulation and beta-blockers to improve symptoms and prognosis.

Conclusion: This case highlights the decision to defer ICD implantation in an athlete with anabolic-steroid-induced HCM. The patient's intermediate HCM Risk-SCD score, absence of high-risk arrhythmias, and potential hypertrophy regression are key factors for such a decision. These patients should be closely monitored, with a plan to reassess if risk factors evolve.

Key words: ICD, HCM, anabolic steroids



LEFT ATRIAL AND APPENDAGE MORPHOLOGY IN THE PRESENCE OF LAA THROMBOSIS AS PREDICTIVE FACTORS FOR DELAYED PVI – INSIGHTS FROM CASE SERIES

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Background: Pulmonary vein isolation (PVI) is a cornerstone in the management of atrial fibrillation (AF). However, the presence of left atrial appendage (LAA) thrombosis, typically identified via transesophageal echocardiography (TEE), poses a significant barrier. Beyond clinical determinants, limited data exist of impact regarding the morphological characteristics of left atrium (LA), LAA and LAA flow patterns on thrombus formation and persistence. The purpose of our study is to evaluate clinical and structural factors linked to the presence and resolution of LAA thrombus in patient scheduled for PVI. **Materials and Methods:** We present a case series of six patients with documented presence of LAA thrombus on TEE prior to planned PVI, all of whom experienced delay of the procedure. Clinical, echocardiographic, and therapeutic parameters were collected and analyzed over time.

Results: Among the six patients, LAA thrombus resolution was achieved in four patients with direct oral anticoagulants (DOACs) – over period from 3 months to 1 year. One patient underwent successful PVI post resolution. Two patients exhibited persistent thrombus despite anticoagulation therapy. One patient from the four previously discussed had a recurrent thrombus, following cerebrovascular event, after prior resolution. Notably, persistent cases had dilated left atria (LA diameter ≥ 42), dilated LAA, and reduced LAA flow velocities. Patients with thrombus resolution generally had normal or mildly enlarged LA dimensions and preserved LAA function.

Conclusion: LAA thrombosis remains a critical obstacle to timely PVI. This series highlights the potential influence of structural parameters of the LA and LAA, including size and flow dynamics, to both the development and resolution of LAA thrombus. Further studies are warranted to identify predictors of thrombus persistence and to optimize timing for intervention. This case series highlights initial observations, we're currently conducting a prospective study to validate these observations in a larger cohort.

Keywords: LAA thrombus; PVI; Atrial fibrillation; Transesophageal echocardiography



MINOCA AND VENTRICULAR TACHYCARDIA PROVOKED BY SEVERE DEHYDRATION: AN UNCOMMON CLINICAL CHALLENGE

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Introduction: Metabolic derangements are increasingly recognized as key contributors to the pathophysiology of Myocardial Infarction with Non- Obstructive Coronary Arteries (MINOCA). Electrolyte imbalances, in particular, can provoke coronary microvascular dysfunction, vasospasm, and increased myocardial oxygen demand, ultimately resulting in ischemic injury. These alterations not only precipitate MINOCA but can also trigger malignant arrhythmias such as ventricular tachycardia (VT),

Case Report: A previously healthy adult presented to the Emergency Department with acute-onset palpitations, dyspnea, and profuse diaphoresis. On initial evaluation, the patient was in unstable VT with bibasilar pulmonary crackles, suggestive of acute pulmonary edema. Immediate synchronized cardioversion was performed due to hemodynamic instability. Upon admission to the Intensive Care Unit (ICU), arterial blood gas analysis revealed a severe mixed acid-base disorder, specifically metabolic acidosis with concurrent respiratory alkalosis, and Kussmaul breathing. The patient reported persistent nausea and vomiting over the previous four days, leading to severe dehydration. Initial management focused on correcting the metabolic acidosis and dehydration with intravenous fluids and sodium bicarbonate. Post-cardioversion ECG showed ST-segment elevation in the anterolateral leads, prompting urgent coronary angiography, which revealed no significant stenosis. Transthoracic echocardiography demonstrated a severely reduced left ventricular ejection fraction. Cardiac MRI showed no signs of myocardial inflammation or edema, excluding myocarditis, but revealed subendocardial late gadolinium enhancement, indicative of ischemic myocardial injury, supporting a diagnosis of MINOCA. After 50 days, the patient underwent successful implantation of an implantable cardioverter-defibrillator (ICD) for secondary prevention of sudden cardiac death.

Conclusion: This case highlights a rare but critical scenario in which severe metabolic derangement, secondary to gastrointestinal losses and dehydration, precipitated life-threatening ventricular arrhythmia and MINOCA.



PRE-EXCITATION SYNDROME IN PATIENT WITH COCAINE ADDICTION

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Background: Stimulant drugs can cause myocyte cell death and fibrosis, resulting in reduced systolic function and increasing the risk of arrhythmias. Cocaine increases the risk of myocardial infarction (MI), heart failure, cardiomyopathy, arrhythmias, aortic dissection, endocarditis, and other cardiovascular diseases. The effects of cocaine on AV conduction in patients with pre-excited atrial fibrillation are not well described.

Case: A 35-year-old male presented with pre-syncope followed by syncope. Clinical signs include enlarged pupils and eye redness, fast breathing, and an irregular fast pulse around 250 bpm. Initial ECG has shown irregular wide complex tachycardia consistent with WPW with AF and immediately treated with cardioversion with low energy shock. Laboratory tests showed elevated NT-proBNP 520pg/ml, (hs-cTn) 120 ng/L. Focus echocardiography showed a reduced ejection fraction of 45% and global hypocontractility. Positive blood and urine tests for cocaine. CMR features include wall motion abnormalities, myocardial perfusion defects, and fibrosis. The patient was advised for an electrophysiological study. The use of beta-receptor antagonists and class Ia and III anti-arrhythmics is strongly discouraged if the patient is likely to continue cocaine use because of documented adverse effects. Furthermore, it was suggested to repeat CMR after 4-8 months of appropriate management to evaluate myocardial response to abstinence and medical therapy.

Conclusion: The medical community is in urgent need of a pharmacologic adjunct to cocaine-dependence treatment that can deter relapse and reduce the risks associated with cardiovascular disease in these patients. Mechanisms behind, and the true incidence of, stimulant drug-induced cardiac arrhythmias need further investigation. Treatment of stimulant drug-induced cardiac arrhythmias is based on general principles of cardiac rhythm management.

Keywords: cocaine, WPW, pre-excitation, cardiomyopathy



TYPE 2 AMIODARONE-INDUCED THYROTOXICOSIS: THE IMPORTANCE OF ACCURATE SUBTYPE DIFFERENTIATION

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Background: Amiodarone is a potent antiarrhythmic agent, rich in iodine and thus associated with thyroid dysfunction, either Amiodarone-Induced Thyrotoxicosis (AIT) or Amiodarone induced hypothyroidism. AIT presents mainly in two forms and their differentiation is often challenging but crucial for guiding appropriate management and optimizing clinical outcomes.

Case presentation: We present a case of a 56-year-old male complaining of lethargy and fatigue during follow up at the Cardiology unit. Patient had a history of atrial fibrillation on long-term amiodarone therapy, raising the suspicion of thyroid dysfunction. Thyroid functional tests revealed biochemical thyrotoxicosis, with negative TSH receptor antibodies as well as thyroid peroxidase antibodies. Thyroid ultrasound demonstrated a small gland with heterogeneous echotexture and decreased internal vascularity, while scintigraphy with pertechnetate showed low uptake—findings consistent with Type 2 AIT. Mildly elevated inflammatory markers further supported the diagnosis. Initial management with Propylthiouracil (PTU) proved insufficient, prompting the addition of corticosteroids. Amiodarone was discontinued, and a substitute of beta-blocker was initiated for rate control. Subsequent follow-up showed clinical and biochemical improvement, allowing for gradual tapering of therapy.

Conclusion: This case highlights the diagnostic and therapeutic challenges associated with AIT. Regular thyroid function monitoring and early, individualized management are essential for proper diagnosis, to reduce complications and optimize clinical outcomes in affected patients.

Keywords: iodine excess, amiodarone induced thyrotoxicosis, thyroid scintigraphy



ABLATION OF THE ACCESSORY PATHWAY AS FIRST-LINE THERAPY FOR WPW SYNDROME IN YOUNG PEOPLE

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Introduction: Wolff-Parkinson-White (WPW) syndrome is a clinical condition characterized by the presence of an accessory pathway (AP) and episodes of atrioventricular reentrant tachycardia (AVRT). While many individuals remain asymptomatic, about 10% to 30% of those with ECG findings may develop supraventricular tachycardia (SVT) or atrial fibrillation over their lifetime.

Case Report: We present the case of a 26-year-old male patient admitted to the Cardiology Department due to symptoms of palpitations and shortness of breath. ECG findings: Sinus rhythm, short PR interval, and the presence of a delta wave, suggesting the existence of an accessory pathway with right posteroseptal localization. An electrophysiology study (EPS) performed five years ago confirmed the presence of an AP, and radiofrequency (RF) ablation was conducted on the right posteroseptal side as well as a transseptal puncture for left posteroseptal ablation, resulting in the loss of the delta wave. Post-ablation ECG showed no visible delta wave, the patient remained asymptomatic, and no therapy was required until 2024. In 2025, the patient experienced repeated episodes of tachycardia, with ECG findings of a delta wave, indicating recurrence of preexcitation. A redo RF ablation was performed at a posterolateral localization, leading to the complete loss of preexcitation. The patient was discharged in good general condition without the need for further therapy.

Conclusion: Catheter ablation of the accessory pathway is a Class I indication in patients with documented reentrant



DIGOXIN - INDUCED COMPLETE ATRIOVENTRICULAR BLOCK IN AN ELDERLY PATIENT

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Introduction: Digoxin can cause a multitude of dysrhythmias due to: increased automaticity (increased intracellular calcium) and decreased AV conduction (increased vagal effects at the AV node). The classic digoxin toxic dysrhythmia combines: supraventricular tachycardia (due to increased automaticity) and slow ventricular response (due to decreased AV conduction). Chronic digoxin toxicity is possible, even at serum digoxin concentrations in the therapeutic range.

Case report: A 70-year-old female patient was transferred to the Cardiology Clinic from a secondary health facility due to fatigue during physical exertion and shortness of breath. Current worsening of symptoms accompanied by dizziness, but preserved consciousness. Her medical history included heart failure, atrial fibrillation, diabetes mellitus and COPD. She was placed on tablet anticoagulant therapy with acenocoumarol, beta blocker and digoxin. The latest echocardiography shows signs of right-sided heart strain and signs of PAH. In addition, we followed up ECG recordings showing signs of complete AV block with a heart rate of 35 bpm, with a characteristic “reverse tick” or “Salvador Dali sagging” appearance in the anterolateral leads. From the moment of admission, beta blockers and digoxin were excluded from therapy. Anticoagulant therapy was continued. A consulting pulmonologist and endocrinologist were called. Subsequently, we received a good clinical response to the prescribed therapy. Timely, we discharged the patient with a recommendation for medical treatment and an appointment for a Holter monitor for rhythm consistent with the newly prescribed therapy and a scheduled control.

Conclusion: In a cases like ours, it is of utmost importance to exclude the iatrogenic cause from therapy with subsequent monitoring and making a decision to implant a pacemaker. This and many other cases highlight the critical role of the interprofessional healthcare team in managing digoxin therapy by enhancing their understanding of its complex pharmacology and potential adverse effects through evidence-based knowledge.



CASE REPORT: ECG FINDINGS IN ACUTE CHEST PAIN: TAKOTSUBO CARDIOMYOPATHY VS. ACUTE MYOCARDIAL INFARCTION

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Introduction: Takotsubo cardiomyopathy is a stress-induced condition that mimics acute myocardial infarction without obstructive coronary artery disease. It causes left ventricular dysfunction and apical ballooning. This condition is often triggered by emotional or physical stress and is more common in postmenopausal women.

Aim: This report describes a case of Takotsubo cardiomyopathy in a postmenopausal woman, highlighting the importance of ECG interpretation to differentiate it from acute anterior MI and avoid unnecessary interventions.

Case Report: A 70-year-old woman presented with acute chest pain and shortness of breath. Her ECG showed ST-segment elevations >2 mm in V2-V4 and negative T waves in V4-V6, suggesting an acute MI. Echocardiography revealed left ventricular apex akinesia, an ejection fraction (EF) of 21.74%, and a reduced global longitudinal strain (GLS) of -14%. Coronary angiography showed no significant stenosis. Aortic stenosis was noted, along with increased mitral leaflet thickness. A follow-up echocardiogram showed improved EF (41.96%) and moderate aortic stenosis with mild regurgitation. The patient was treated conservatively with beta-blockers, antiplatelets, anticoagulants, and inotropic therapy and was discharged with plans for cardiac rehabilitation. Conclusion: This case emphasizes the need to consider TTC in patients with chest pain and ST-segment elevation when coronary angiography is normal. With early diagnosis and conservative management, the prognosis is favorable, and EF typically improves over time.

Keywords: Takotsubo cardiomyopathy, ECG findings, echocardiography, coronary angiography



CARDIOVERSION IN ATRIAL FIBRILLATION: DOES THE LEFT ATRIUM HOLD THE KEY?

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Introduction: Atrial fibrillation (AF) remains the most prevalent sustained arrhythmia and often necessitates rhythm control strategies, including electrical cardioversion. Identifying predictors of successful cardioversion is essential to improve patient outcomes and guide clinical decision-making.

Objective: The aim of this study was to assess whether clinical parameters such as age, ejection fraction (EF), CHA2DS2-VA score, and left atrial (LA) size are associated with the success of cardioversion in patients with AF.

Materials and Methods: A total of 59 patients undergoing electrical cardioversion for AF were retrospectively analyzed. Patients were categorized into two groups based on their rhythm post-cardioversion: those who maintained sinus rhythm ($n = 44$) and those with persistent AF ($n = 15$). Comparative analysis of age, EF, CHA2DS2-VA score, and LA size was performed using the Mann-Whitney U test. A p -value of < 0.05 was considered statistically significant.

Results: There were no significant differences between the SR and AF groups regarding age ($p = .986$), EF ($p = .180$), or CHA2DS2-VA score ($p = .782$). However, a statistically significant difference was observed in LA size ($p = .007$), with patients in the AF group demonstrating larger left atrial dimensions compared to those who maintained SR.

Conclusion: Among the variables studied, only left atrial size showed a statistically significant association with the success of cardioversion. Neither age, ejection fraction, nor CHA2DS2-VA score demonstrated a meaningful impact. These findings highlight the influence of structural atrial remodeling on rhythm outcomes and underscore the potential of LA size as a key factor in predicting cardioversion success. Incorporating LA measurements into pre-procedural assessment may enhance patient selection and improve rhythm management strategies in atrial fibrillation.

Keywords: Atrial fibrillation, sinus rhythm, left atrium size, cardioversion, CHA2DS2-VA Score



COX-MAZE PROCEDURE IN A COMPLEX CONCOMITANT CARDIAC SURGERY: A CASE OF AORTIC VALVE REPLACEMENT, MITRAL VALVE REPAIR, ASCENDING AORTIC RESECTION AND SURGICAL TREATMENT OF ATRIAL FIBRILLATION

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The Cox-Maze procedure is a surgical treatment for atrial fibrillation (AF). For AF patients undergoing concomitant cardiac surgery, such as valve replacement or CABG, Cox Maze procedure offers significant benefits by improving AF control, reducing the need for long-term anticoagulation, and enhancing overall heart function

A 52-year-old male patient presented with progressive fatigue, dyspnea and bilateral lower limb edema. The patient is in long standing persistent AF, with rate of 100bpm. TTE confirmed moderate to severe aortic valve insufficiency, dilated aortic root (42mm) and dilation of ascending Aorta (47mm), secondary moderate mitral valve insufficiency and heart failure with reduced ejection fraction (EF- 30%), right heart failure (TAPSE-12). CT scan confirmed an aneurysm of the ascending aorta. The patient underwent a complex surgical procedure including aortic valve replacement with a 25 mm AVALUS bioprosthesis, mitral valve repair with a 32 mm annuloplasty ring, triangular resection of the ascending aorta, and a Cox-Maze IV procedure. On second postoperative day the sternal closure was performed. The patient remained in the ICU on high doses of inotropes and vasopressors.

By postoperative day three, the patient stabilized and was successfully extubated. On day four, Postoperative ECG showed sinus rhythm with a heart rate of 87bpm and no signs of acute cardiac distress. He was discharged 12th postoperative day, in stable general condition with optimal medical treatment for heart failure. The patient remained in sinus rhythm after 1 year of follow up, without the need for ongoing antiarrhythmic therapy or anticoagulation.

The Cox-Maze IV procedure has a long-term success rate of 80-90% in restoring normal sinus rhythm, particularly in patients with persistent atrial fibrillation, leading to significant improvement in symptoms and quality of life. This case demonstrates the feasibility and benefits of a comprehensive surgical approach in patients with complex valvular pathology and chronic atrial fibrillation.



QUALITY OF LIFE AND PHYSICAL ACTIVITY AFTER SUCCESSFUL PVI ABLATION FOR PERSISTENT ATRIAL FIBRILLATION IN A YOUNG PATIENT: A CASE REPORT

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Background: Atrial fibrillation (AF) is the most common arrhythmia, which leads to significant impairment in quality of life (QOL) and increased risk for adverse cardiovascular outcomes. Radiofrequency ablation (RFA) can significantly decrease or eliminate the recurrences of AF, improving the patients' QOL and cardiac remodeling.

Case report: We are presenting a 54-year-old patient with palpitations and dyspnea, diagnosed with persistent AF one year ago. He has been unsuccessfully treated twice with cavotricuspid isthmus ablation for atrial flutter, when rhythm converted to AF. Patient has hypertension and diabetes type 2 controlled with medical therapy. Coronary artery disease was excluded by angiographic study. Due to persistent symptoms despite medical therapy, patient was referred for electrophysiology study and PVI ablation. Echocardiography showed remodeled left atrium (LA) with increased LAVI 39.32ml/m², normal left ventricular function, EF 66%, and presence of diastolic dysfunction. Transesophageal echocardiography before intervention did not show any thrombotic masses in the LA appendix or left atrium. 3D mapping of LA with CARTO system was used and successful RFA was performed using CLOSE protocol, resulting in isolation of 4 pulmonary veins. The patient was discharged after 2 days in sinus rhythm, with a heart rate of 58 bpm. There were no periprocedural or postprocedural complications. One year after the intervention, the patient is asymptomatic, in sinus rhythm, with significantly improved QOL, physical activity, and walking distance. Control echocardiography did not show significant differences in LA dimensions, LA area, or LAVI, nor in diastolic function, compared to the results at the time of intervention.

Conclusion: RFA is most commonly used in patients with paroxysmal or persistent AF, particularly when other treatments are not effective. The procedure can significantly reduce symptoms, improve QOL and decrease the risk of complications associated with AF.

Keywords: atrial fibrillation, radiofrequency ablation, quality of life



FIRST-ONSET PAROXYSMAL ATRIAL FIBRILLATION IN 76-YEAR-OLD WOMAN: AF-CARE APPROACH BASED ON 2024 ESC GUIDELINES

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This case report describes a previously healthy 76-year-old woman with no chronic illnesses or cardiac history, who presented with first-onset symptomatic paroxysmal atrial fibrillation (AF) and rapid ventricular response (RVR; 185/min). The 2024 ESC AF Guidelines AF-CARE framework was applied: [C] Comorbidity screening confirmed no underlying conditions (normal BMI 21.3, no hypertension or diabetes), [A] Stroke risk assessment revealed a CHA₂DS₂-VA score of 2 (age ≥75 +), mandating lifelong anticoagulation (Class I recommendation for DOACs) despite successful rhythm control.

The patient received tbl. flecainide a 200 mg (“pill-in-the-pocket”), achieving sinus rhythm within 25 minutes with symptom resolution. Echocardiography showed preserved LVEF (65%), normal diastolic function, and a left atrial volume index (LAVI) of 21 mL/m² (normal <28mL/m²), suggesting minimal or no atrial remodelling. Per 2024 ESC updates, two long-term strategies were considered:

1. Continued pill-in-pocket (Class IIa): Justified by her excellent drug response and low AF burden but requires monitoring for QRS widening and recurrent episodes.
2. Pulmonary vein isolation (PVI) ablation (Class I for paroxysmal AF): Now first-line for symptomatic patients, including selected elderly, given comparable safety/efficacy to younger cohorts.

The guidelines emphasize dynamic reassessment (E), including annual stroke risk review and AF progression monitoring. Despite her low LAVI (favoring lower recurrence risk), shared decision-making should weigh ablation’s potential to reduce future episodes against her current stability. This case highlights the ESC’s patient-centered approach, integrating anticoagulation, rhythm control, and individualized risk stratification in elderly AF patients without comorbidities.

In conclusion, while pill-in-the-pocket flecainide remains viable for infrequent episodes, PVI ablation offers a definitive option if recurrence impacts quality of life.



COCAINE-RELATED VENTRICULAR TACHYCARDIA

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Introduction: Cocaine use is associated with a variety of arrhythmias, ranging from benign sinus tachycardia to life-threatening arrhythmias, including ventricular tachycardia, ventricular fibrillation, and torsades de pointes. The pathophysiology of cocaine's cardiovascular effects involves stimulation of the sympathetic nervous system by inhibiting catecholamine reuptake at sympathetic nerve terminals, stimulating central sympathetic outflow, and increasing the sensitivity of adrenergic nerve endings to norepinephrine. Additionally, cocaine acts as a Class I antiarrhythmic agent by blocking sodium and potassium channels, which depresses cardiovascular parameters.

Case report: A 39-year-old patient presented to the Cardiology Clinic due to attacks of tachycardia, sweating, and loss of consciousness. Symptoms had started approximately a month prior and appeared to be triggered by cocaine use. The patient was undergoing ampullary substitution therapy with methadone. A brain MRI performed by a neurologist, showed normal findings. Upon admission, the patient's blood pressure was 120/70 mmHg. Auscultation revealed vesicular breath sounds without murmurs, and the patient was hemodynamically stable. ECG showed regular morphology and conduction of the ST segment and T wave, with a heart rate of 50 bpm. Holter rhythm monitoring detected frequent ventricular ectopic beats (VES), episodes of bigeminy and trigeminy, and documented episodes of non-sustained ventricular tachycardia (NSVT). Hospitalization was indicated, and an implantable cardioverter-defibrillator (ICD) was implanted. The procedure was uneventful, and the patient was discharged in a hemodynamically and rhythmically stable condition, with strong advice to abstain from psychoactive substances.

Conclusion: In cases of unexplained loss of consciousness in drug users, ventricular arrhythmia should always be considered. The long-term outcomes of patients with cocaine use disorder after ICD implantation may be further compromised by an increased defibrillation threshold, raising the risk of ICD failure. Therefore, these patients should be counseled on the necessity of absolute drug abstinence.



THYROTOXICOSIS-INDUCED MULTIFOCAL ATRIAL TACHYCARDIA IN OLDER WOMAN

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Introduction: Atrial tachycardia in the setting of thyrotoxicosis is a type of supraventricular tachycardia caused by the heightened sensitivity of the heart to circulating thyroid hormones (T3/T4). These hormones increase beta- adrenergic receptor density and enhance automaticity, leading to abnormal atrial impulses.

Case report : A 71-year-old female with a past medical history of supraventricular extrasystoles and atrial tachycardia presented to the emergency department with a 10-day history of palpitations, fatigue, and mild dyspnea. She also reported recent unintentional weight loss, increased sweating, and insomnia. The patient was diagnosed with thyrotoxicosis

30 years ago and initially treated with antiarrhythmic therapy. However, treatment with propranolol led to an iatrogenic atrioventricular (AV) block, prompting discontinuation of beta-blocker therapy. Since then, she has been managed with thiamazole (tirazole) alone. Over the years, she has remained in remission without the need for ongoing pharmacological treatment, and has been monitored through regular endocrinology and cardiology follow-ups.

A 24-hour Holter ECG revealed an irregular rhythm with variable PR intervals, consistent with multifocal atrial tachycardia (MAT). Echocardiography showed heart failure with preserved ejection fraction (HFpEF) along with enlargement of both the left and right ventricles. Laboratory tests demonstrated elevated free T4 levels (FT4: 42.06 pmol/L) and a suppressed TSH (<0.01 mIU/L), confirming a relapse of thyrotoxicosis. Following comprehensive diagnostic evaluation, the patient was started on thiamazole 20 mg three times daily (Tbl. Thiamazole 20 mg 3×1) and a beta-blocker.

At one-month follow-up, the patient reported complete resolution of symptoms. Control ECG and repeat 24-hour Holter monitoring showed no evidence of extrasystoles, and the current treatment regimen was continued.

Conclusion: Thyroid hormones have significant effect on cardiovascular system especially electrophysiology properties of the atria. Any imbalance of euthyroid state may impact on developing and maintenance of atrial tachycardia. Resolving the thyroid dysfunction carries better prognosis compared to structural heart diseases related arrhythmias.



FROM NON-SPECIFIC SYMPTOMS TO DIAGNOSIS OF A LIFE THREATENING DISEASE: A CASE OF ARRHYTHMOGENIC CARDIOMYOPATHY

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Arrhythmogenic cardiomyopathy (AC) is a progressive inherited heart disease characterized by fibrofatty infiltration of the myocardium with higher risk of ventricular arrhythmias and sudden cardiac death (SCD). Even though, the main phenotype of AC is characterized by predominant right ventricular involvement, variants with involvement of both ventricles equally or predominantly the left ventricle have been increasingly reported. A . A 48-year- old female patient presented to the emergency department due to unclear episodes of syncope in the last 24 hours. On several occasions, the patient has been consulting the clinicians due to palpitations. She was on treatment with bisoprolol, which she discontinued 3 months ago. The electrocardiogram showed multifocal ventricular extrasystole with R to T phenomenon. The laboratory analysis showed elevated troponin I of 120 ng/L. The patient was admitted to the arrhythmology department for further evaluation. A 2D transthoracic echocardiography revealed normal dimensions and systolic function of the left ventricle, normal dimensions of the right ventricle. On the day of admission, the patient had an episode of ventricular fibrillation, immediately defibrillated with DCES 200J, and converted to sinus rhythm. The coronary angiography showed normal flow through coronary arteries without stenosis. The magnetic resonance of the heart revealed reduced systolic function with wall motion abnormalities and late gadolinium enhancement in both ventricles with a finding of AC. An implantable cardioverter defibrillator was placed, and the patient was discharged in good clinical condition with a recommendation for bisoprolol treatment of 5 mg once per day. The results of the genetic analyses are pending. AC is a potentially life-threatening disease that, due to non-specific signs and symptoms, is often misdiagnosed, leading to an increased number of SCD cases. With this case report we want to emphasize the importance of detailed diagnostic work-up of the patients with syncope and ventricular arrhythmias for early diagnosis and treatment of AC, as well as providing screening of the first-degree relatives to prevent the SCD.



HIGH-DEGREE ATRIOVENTRICULAR BLOCK IN A PATIENT WITH AORTIC BICUSPID VALVE CALCIFICATION AND SEVERE STENOSIS

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Background: Bicuspid aortic valve (BAV) is the most prevalent congenital cardiac anomaly, affecting up to 2% of the population. It is commonly associated with progressive aortic stenosis (AS), and while conduction disturbances are recognized in this context, high-degree atrioventricular (AV) block remains a rare but serious complication. This case report presents a patient with severe BAV-related AS who developed symptomatic high-degree AV block, highlighting the need for close monitoring and timely intervention.

Case: A 51-year-old male with no known cardiac history presented with dizziness, fatigue, and exertional dyspnea. Physical examination revealed bradycardia and a harsh systolic murmur over the aortic area. Electrocardiography showed sinus rhythm with paroxysmal AV block, while telemetry during hospitalization confirmed episodes of complete AV block with a ventricular escape rhythm. Transthoracic echocardiography revealed a heavily calcified bicuspid aortic valve with severe stenosis (valve area 0.5 cm^2 , V_{max} 6 m/s, mean gradient 9 mmHg). Coronary angiography excluded significant coronary artery disease. Due to persistent symptomatic bradyarrhythmia, a dual-chamber pacemaker was implanted. The patient was subsequently referred for surgical aortic valve replacement.

Discussion: High-degree AV block in BAV-associated AS is likely caused by progressive fibrosis and calcification encroaching upon the cardiac conduction system. While conduction disturbances such as bundle branch blocks are more commonly observed, complete AV block can pose a life-threatening risk if left untreated. Timely recognition and pacing intervention are crucial in preventing complications such as syncope or sudden cardiac death. In some cases, aortic valve intervention may also alleviate conduction abnormalities.

Conclusion: Early electrophysiological assessment and pacemaker therapy should be considered in those with symptomatic bradycardia or high-degree AV block, particularly when planning valve replacement.

Key words: BAV, AV block, calcified aortic valve



VENTRICULAR TACHYCARDIA PRESENTING SECONDARY TO HYPOKALEMIA AS A RESULT OF CONN'S SYNDROME

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Background: Hypokalemia is an electrolyte abnormality reversible but can be a potentially fatal disorder and it is essential to be treated and identified urgently. This condition leads to electrophysiological effects such as prolonged action potential as well as early depolarization and may escalate into arrhythmias such as ventricular tachycardia (VT). We describe a case of a man who presented with ventricular tachycardia as a complication of primary hyperaldosteronism.

Case report: This is a case report of a 66-year-old male patient with palpitations, dizziness, and syncope who came to the emergency department. On his past medical history had hypertension, recent weight loss, and hypertrophic cardiomyopathy. Laboratory exams were characterized by severe hypokalemia (K 1.5 mmol/L). Initial ECG showed wide-complex tachycardia, suspicious of ventricular tachycardia and he was defibrillated two times with 100 J DCES. After intravenous potassium repletion and antiarrhythmic treatment, the patient was stabilized. Echocardiography findings have shown hypertrophic cardiomyopathy. CT abdominal scan disclosed a oval mass 25x17mm of the right and 30x20 mm of the left suprarenal glands. Two years after the hospitalization in the cardiology clinic, the patient was hospitalized in the Neurology department and experienced difficulty walking, limited movement of the extremities, and significant weight loss. The patient has a motor deficit in the lower extremities with spastic paresis. An MRI of the brain and cervical spine was performed, leading to a diagnosis of cervical myelopathy.

Conclusion: Hypokalemia is a critical and fatal electrolyte abnormality that may lead to ventricular tachycardia and sudden death so it should be promptly diagnosed and early treated. There is importance in recognizing the connection among electrolyte disturbances that is a common cause of adrenal tumors, but sudden death is the most unwonted presentation.



ARRHYTHMOGENIC RIGHT VENTRICULAR CARDIOMYOPATHY, A PROGRESSIVE DISEASE OF RIGHT VENTRICULAR FAILURE AND PROTEIN LOSING SYNDROME

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Introduction: Arrhythmogenic right ventricular cardiomyopathy (ARVC) is a rare genetic disorder that primarily affects the right ventricle (RV), causing ventricular tachyarrhythmias that predominantly originate from the RV and increasing the risk of sudden cardiac death in young, apparently healthy individuals. Symptoms include palpitations, syncope, and cardiac arrest. As the disease progresses, signs of right ventricular failure begin to appear.

Case Report: We present the case of a 60-year-old female patient who has been treated at the Clinic of Cardiology in Skopje for more than 20 years. Due to frequent episodes of ventricular tachycardia (VT), an implantable cardioverter-defibrillator (ICD) was placed, and a diagnosis of ARVC was established. Several years ago, the patient began experiencing severe fatigue, palpitations, dyspnea, orthopnea, leg swelling, and the development of ascite. Echocardiography revealed RV dilatation (basal diameter 60 mm), reduced RV function (TAPSE 9 mm, FAC 19%, TDI S wave 3 cm/s, GLS -5%), thinning and hyper echogenicity of the RV wall (3 mm), an RV/LV ratio >1 , and preserved left ventricular ejection fraction (LVEF). Over the past year, despite optimal heart failure management and intensive diuretic therapy, the patient has had persistent ascites and peripheral edema. The disease has continued to worsen. Laboratory tests showed low levels of total protein and albumin (total protein 50 g/L, albumin 24 g/L), which remained low despite substitution. A diagnosis of protein-losing enteropathy (PLE) was made.

Conclusion: Right-sided heart failure may contribute to the development of protein-losing enteropathy, likely due to increased interstitial pressure or lymphatic obstruction. This condition can lead to progressive disease deterioration and reduced effectiveness of treatment.

Keywords: arrhythmogenic right ventricular cardiomyopathy, right ventricular failure, protein losing syndrome



ICD IMPLANTATION IN PATIENT WITH DUCHENNE MUSCULAR DYSTROPHY

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Introduction: Duchenne muscular dystrophy (DMD) is the most common and the most severe form of genetic neuromuscular diseases, inherited in X recessive trait, usually affecting males. DMD is caused by a mutation of dystrophin – a cytoskeleton protein involved in membrane stabilization. The nonfunctional protein makes the muscle cell prone to necrosis, subsequently changing the muscle with connective and adipose tissue. Major cause of mortality is cardiomyopathy associated with heart failure and arrhythmias.

Case report: We present a case of a 32-year-old male who was diagnosed with DMD by genetic testing and muscle biopsy 10 years prior to hospitalization. He was admitted to the emergency department with symptoms of presyncope, vertigo, and general weakness. During the examination he was hypotensive, but conscious. On the 12-lead ECG, sustained ventricular tachycardia was detected, which was spontaneously terminated. The lab findings showed elevated levels of CK. The attempt to perform elective coronary angiography was unsuccessful due to contractures. Afterwards, the patient was evaluated, regarding the implantation of ICD as secondary prevention. An echocardiographic assessment was obtained, with findings of reduced left ventricular contractility and EF of 30-35%. A single-chamber ICD was implanted with an apical position of the ventricular electrode. The patient was discharged in a stable hemodynamic and rhythmic condition.

Conclusion: The structural changes in the myocardium due to muscular dystrophy may be a trigger for ventricular tachycardia. If not treated properly it can be a reason for mortality in young patients with DMD. The multidisciplinary approach requires early referral to cardiologist by neurologists or pediatricians, for an echocardiographic evaluation, as well as starting with symptomatic heart failure therapy on time. Assessing the need for ICD implantation as a primary prevention is also of great importance, as it can often be a life-saving procedure.

Key words: Duchenne muscular dystrophy, ventricular tachycardia, ICD



UNVEILING ARRHYTHMOGENIC RIGHT VENTRICULAR CARDIOMYOPATHY IN A YOUNG ADULT: A COMPREHENSIVE CASE REPORT

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Background: Arrhythmogenic Right Ventricular Cardiomyopathy (ARVC) is a rare, inherited disorder characterized by the progressive replacement of the right ventricular myocardium by fibrofatty tissue, which results in arrhythmogenesis, right ventricular dysfunction, and a heightened risk of SCD.

Clinical case: A 28-year-old male presented to the emergency department with a history of palpitations, dyspnea, and fatigue. The initial ECG revealed atrial fibrillation with a rapid ventricular response, while the echocardiogram showed no significant abnormalities. Laboratory investigations were within normal limits. On subsequent evaluation, the ECG demonstrated a shortened P-R interval, prompting the decision to proceed with an electrophysiological study. During the study, clinical tachycardia with atrial fibrillation, which intermittently transitioned to atrial flutter, was induced. No accessory pathways were identified. Based on these findings, a recommendation for radiofrequency ablation of AF was made. A pre-interventional TEE was performed, revealing no thrombus formation in the LAA. Six months later, the patient re-presented with recurrent symptoms of dyspnea, palpitations, and diaphoresis. The ECG showed non-sustained ventricular tachycardia, and repeated echocardiography revealed a mildly reduced ejection fraction and impaired left ventricular deformation, with a Global Longitudinal Strain of 16%. Cardiac MRI identified fatty infiltration and fibrosis of the right ventricle, raising suspicion for ARVC. Genetic testing confirmed a pathogenic mutation in the PKP2 gene, confirming the diagnosis of ARVC. Given the patient's arrhythmic phenotype and the high risk of sudden cardiac death associated with ARVC, the implantation of ICD was discussed and agreed upon for secondary prevention.

Conclusion: This case underscores the importance of comprehensive diagnostic evaluation in young patients with arrhythmic symptoms, highlighting the need for early diagnosis and timely intervention, including genetic testing and advanced imaging techniques, to optimize long-term outcomes. The patient's management emphasizes the role of an ICD in mitigating the risk of sudden cardiac death in patients with ARVC and recurrent arrhythmias.

Keywords: Arrhythmogenic Right Ventricular Cardiomyopathy (ARVC), Sudden Cardiac Death, Electrophysiological Study, Non-Sustained Ventricular Tachycardia (NSVT), PKP2 Mutation.



HYPOKALEMIA INDUCED ELECTRICAL STORM

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Introduction: Electrical storm is a medical emergency characterized by repetitive episodes of sustained ventricular arrhythmias in a limited period of time (at least three within a 24-hour period), leading to repeated appropriate implantable cardioverter defibrillator therapies.

Case report: A 55-year-old female with a history of polymorphic ventricular extrasystole that began 4 years ago. She was treated with medical therapy using beta-blockers and a class III antiarrhythmic drug- amiodarone. One year ago, she was admitted to the hospital with palpitations and dizziness. A 24-hour Holter ECG recorded several episodes of non-sustained ventricular tachycardia and polymorphic ventricular extrasystoles. Echocardiography revealed HFpEF, an arrhythmogenic mitral valve prolapse, and genetic testing showed no significant findings. Diagnostic coronary angiography also showed no significant stenoses. Following all diagnostic procedures, an ICD device was implanted, and the patient was discharged with a beta-blocker and amiodarone. Ten months after ICD implantation, she was re-admitted with symptoms of syncope, palpitations, dizziness, vomiting, and diarrhea that had lasted three days prior to hospitalization. This led to repeated appropriate ICD therapies more than one hundred episodes. ECG monitoring in the Intensive Care Unit revealed repetitive episodes of sustained ventricular tachycardia. Blood analysis showed electrolyte imbalance with significant hypokalemia (2.9 mmol/L). The patient was treated with amiodarone i.v., magnesium sulfate, a mineralocorticoid receptor antagonist, and potassium chloride supplementation. After stabilization of her clinical and hemodynamic condition, she was discharged on a beta-blocker and antiarrhythmic drug. At one-month follow-up, the patient reported no symptoms. Technical interrogation of the ICD device showed no episodes of VT, and the same therapy was maintained.

Conclusion: Potassium plays a crucial role in managing electrical storm and also enhances the efficacy of antiarrhythmic drugs such as amiodarone. Therefore, hypokalemia can reduce their effectiveness and may increase proarrhythmic risk.



DIABETES MELLITUS AND 3RD DEGREE AV BLOCK(CASE REPORT)

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Introduction: Diabetes mellitus type 2 (T2D) increases the risk of out-of-hospital sudden cardiac arrest by 2 to 4-fold compared to non-diabetic patients. T2D causes idiopathic fibrosis of the conduction system, leading to many conduction disturbances. The risk of AV block depends on the duration of unregulated HbA1c levels, smoking, alcohol consumption, and the presence of comorbidities such as hypertension.

Objective: The aim of this case report is to highlight the association between diabetes mellitus and complete AV block.

Case report: We present a 69-year-old male patient, diagnosed with T2D 15 years ago, who has been on insulin therapy for the last 6 months due to poor glycemic control. The patient was not regularly monitored regarding glycemic regulation and diabetes-related complications. Upon admission to the Clinic for Endocrinology, he complained of fatigue, malaise, and an episode of loss of consciousness a few days prior. The patient is a smoker, does not consume alcohol, and is receiving medication for hypertension. His blood pressure was 140/75 mm Hg, and his heart rate was 35 bpm. The ECG on admission showed second-degree AV block, Mobitz II, with 2:1 conduction to the ventricle. Blood tests were within normal ranges, except for glycemic status (Gly 9 mmol/L, HbA1c 10%). The patient was immediately transferred to the ICU at the Clinic of Cardiology, where a follow-up ECG showed progression to third-degree AV block. Dual-chamber pacemaker implantation was performed, and treatment continued with antihypertensive, antilipemic drugs, and insulin therapy.

Conclusion: Diabetes mellitus and complete AV block are two medical conditions that may be related. The exact mechanism linking these two conditions is not fully understood, but idiopathic fibrosis, inflammation, and metabolic changes may play a role. A low heart rate in a diabetic patient should always be followed by an ECG for the early diagnosis of conduction disturbances.



PERSISTENT FOCAL ATRIAL TACHYCARDIA WITH TACHYCARDIOMYOPATHY: A SUCCESSFUL ELECTROPHYSIOLOGICAL RESOLUTION OF TWO PATHOLOGIES

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Focal atrial tachycardia accounts for about 10% of all supraventricular tachycardias. Although benign, it can have a frequency range of 100–200 beats per minute, as well as variable duration. The aim of this case report is to demonstrate that persistent ectopic atrial tachycardia can result in tachycardiomyopathy, and that the most appropriate treatment is catheter ablation of the focus. We present a case of a 28-year-old male who initially sought medical evaluation due to persistent palpitations and rapid heartbeat. Initial investigations, including echocardiography, complete blood count, and thyroid function tests, revealed no abnormalities. The initial electrocardiogram (ECG) was interpreted as sinus tachycardia, and the patient was started on low-dose beta-blocker therapy. Despite treatment, symptoms persisted over the following month. The patient was subsequently hospitalized for further evaluation, where atrial tachycardia was suspected. Second echocardiography demonstrated findings consistent with tachycardiomyopathy, including a reduced ejection fraction. The patient was treated with a combination of an antiarrhythmic agent and a beta-blocker, resulting in successful conversion to sinus rhythm. However, due to partial intolerance to the medical therapy and considering the patient's young age and the potential for definitive treatment, he was referred to a tertiary care center for catheter ablation targeting the presumed ectopic atrial focus. During the electrophysiologic study an ectopic focus on the crista terminalis was detected and was ablated in the same act. After the procedure the patient is in sinus rhythm with a heart frequency of 75 beats per minute, third echocardiography reported normal parameters and there is no need of further chronic therapy. Our case demonstrated that persistent focal atrial tachycardia can induce tachycardiomyopathy.

Ablation is the treatment of choice, the literature describes it as curative and especially suitable for ectopic foci in young-aged individuals. The termination of tachycardia usually results with the reversion of the tachyarrhythmia, as shown in our case.



GENDER-RELATED DIFFERENCE IN THE CHARACTERISTICS OF PATIENTS REFERRED FOR ELECTIVE ELECTRICAL CARDIOVERSION

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Introduction: Electrical cardioversion is a commonly used procedure to restore sinus rhythm in patients with atrial fibrillation by delivering a synchronized electrical shock to the heart. It is most effective in recent-onset atrial fibrillation and requires appropriate anticoagulation to minimize the risk of thromboembolic complications.

Objectives: The aim of the study was to analyse differences in the characteristics of male and female patients referred for elective electrical cardioversion.

Materials and Methods: This study presents a retrospective statistical analysis of a total of 59 patients admitted at the University Clinic Cardiology, in Skopje, between March 15, 2024, and March 15, 2025, with ECG findings confirming atrial fibrillation or atrial flutter.

Results: The analysis revealed that out of the 59 admitted patients in ICU with atrial fibrillation/flutter, 36 (61%) were male, and 23 patients (39%) were female. We have found different gender distribution in patients admitted for cardioversion regarding CHA₂DS₂-VA score. Mean CHA₂DS₂-VA score in male patients was 1,7 +/- 1,5, and mean CHA₂DS₂-VA score in female patients admitted for cardioversion was 2,6 +/- 1,3. It was mostly due to difference in age (female patients 69+/- 9, male patients 61+/-14, P<0,05) and difference in a presence of hypertension, (78% female patients have hypertension vs 50% male patients, P<0,05). Regarding anticoagulant therapy, 33% of male and 4% of female patients were without prior anticoagulant therapy, 11% of male and 35% of female patients were on vitamin K antagonists (VKA), and 56% of male and 61% of female patients were on DOAC.

Conclusion: Female patients had a significantly higher CHA₂DS₂-VA score than male patients, primarily due to their older age and higher prevalence of hypertension. Additionally, anticoagulation therapy patterns differed between genders, with a greater proportion of male patients lacking prior anticoagulation, while female patients were more likely to be on VKA.



HYPOKALEMIA AS A RISK FACTOR FOR VENTRICULAR TACHYCARDIA IN PATIENTS WITH HEART FAILURE

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Introduction: Ventricular tachycardia is a common occurrence in patients with heart failure. Studies indicate that 20% of patients with heart failure develop an episode of ventricular tachycardia within the first five years. The prevalence of hypokalemia in heart failure patients ranges from 19% to 54%, and low potassium levels in these patients are among the most common causes of ventricular tachycardia.

Objectives: The aim of this study is to demonstrate that the lower reference limit for potassium in patients with heart failure should be at least 4.2 mmol/L, as even a slight decrease below this threshold significantly increases the risk of ventricular tachycardia.

Materials and Methods: This study presents a retrospective statistical analysis of a total of 32 patients admitted at the University Clinic Cardiology, in Skopje, between November 15, 2024, and March 15, 2025, with ECG findings confirming ventricular tachycardia. The study also analyzes the proportion of these patients with a known history of heart failure.

Results: The analysis revealed that out of the 32 recorded patients with ventricular tachycardia at admission, 22 patients had underlying heart failure. Among these 22 patients, 17 had potassium levels equal to or below 4.2 mmol/L. This means that 53% of all admitted patients with ventricular tachycardia had both heart failure and hypokalemia.

Conclusion: Based on the analyzed results, we conclude that ventricular tachycardia due to hypokalemia in patients with heart failure is a common condition. It is necessary to adjust the lower reference limit for potassium to a minimum of 4.2 mmol/L in patients with heart failure, as even a minor drop below this threshold increases the risk of ventricular tachycardia. Patients diagnosed with heart failure should undergo regular electrolyte monitoring to reduce the risk of ventricular tachycardia or other cardiac arrhythmias.



VALVULAR ATRIAL FIBRILLATION AND THERAPEUTIC DECISION-MAKING IN MITRAL VALVE DISEASE

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Introduction: Atrial fibrillation (AF) is a common complication in patients with mixed rheumatic mitral disease (MD), including mitral stenosis (MS) and mitral regurgitation (MR). MD impairs left atrial (LA) function due to pressure overload, resulting in atrial remodeling, which predisposes to AF. This arrhythmia triggers symptoms and increases the risk of adverse cardiovascular events. Multidisciplinary decision-making is critical in managing valvular heart disease, offering optimal diagnostic and therapeutic strategies for improved patient outcomes.

Case Report: We present a 66-year-old female with severe rheumatic MD, initially diagnosed at the age of 24, which had progressively worsened over the past four years. The patient presented with palpitations and shortness of breath. Her medical history included permanent AF for four years, hypertension, and diabetes type 2. On physical examination, she had fast and irregular heart rhythm, with a systolic and diastolic murmur at the apex. Electrocardiogram confirmed AF with rapid ventricular response. Transthoracic echocardiogram revealed moderate to severe MS with moderate mitral MR, severe LA enlargement, and elevated left atrial volume index (LAVI), with normal left and right ventricular size and function. Coronary angiography excluded any significant coronary artery stenosis. Despite being treated with antiarrhythmic, antihypertensive, and vitamin K antagonist anticoagulation therapy, her symptoms still persisted, prompting consultation with a cardiac surgeon. A decision was made to proceed with mitral valve replacement combined with the Maze procedure.

Conclusion: Effective management of AF in patients with rheumatic MD focuses on rate control, thromboembolism prevention, and timely valve interventions to improve survival. Advances in therapeutic options for valvular heart disease underscore the importance of a multidisciplinary “Heart Team” approach in treatment decisions, enabling collaborative and tailored solutions for complex cases, such as ours.

Keywords: atrial fibrillation; rheumatic mitral stenosis and regurgitation; heart team; mitral valve replacement; Maze procedure



ПРЕВЕНЦИЈА НА НЕНАДЕЈНА СРЦЕВА СМРТ КАЈ ПАЦИЕНТ СО АРИТМОГЕНА ДЕСНОКОМОРНА КАРДИОМИОПАТИЈА

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УК за Кардиологија, Скопје

Вовед: Аритмогена деснокоморна кардиомиопатија (АДКК) е примарна кардиомиопатија кај која се развива прогресивна фибро-мастна замена на миокардното ткиво доминантно на десната комора, а може да е зафатена и левата комора. Почеста е кај мажите, се манифестира од втората до четвртата декада со палпитации, пресинкопи, синкопи, ВЕС, коморна тахокардија(КТ), нагла срцева смрт. Главни цели во третманот се подобрување на симптомите, да се спречи прогресија на болеста и да се превенира ненадејна срцева смрт.

Приказ на случај: Пациент 45 години, маж, со палпитации, пресинкопи, замор при напор, примен на Клиника за Кардиологија за имплантација на кардиовертер-дефибрилатор (ИКД) со цел примарна превенција на ненадејна срцева смрт поради АДКК. ТТЕ левата комора умерено редуцирана систолна функција(ЕФ37%) и дијастолна дисфункција, десната комора гранични димензии и редуцирана систолна функција. 24hХолтерЕКГ синус ритам со средна фр.67/мин., 12% сВЕС, 1,4% полиморфни ВЕС, чести ВЕС- парови и ВЕС-бигеминија. Коронарографија без сигнификантни стенози на коронарните артерии. МРИсрце фибромасна замена на миокардно ткиво во левата комора и слободниот ѕид на десната комора, во прилог на недилатативна бивентрикуларна кардиомиопатија. Генетско тестирање присутна варијанта со непознато клиничко значење во ДСГ2-генот, а познато е дека патогена варијанта во ДСГ2 асоцира со АДКК. Третман: Кај пациентот имплантиран ИКД за примарна превенција на ненадејна срцева смрт поради АДКК. Пациентот испишан со антибиотска терапија, бета блокатор и останата терапија за срцева слабост.

Заклучок:Третманот на АДКК е насочен кон коморните нарушувања на ритамот, срцевата слабост и превенција на ненадејна срцева смрт. Имплантација на ИКД во примарна превенција треба да се разгледа кај пациенти со висок ризик, додека во секундарна превенција се препорачува кај тие кои преживеале кардијак арест или хемодинамски нестабилна КТ.

Клучни зборови:Аритмогена кардиомиопатија, кардиовертер- дефибрилатор.



PAROXYSMAL ATRIAL FIBRILLATION AND ACUTE HEART FAILURE. A CASE REPORT

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Introduction: Paroxysmal atrial fibrillation (AF) is defined as AF that terminates spontaneously or with intervention within 7 days of onset. AF and acute heart failure (AHF) frequently co-exist and exacerbate one another, leading to increased morbidity and mortality. Despite this, the prevalence, significance, and optimal treatment strategies for AF in the setting of AHF remain insufficiently studied.

Aim: To present a case of paroxysmal atrial fibrillation in the context of acute heart failure and to highlight the challenges in management and the importance of a multidisciplinary treatment approach.

Material and Methods: An 86-year-old patient was admitted to the urgent outpatient clinic at the Cardiology Clinic with dyspnea, orthopnea, and irregular tachycardia that began 1–2 hours before admission. The patient had a history of treated hypertension but no prior arrhythmia. Clinical and laboratory findings confirmed a diagnosis of acute heart failure and paroxysmal atrial fibrillation with a rapid ventricular response (130 bpm). The patient was hospitalized in the intensive care unit and treated with intensive diuretic therapy, high-dose amiodarone, enoxaparin (1 mg/kg s.c./12h), dual antiplatelet therapy (aspirin 100 mg and clopidogrel 75 mg daily), and pantoprazole.

Results: Initial labs showed elevated troponin (50,000 ng/L), leukocytosis ($20 \times 10^9/L$), CRP (156 mg/L), and moderate renal insufficiency (GFR 46 ml/min/1.73 m²). After two days of treatment, the patient converted to sinus rhythm. Troponin decreased to 13,562 ng/L, leukocytes to $8.3 \times 10^9/L$, and CRP to 38.1 mg/L. Renal function remained impaired (creatinine 126 $\mu\text{mol/L}$, urea 13.9 mmol/L, GFR 48ml/min/1.73 m²). Echocardiography showed ejection fraction 46%, mildly increased LV size (LVEDd 55 mm), and increased left atrial volume (LAVI 45.1 mL/m²).

Conclusion: Management of atrial fibrillation in acute heart failure requires a multidisciplinary approach. Key treatment components include addressing underlying conditions, rhythm or rate control, and appropriate anticoagulation therapy.

Keywords: acute heart failure, atrial fibrillation, anticoagulant therapy



SUSPECTED SUPPLEMENT-INDUCED MYOCARDITIS

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Ventricular tachycardia is a potentially life-threatening arrhythmia, typically associated with structural heart disease, but it can also result from toxin-induced myocardial injury. With the rise in popularity of unregulated, internet-purchased weight loss products, cases of supplement-related cardiotoxicity are increasingly recognized.

Case Presentation: A 48-year-old previously healthy woman presented to General Hospital with palpitations, nausea, dizziness and shortness of breath. She reported daily use of online-purchased weight loss drops for two months. ECG on arrival showed sustained monomorphic VT at 200 bpm. She was stabilized and transferred to Emergency room in University clinic of cardiology-Skopje. On admission laboratory tests showed elevated high-sensitivity troponin, white blood cell count and C-reactive protein. ECG monitoring revealed recurring VT. Echocardiography revealed hypokinesia of the inferior and inferolateral walls with mildly reduced ejection fraction, and pathological value of global longitudinal strain. Coronary angiography was performed to rule out ischemic causes. MRI confirmed acute myopericarditis with myocardial edema and late gadolinium enhancement. A 24-hour Holter recorded VES and one VT recurrence. The patient was stabilized with intravenous amiodarone and beta-blockers. Anti-inflammatory therapy with high-dose NSAIDs and colchicine was initiated to treat the pericardial component. Cardioprotective agents, including ACE inhibitors, SGLT-2i were started to support left ventricular function. Control echocardiography showed signs of subacute myocarditis and partial improvement in wall motion abnormalities.

Conclusion: Given the strong temporal association between the use of unregulated weight loss supplements and the onset of VT, it is challenging to definitively determine whether the myocarditis is primarily toxic, inflammatory or both. This case serves as a reminder for clinicians to consider supplement use in patients presenting with unexplained arrhythmias.

Keywords: Ventricular tachycardia, myopericarditis, weight loss supplements



ASSOCIATION BETWEEN ATRIAL FIBRILLATION AND DEMENTIA: A CROSS-SECTIONAL STUDY FROM 6 CITIES OF NORTH MACEDONIA

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Introduction: Atrial fibrillation (AF) and dementia are two major public health concerns. Both conditions share vascular risk factors, but the age-specific nature of their association remains insufficiently explored.

Goals: This study aims to evaluate the relationship between AF and dementia, with an emphasis on age-stratified patterns of co-occurrence.

Material & Methods: A cross-sectional analysis of 1,641 individuals (912 males, 729 females) aged 50+ years, from six cities in a 14-year period (2011-2024). Statistical analyses were conducted using SPSS version 25. The association between AF and dementia was examined using the Chi-square test for categorical variables and logistic regression to adjust for age, gender, and comorbidities. Spearman correlation was used to assess non-parametric relationships.

Results: Dementia was present in 328 patients (19.98%), among those with dementia, 85 patients (25.9%) had concurrent AF, compared to 181 (13.8%) in the non-dementia group. A statistically significant association was found between AF and dementia ($\chi^2 = 28.1$, $p < 0.001$). The odds of having dementia were 2.18 times higher (OR = 2.18, 95% CI: 1.61–2.94) in patients with AF compared to those without. The highest proportional prevalence of comorbid AF and dementia was observed in the younger age groups: 33.3% among patients aged 50–59, and 35.9% in those aged 60–69. This proportion decreased to 20.4% in the 70–79 group and 17.3% in the 80+ group.

Conclusions: These findings suggest that AF may contribute to early-onset cognitive decline, possibly via subclinical vascular mechanisms, highlighting the need for early cardiovascular screening and cognitive assessment in patient with AF. Males exhibited a slightly higher risk of dual diagnosis than females. The decreasing prevalence of co-diagnosis in older groups may reflect survivor bias or underdiagnosis in advanced age.

Key words: Atrial fibrillation, Dementia, Cognitive Dysfunction, Minimental State Examination Test, Clock Drawing Test, Cardiovascular Screening



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Данчо Кал'чев. Порта