Problemi liječenja prirođenih srčanih grešaka odraslih u Hrvatskoj: organizacija u tercijarnom centru i prikaz tri slučaja

Adult Congenital Heart Disease Treatment Problems in Croatia: Organization in a Tertiary Center and Report of Three Cases

Maja Strozzi*, Margarita Brida, Darko Anić

Medicinski fakultet Sveučilišta u Zagrebu, Klinički bolnički centar Zagreb, Zagreb, Hrvatska

University of Zagreb School of Medicine, University Hospital Centre Zagreb, Zagreb, Croatia

RECEIVED: January 26, 2015

UPDATED: February 1, 2015

ACCEPTED: February 2, 2015

SAŽETAK: Broj je bolesnika s prirođenim srčanim greškama u odrasloj dobi (PSGO) u porastu pa premda njihov točan broj i raspodjela u Hrvatskoj nisu poznati, potreba za njihovim praćenjem i liječenjem u specijaliziranom centru postaje nužnost. Prema procjeni radi se o više od 12.000 bolesnika kod kojih se u većini slučajeva očekuje neka od kasnijih komplikacija i potreba za jednom ili više procedura. U preporukama Europskog kardiološkog društva dane su smjernice za broj potrebnih centara, kao i za njihovu organizaciju. U Kliničkom bolničkom centru Zagreb započeta je organizacija centra. Opisani su prvi koraci koji uključuju organizaciju ambulante za PSGO, redoviti multidisciplinarni konzilij, kao i formiranje registra te prvi koraci u edukaciji kardiološke zajednice. U okviru Centra u kratkom je razdoblju pregledan velik broj bolesnika, što je omogućilo uvid u probleme te skupine bolesnika. Ovdje donosimo tri prikaza slučajeva. Prvi je pacijentica s operiranom tetralogijom Fallot kod koje nije pravilno dijagnosticirana i liječena aritmija, što može dovesti do znatnog kliničkog pogoršanja. Druga je pacijentica s neprepoznatom korigiranom transpozicijom, zbog manjka iskustva kardiologa. Iako pacijentica još nema značajnih tegoba, one se očekuju u budućnosti i stoga je postavljanje dijagnoze bilo ključno. U trećem slučaju prikazana je tipična PSGO pacijentica s multiplim operacijama u djetinjstvu kod koje se trajno traže nova rješenja; u ovom slučaju nekirurška implantacija zalistka na aortnoj poziciji. Ovaj prikaz ukazuje i na posebnost liječenja te skupne mladih ljudi kojima je osobito važna kvaliteta života.

SUMMARY: Due to the growing number of patients with adult congenital heart disease (ACHD), although their exact number and distribution in Croatia is not yet known, monitoring and treating these patients in specialized centers has become a necessity. Their number is estimated at 12 000, and in most cases these patients will require one or more surgical procedures due to complications later in life. The recommendations of the European Society of Cardiology include guidelines on the necessary number of specialized centers and their organization. Organization of such a center has begun in the Zagreb Clinical Hospital Center. This article describes the first steps being taken, which include setting up a clinic for ACHD, regular multidisciplinary councils, formation of a patient registry, and first steps towards educating the cardiologic community. A large number of patients were examined in the Center recently, providing insight into the specific problems in this patient population; we will present three cases here. The first is a woman with a surgically repaired tetralogy of Fallot but with an improperly diagnosed and treated case of arrhythmia, which can lead to serious clinical deterioration. The second patient is a woman with a case of corrected transposition that went undiagnosed due to a lack of experience on part of the cardiologist. Although the patient has not experienced significant difficulties, they are expected in the future, making a correct diagnosis extremely important. The third case is a typical ACHD patient, a woman that had undergone numerous surgeries in childhood in a constant search for a long-term solution, which in this case was a non-surgical valve replacement at aortic position. This overview also outlines specific challenges faced when treating young people who put especially high value on the quality of life.

KLJUČNE RIJEČI: prirođene srčane greške, odrasli bolesnici, organizacija, registar, transpozicija velikih krvnih žila, tetralogija Fallott.

KEYWORDS: congenital heart diseases, adults, organization, registry, transposition of the great arteries, tetralogy of Fallot.

CITATION: Cardiol Croat. 2015;10(1-2):3-10. | **DOI:** http://dx.doi.org/10.15836/ccar.2015.3

***ADDRESS FOR CORRESPONDENCE:** Maja Strozzi, Klinički bolnički centar Zagreb, Kišpatićeva 12, HR-10000 Zagreb, Croatia. / Phone: +385-1-2367-508 / E-mail: maja.strozzi@gmail.com

ORCID: Maja Strozzi, http://orcid.org/0000-0003-4596-8261 • Margarita Brida, http://orcid.org/0000-0001-8754-8156 • Darko Anić, http://orcid.org/0000-0002-7378-944X

Uvod

U posljednje smo vrijeme svjedoci rastuće populacije bolesnika s prirođenim srčanim greškama u odrasloj dobi (PSGO). Precizni podatci o veličini i sastavu tih pacijenata u Hrvatskoj nedostaju, a trend rasta, prije svega zbog znatnog napretka u preživljenju bolesnika s prirođenim srčanim greškama u djetinjstvu, posebice onih složenijih, jest realnost. U populacijskoj studiji koja je obuhvatila djecu s evidentiranom prirođenom srčanom greškom u razdoblju od 1985. do 1994. godine u Velikoj Britaniji, 78% djece preživjelo je do dobi od 16 godina, kada prelaze u odraslu dob. Analizom te populacije nađeno je da se čak 82% tih grešaka može smatrati manje ili više hemodinamski značajnim, što znači potrebu za ozbiljnom dugoročnom zdravstvenom skrbi. Većina PSGO poznata je iz djetinjstva, no neke se dijagnosticiraju po prvi put u odrasloj dobi.

Procjenjuje se da je prevalencija PSGO 3-6,1 promila.[1] U Hrvatskoj, aproksimativno, radi se o više od 12.000 bolesnika. Ovaj podatak proizlazi iz epidemioloških podataka drugih razvijenih zemalja te podataka hrvatskih pedijatrijskih kardiologa.[2] U preglednom članku o problemu PSGO u Hrvatskoj, u ovom časopisu iz 2012. godine[3], autori su prikazali sve poznate podatke o nacionalnoj epidemiologiji PSG u dječjoj dobi i iznijeli probleme koji se pojavljuju u organizaciji medicinske skrbi u Hrvatskoj za PSGO. U zaključku je istaknuta potreba za organizacijom skrbi za PSGO pacijente, prije svega edukacijom internista-kardiologa, organizacijom specijaliziranog centra s mogućnošću optimalnog multidisciplinarnog pristupa te formiranjem registra.

Pregledni članak u ovom broju časopisa[4] upoznaje nas s najvažnijim novostima u liječenju PSGO na temelju literature objavljene u posljednje dvije godine. U tom razdoblju u Hrvatskoj je postignut malen napredak. U ovom preglednom članku prikazujemo početak formiranja PSGO centra u Kliničkom bolničkom centru Zagreb te prikaz tri slučaja karakteristična za problematiku liječenja tih bolesnika u Hrvatskoj.

OSNIVANJE CENTRA I REGISTRA BOLESNIKA S PRIROĐENIM SRČANIM GREŠKAMA U ODRASLOJ DOBI

Nakon objave preporuka za liječenje PSGO objavljenih 1998. god. počinje organizacija centara za liječenje tih pacijenata, a već tri godine kasnije zabilježeno je i smanjenje smrtnosti, iako su pacijenti sve kompleksniji. Za porast od 10% pacijenata kontroliranih u specijaliziranim tercijarnim centrima, postignuto je u 5 godina smanjenje smrtnosti od 5%.[5] I u posljednjim preporukama, objavljenima 2010. god., ističe se potreba organizirane posebne skrbi za pacijente s PSGO.[6] Najčešći razlozi slabije zdravstvene skrbi bolesnika sa PSGO, zbog kojih postoji potreba za specijaliziranim centrom[7]:

- PSGO pacijenti se pri prelasku u odraslu dob gube iz pedijatrijskog praćenja, a najčešće liječnik obiteljske medicine ili internist-kardiolog ne posvećuje dovoljno pažnje toj skupini pacijenata;
- Pacijenti i njihovi roditelji nisu dovoljno educirani o stanju, dijelom jer su sami pacijenti bili djeca kad je bolest nastupila, a roditelji vrlo često nemaju realan pristup. Dijelom je razlog i "kratka" povijest uspješnih operacija kompleksnih srčanih grešaka te su tek sada poznati dugoročni rezultati i moguće kasne komplikacije;

Introduction

Lately we have witnessed a growing population of patients with adult congenital heart disease (ACHD). Precise data on the size and composition of this patient population in Croatia is not yet available, but the growth trend, caused primarily due to greatly increased childhood survival rates of patients with congenital heart disease (CHD), is real. A population study encompassing children with CHD between 1985 and 1994 in Great Britain found that 78% of the children survived until 16 years of age, when they were classified as adults. Population analysis showed that as many as 82% of these congenital defects can be considered more or less hemodynamically significant, which necessitates serious long-term medical care. Most ACHD have been diagnosed in childhood, but some are diagnosed for the first time as adults.

The prevalence of ACHD is estimated at 3-6.1 per 1000.[1] In Croatia this amounts to more than 12 000 patients. This approximation is based on epidemiological data from other developed countries and data from Croatian pediatric cardiologists.[2] In the review article on ACHD in Croatia published in this journal in 2012[3], the authors presented all the known data on national CHD epidemiology in childhood and outlined the problems in the organization of ACHD medical care. They concluded there was a need for organized care for ACHD patients primarily through educations of internist-cardiologists, organizing a specialist center capable of pursuing the optimal multidisciplinary approach, and forming a patient registry.

A review article in this issue of the journal[4] informs about the most important developments in ACHD treatment based on the literature published during the last two years. During that period, there has been little progress in Croatia. This review article describes the formation of an ACHD center in the Zagreb Clinical Hospital Center and presents three cases characteristic of the challenges faced in treating these patients in Croatia.

FORMING THE CENTER AND ACHD PATIENT REGISTRY

After the publication of the ACHD treatment guidelines in 1998, the organization of a center for the treatment of these patients was started, and a drop in mortality was noted already within three years, although the cases were increasingly complex. The 10% increase in patients monitored in specialized tertiary centers translated into a 5% drop in mortality within five years.[5] The most recent guidelines, published in 2010, also stress the need to provide organized special treatment for patients with ACHD.[6] The most common causes of poor medical treatment for patients with ACHD that necessitates the organization of specialized centers are as follows[7]:

- Patients with ACHD are lost to pediatric monitoring once they become adults, and this group of patients usually does not receive sufficient attention from the family doctor or internist-cardiologist;
- The patients and their parents are not sufficiently informed of their condition, partly because they were children at the onset of the disease, and the parents often do not have a realistic approach. Partly to blame is the "short" history of successful surgeries of complex heart defects, with long-term results and late consequences only now becoming apparent;

- Nedostatna edukacija kardiologa licenciranih za odraslu dob.

Iako su pojedini kardiolozi u Kliničkom bolničkom centru Zagreb, Kliničkom bolničkom centru Sestre milosrdnice, ali i drugdje, već dugo pokazivali interes za tu skupinu bolesnika, radilo se o pojedinačnim pokušajima. Organizacija PSGO centra u Kliničkom bolničkom centru Zagreb započela je 2014. god. u nekoliko smjerova:

- Stvaranje registra (u tri mjeseca skupljeni su podatci za prvih 200 bolesnika);
- Utemeljenje PSGO ambulante, za sada jednom tjedno, a uskoro u novim prostorima Dnevne bolnice Klinike za bolesti srca i krvnih žila;
- Održavanje redovitih PSGO sastanaka (jednom tjedno) multidisciplinarnog tima u stalnom sastavu više kardiologa s interesom u tom području, pedijatrijskog kardiologa, kardijalnog kirurga specijaliziranog za kongenitalne anomalije i po potrebi drugih stručnjaka;
- Nabavka dodatne opreme;
- Organizacija PSGO tečajeva u suradnji s pedijatrijskim kardiolozima, kao i sekcija na nacionalnom kardiološkom kongresu u svrhu edukacije šire kardiološke zajednice.

U prvim mjesecima rada dobiven je bolji uvid u problematiku liječenja te skupine bolesnika. Zbog kompleksnosti, ti pacijenati traže više vremena za klinički pregled, ultrazvučnu evaluaciju, invazivna obrada je kompleksnija, a prisutni su i drugi problemi koje je potrebno rješavati (pitanja o fizičkom opterećenju, trudnoći, kontracepciji, bavljenju sportom itd). U ovom kratkom vremenu naišli smo i na niz bolesnika koji su do sada bili nedovoljno evaluirani i liječeni. Ovdje prikazujemo tri tipična slučaja pacijenata sa PSGO iz registra.

Prvi slučaj: tetralogija Fallot

Pacijenti s operiranom tetralogijom Fallot (TOF) imaju povećani mortalitet i morbiditet koji se može očitovati već u ranoj odrasloj dobi. Prema najnovijim podatcima u literaturi, čimbenici rizika za pojavu iznenadne srčane smrti i ventrikularnih aritmija u tih bolesnika su hipertrofija i dilatacija desne klijetke, ventrikularna disfunkcija te pojava atrijskih tahiaritmija.[8] Najčešći razlog za slabljenje desne klijetke su promjene na pulmonalnom zalistku, najčešće insuficijencija. Iako se dobro klinički tolerira, pa odluka o potrebi i vremenu korekcije izaziva dileme, u novije vrijeme, zbog niskog proceduralnog rizika preporučuje se ranije, u svrhu očuvanja funkcije desne klijetke te time i prevencije neželjnih kardioloških događaja.[9] Atrijske aritmije su također rizični čimbenik za iznenadnu srčanu smrt i pojavu ventrikularnih tahikardija.

PRIKAZ PACIJENTICE: Lj. P., rođena 1962. god., u dobi od 15 godina učinjena potpuna kirurška korekcija TOF. Dobro je tolerirala fizički napor i rodila devetoro zdrave djece. Prve poteškoće u vidu intolerancije napora pojavile su se nakon četrdesete godine. Zbog teške stenoze izgonskoga trakta desne klijetke (DV) kao i suprapulmonalne stenoze učinjena je reoperacija uz zatvaranje manjega rezidualnoga ventrikularnoga septalnog defekta (VSD) 2009. god. Postoperativno je nastupilo kliničko poboljšanje, no i dalje bez redovitiih kardioloških kontrola. Tri

- Insufficiently educated cardiologists licensed for treating such cases in adult age.

Although individual cardiologist in the University Hospital Centre Zagreb, University Hospital Centre "Sestre milosrdnice", and elsewhere expressed interest in this group of patients a long time ago, these were individual efforts. The organization of the ACHD center in the University Hospital Centre Zagreb in 2014 took several different directions:

- Forming a patient registry (data has been collected on the first 200 patients within three months);
- Founding an ACHD clinic, which operates once a week for now, and soon to be at new premises at the Daytime Hospital of the Cardiovascular Diseases Clinic;
- Holding weekly ACHD meetings of a multidisciplinary team with constant membership, comprised of a number of cardiologists, a pediatric cardiologist, a cardiac surgeon specialized in congenital anomalies, and other experts as needed;
- Acquiring additional equipment.

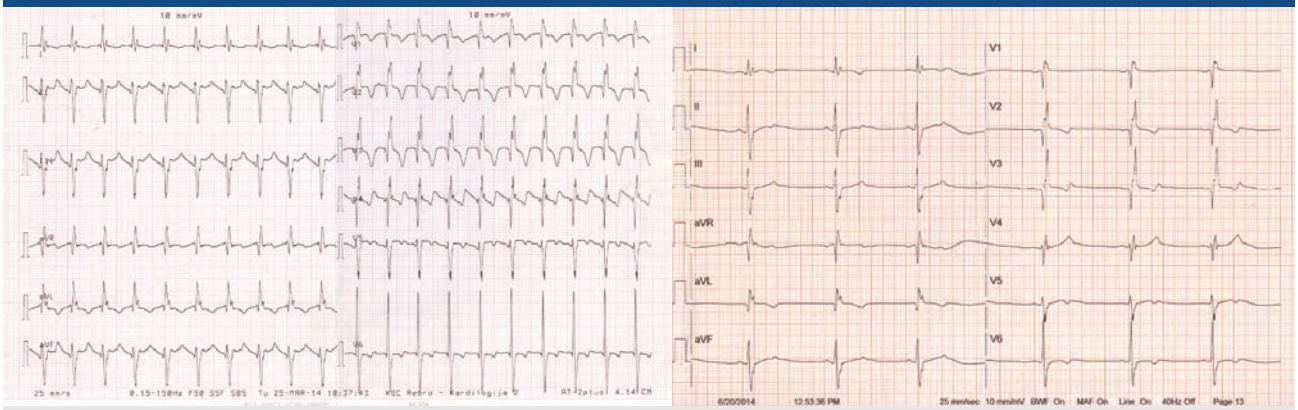
The first few months provided better insight in the specific challenges in treating this group of patients. Due to the complexity of the cases, patients with ACHD require more time for clinical examination and ultrasound evaluation; invasive examinations are more difficult; and there are other issues to be addressed (questions about physical exertion, pregnancy, contraception, sports, etc.). In this short period we already encountered a number of patients who had been insufficiently evaluated and treated until now. We report three typical cases from the ACHD patient registry.

Case one: Tetralogy of Fallot

Patients with surgically treated tetralogy of Fallot (ToF) have increased morbidity and mortality, which can already manifest in early adulthood. According to most recent data, risk factors for sudden cardiac death and ventricular arrhythmia in these patients are hypertrophy and right ventricle (RV) dilation, ventricular dysfunction, and atrial tachyarrhythmias.[8] The most common cause of RV weakening are changes on the pulmonary valve, insufficiency being the most common. Although is well clinically tolerated, causing dilemmas on the need and time of corrective treatment, earlier treatment has been favored recently due to low procedural risk and to preserve RV functionality, avoiding unwanted cardiac events.[9] Atrial arrhythmias are also a risk factor for sudden cardiac death and ventricular tachycardia.

CASE REPORT: Lj. P., born in 1962, underwent complete surgical correction of ToF at 15 years of age. She tolerated physical exertion well, and gave birth to nine healthy children. The first difficulties regarding lack of tolerance to exertion began to manifest in her forties, due to severe stenosis of the output flow of the RV as well as pulmonary stenosis. Reoperation was performed in 2009 and included closure of a small residual ventricular septal defect (VSD). This resulted in clinical improvement, but no regular follow-up was made. Three years before her presentation to the ACHD center, exertion intolerance began to reoccur. Repeated electrocardiogram (ECG) tests described sinus tachycardia at 120/min. Upon her arrival to the center, a

FIGURE 1.



12-lead ECG before and after conversion.

godine prije dolaska u PSGO centar ponovno je bila registrirana intolerancija napora. U višekratnim kardiološkim kontrolama u EKG-u opisana sinusna tahikardija frekvencije 120/min. Kod dolaska u PSGO centar u EKG-u jasna undulacija atrija frekvencije 130/min, trajno prisutna i u holteru EKG-a. Na ultrazvuku srca vidljiva hipokontraktilnost DV, TAPSE 9, ali i lijevoga ventrikula (LV), EF 35%, bez rezidualnog VSD-a, blago dilatirana ascendenta aorta, bez stenoze u području izgonskog trakta DV ili pulmonalnog zalistka. Unatoč dugom trajanju undulacije, učinjena je uspješna elektrokardiovarzija (**slika 1**).

Uz beta-blokator i amiodaron, pacijentica je u stabilnom sinusnom ritmu, sa značajnim kliničkim poboljšanjem, kao i poboljšanjem sistoličke funkcije LV. Planiran je pregled magnetnom rezonacijom (NMR) u svrhu utvrđivanja parametara DV.[10]

DISKUSIJA: Klinički tijek tipičan je za pacijente s operiranom TOF. U djetinjstvu i mladosti pacijentica nije imala kliničkih smetnji te je bez potešekoća iznijela devet trudnoća, što je rijetkost i u potpuno zdravih žena.[11] Tipično je za PSGO pacijente u Hrvatskoj da ne odlaze na posebne kontrole, osim u slučaju značajnog kliničkog pogoršanja. I nakon uspješne operacije, ponovno je bila bez praćenja u tercijarnom centru i bez liječenja dugotrajne aritmije. Atrijske aritmije nisu rijetke nakon operacije TOF, a njihova pojava povezana je s značajnim morbiditetom, koji uključuje srčano popuštanje, ozbiljne ventrikularne poremećaje ritma, potrebu za reoperacijom te smrt. Pojava atrijskih aritmija češća je kod pacijenata s povećanim volumenom atrija te značajnom pulmonalnom regurgitacijom, što ovdje nije bio slučaj.[12] U literaturi se navodi i mogućnost ablacije pulmonalnih vena u slučajevima fibroundulacija nakon operacije TOF.[13] Kod naše je pacijentice postignut sinusni ritam elektrokonverzijom, unatoč dugom trajanju aritmije.

ZAKLJUČAK: Odsutnost redovitih kontrola u tercijarnom centru doveo je do reparacije pulmonalnog zalistka relativno kasno, tek pri pojavi ozbiljnih simptoma. I nakon uspješne operacije ponovno nisu uslijedile redovite kontrole pa je pacijentica dvije godine imala atrijsku tahikardiju, koja je riješena tek u specijaliziranom centru. UZV srca upućuje na dobar rezultat reoperacije prije 6 godina uz redukciju ventrikularne funkcije. Planira se pregled NMR-om te redoviti pregledi u PSGO centru.

clear atrial flutter at 130/min was found, and was constant on the ECG holter. Cardiac ultrasonography found hypocontractility of the RV, TAPSE 9, but also of the left ventricle (LV), EF 35%, with no residual VSD, as well as mild dilation of the ascending aorta, with no stenosis in the output pressure of the RV or the pulmonary valve. Despite the long duration of the undulation, the electroconversion was successful (**Figure 1**).

Due to beta-blockers and amiodarone, the patient is maintained on a stable sinus rhythm, with significant clinical improvement along with improved systolic function of the LV. A magnetic resonance imaging (MRI) test is scheduled to ascertain RV parameters.[10]

DISCUSSION: The clinical development is typical for patients operated for ToF. In her childhood and youth, the patient had no clinical difficulties and brought nine pregnancies to term with no complications, a rarity even in completely healthy women.[11] It is typical of ACHD patients in Croatia to forgo special examinations barring significant clinical deterioration. After the second surgery, the patient also discontinued tertiary center monitoring and treatment for arrhythmia. Atrial arrhythmia is common after ToF operations, and is associated with significant morbidity, including cardiac failure, serious disorders in ventricular rhythm, reoperation, and death. Atrial arrhythmia is common in patients with increase atrial volume and significant pulmonary regurgitation, which was not the case here.[12] A study indicates that pulmonary vein ablation is also a possible treatment for atrial flutter after ToF correction.[13] In our patient, sinus rhythm was achieved through electroconversion, despite the long duration of the arrhythmia.

CONCLUSION: Neglecting regular follow up in a tertiary center led to relatively late repair of the pulmonary valve, only after serious symptoms had been manifested. Even after successful surgery, there was no proper follow up, and the patient suffered from atrial tachycardia for two years, resolved only after she presented at a specialized center. Cardiac ultrasonography indicates the reoperation six years ago was successful, despite reduced ventricular function. A magnetic resonance imaging (MRI) test is scheduled, as well as regular follow up in the ACHD center.

Drugi slučaj: korigirana transpozicija (L-TGA)

Korigirana transpozicija (L-TGA) karakterizirana je zamjenom desne i lijeve klijetke, kao i aorte i pulmonalne arterije (dvostruka diskordancija).[14] Ukoliko nisu pridružene druge anomalije, nije rijetkost da bude dijagnosticirana kasnije u životu, najčešće pri pojavi prvih simptoma, koji su najčešće srčano popuštanje, smetnje ritma ili pojava novog šuma. Katkad se pronađe i slučajno. Dugoročni ishod je determiniran progresivnim slabljenjem sistemske (desne) klijetke, insuficijencijom sistemske (trikuspidalne) valvule, najčešće u četvrtom ili petom desetljeću života.[15]

PRIKAZ PACIJENTICE: M. B., rođena 1979. god., zdrava, rodila dvoje djece. Prije pet godina, tijekom sistematskog pregleda učinjen je EKG, koji je opisan kao patološki (patološka lijeva os, slika inferiornog ožiljka, interventrikularne smetnje provođenja). Unatoč odsutnosti kliničkih smetnji, osim povremenog osjećaja lupanja srca, učinjena je opsežna kardiološka obrada. Ehokardiografski je nalaz u više navrata bio uredan, osim suspektne manje apikalne aneurizme DV. MSCT koronarografija također je bila uredna. Na NMR-u opisana je rotacija srca i umjerena dijastolička disfunkcija, objašnjeno činjenicom da bolesnica ima anomaliju prsnoga koša (pectus infundibuliforme). Pacijentica je od svog kardiologa upućena u PSGO centar. Učinjen je ehokardiografski pregled i postavljena je dijagnoza L-TGA (**slika 2**). Sistemska klijetka je anatomski desna. Također je uočena redukcija sistoličke funkcije sistemske klijetke, EF oko 45% te blaga trikuspidalna regurgitacija.

DISKUSIJA: Dijagnoza L-TGA najčešće se postavlja ehokardiografski, i to upravo prema anatomskim karaktristikama klijetki i mjestu insercije atrioventrikularnih valvula. U opisu "desne" klijetke na ranijim ehokardiografskim pregledima, spominje se apikalna aneurizma, a radi se zapravo o tipičnom obliku anatomskog lijevog ventrikula. U ovom slučaju radilo se o manjku iskustva u dijagnostici PSGO. Iz istog razloga dijagnoza nije postavljena NMR-om. Pacijentica je dobi 35 godina i za sada nema subjektivnih smetnji u smislu intolerancije napora i smetnji ritma, no s obzirom na oslabljenu funkciju sistemske klijetke može se očekivati u sljedećim

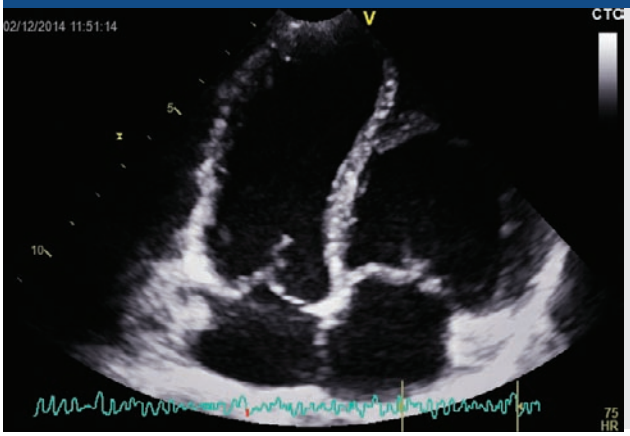
Case two: Corrected transposition of the great arteries (L-TGA)

Corrected transposition of the great arteries (L-TGA) involves switching the RV and LV as well as the aorta and pulmonary artery (double discordance).[14] If the patient has no other anomalies, it is not uncommon for it to be diagnosed later in life, usually when the first symptoms appear, which are most often heart failure, rhythm disturbances, or appearance of a new heart murmur. Sometimes it is discovered by accident. Long-term outcome is determined by the progressive weakening of the systemic (right) ventricle and tricuspid valve insufficiency, usually in the when the patient is in their forties or fifties.[15]

CASE REPORT: M. B., born in 1979, healthy, gave birth to two children. Five years ago, during a routine checkup, ECG was pathological (pathological left axis, inferior scar pattern, interventricular conduction disorders). Despite the lack of clinical difficulties other than an intermittent feeling of the heart pounding, a detailed cardiologic examination was performed. Echocardiographic findings were repeatedly found to be within normal limits, other than a suspect minor apical aneurysm in the RV. MSCT coronarography was also within normal limits. Nuclear magnetic resonance (NMR) demonstrated cardiac rotation and moderate diastolic dysfunction, which was explained by the fact that the patient has a thoracic anomaly (pectus infundibuliforme). The cardiologist referred the patient to the ACHD center. An echocardiographic examination was performed, and L-TGA was diagnosed (**Figure 2**). The systemic ventricle was anatomically on the right. A reduction in systolic function of the systemic ventricle was also noted – EF 45% – as well as mild tricuspid regurgitation.

DISCUSSION: L-TGA is most commonly diagnosed using echocardiography, based on the anatomical characteristics of the ventricles and the insertion point on the atrioventricular valves. Descriptions of the "right" ventricle from earlier echocardiographic examinations mention an apical aneurysm, but the ventricle is actually perfectly normal for an anatomically left ventricle. This was a case of a lack of experience in ACHD diagnostics, as was the failure to establish a diagnosis after NMR imaging. The patient is 35 years old, and has had no

FIGURE 2.



Echocardiography image of the patient with corrected transposition. To the left of the image is the anatomically left ventricle (functionally the right ventricle), with a lower-placed AV valve insertion; to the right of the image the right ventricle is at the place of the systemic ventricle.

godinama. U dugoročnom praćenju tih bolesnika mortalitet je upravo uzrokovan srčanim popuštanjem ili naglom smrću.[16] Ostaje otvoreno pitanje trikuspidalne regurgitacije. Još nije utvrđeno je li ona posljedica popuštanja klijetke, ili je obrnuto. Sigurno je da ona predstavlja terapijski problem, jer su rezultati operacija loši, kako reparacije, tako i ugradnje artificijelog zalistka.[17] Preporučuje se pažljivo praćenje tih bolesnika u za to specijaliziranom centru.

ZAKLJUČAK: Postavljanje ispravne dijagnoze u ovom je slučaju bilo važno za promjenu stila života pacijentice u smislu opreza pri izlaganju većem fizičkom naporu, kao i za donošenje životnih odluka, kao što je npr. nova trudnoća, koja može utjecati na promjene u hemodinamici.[18] Pacijentici je preporučena kontrola u specijaliziranom centru za godinu dana, koja uključuje i ehokardiografski pregled zbog praćenja funkcije sistemske klijetke i razvoja trikuspidalne regurgitacije.

Treći slučaj: D-transpozicija velikih krvih žila (D-TGA)

D-transpozicija velikih krvih žila (D-TGA) je cijanotična srčana greška u kojoj iz morfološki lijeve klijetke izlazi plućna arterija, dok iz morfološki desne klijetke izlazi aorta. Preživljavanje novorođenčadi je moguće jedino ako postoji komunikacija tj. miješanje krvi između dvije paralelne cirkulacije u smislu ventrikularnog ili atrijskog septalnog defekta te otvorenoga duktusa Botalli.[19] Kardiokiruška je operacija prijeko potrebna u što kraćem vremenskom roku kako bi omogućila preživljavanje. Zamjena arterija na njihovu anatomsku poziciju (*arterial switch operation*) danas je operacija izbora. Dugoročno je praćenje nužno zbog mogućnosti kasnijih komplikacija koje se pojavljuju u 5-25% slučajeva te često zahtijevaju i reintervencije, npr. stenoza plućne arterije, insuficijencija koronarnih arterija, dilatacija neoaortalnog korijena, neoaortalna stenoza ili insuficijencija.[20]

PRIKAZ PACIJENTICE: U. J., rođena 1987. god., sa D-TGA, u koje je učinjena operacija zamjene velikih arterija (*arterial switch*), uz korekciju pridruženih anomalija: zatvaranje atrijskog i ventrikularnog sepatalnog defekta te duktusa Botalli, kao i komisurotomije pulmonalnog zalistka i korekciju perifernih pulmonalnih stenoza. Tijekom djetinjstva podrvgnuta je još trima kompleksnim kardiokiruškim operacijama koje uključuju zamjenu aortnog zalistka biološkom protezom (25 mm) 2001. god. zbog značajne aortne insuficijencije, 2002. god korekciju koarktacije aorte nakon neuspješnih dilatacija. Nakon toga, 2010. god., klinički bez većih poteškoća, rodila prirodnim putem zdravog dječaka. Poslije toga postaje simptomatična s progresivnim pogoršanjem zbog degeneracije biološke aortne proteze (maksimalni sistolički gradijent 110 mmHg, srednji 80 mmHg uz očuvanu globalnu sistoličku funkciju lijeve klijetke). Preporučena je, sada već peta po redu, kardiokiruška konvencionalna operacija, kojoj je mlada bolesnica bila nesklona s obzirom na to da je samohrana majka pa su razmotrene alternativne mogućnosti liječenja. Nakon podrobne evaluacije situacije, u suradnji s inozemnim centrom, donesena je odluka i učinjena perkutana implantacija zalistka (TAVI), i to "valvula u valvuli" sa 26 mm

subjective difficulties so far regarding exertion intolerance and arrhythmia, but difficulties can be expected to emerge in the following years due to the impaired function of the systemic ventricle. Long-term monitoring of such patients shows that mortality in such patients is caused by heart failure or sudden death.[16] The question of tricuspid regurgitation remains open. It has still not been determined whether it is a consequence of ventricle failure or vice-versa. It is clear that it is an issue with the treatment, since the results of operations, repair, and artificial valve implants are all poor.[17] Careful monitoring of such patients in a specialized center is recommended.

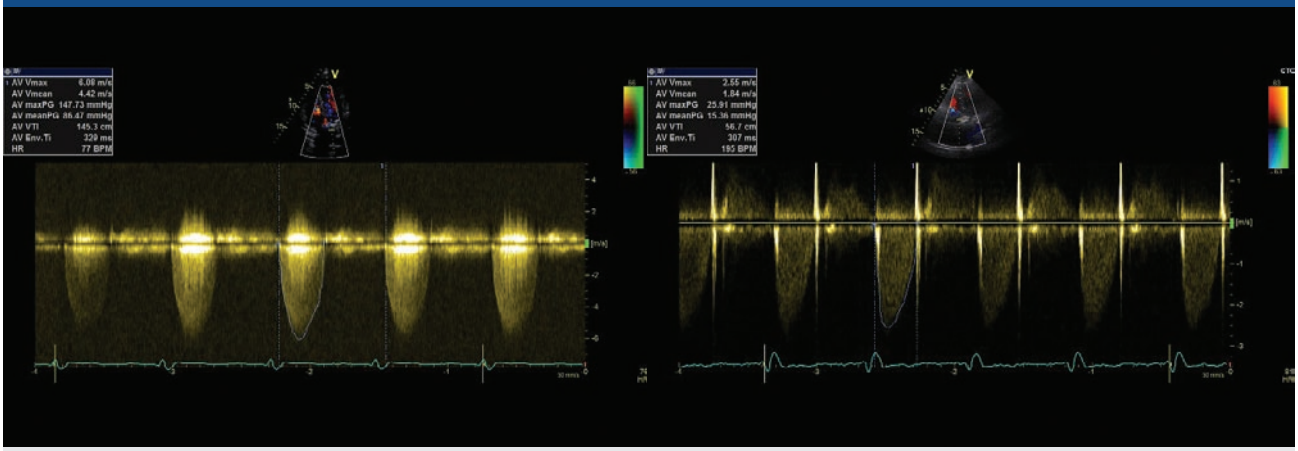
CONCLUSION: In this case, establishing a correct diagnosis was very important for implementing lifestyle changes, including caution in physical exertion, and in life decisions such as a new pregnancy, which can cause hemodynamic changes.[18] The patient was recommended a yearly follow up in a specialized center, which would include a echocardiographic imaging to monitor the function of the systemic ventricle and the development of tricuspid regurgitation.

Case three: Complete transposition of the great arteries (D-TGA)

D-transposition of the great arteries is a cyanotic heart defect in which the pulmonary artery exits the morphologically left ventricle, and the aorta is attached to the morphologically right ventricle. Survival is possible only if there is mixing between the two parallel circulations in the form of a ventricular or atrial septal defect and an open ductus arteriosus.[19] Performing cardiac surgery as soon as possible is crucial to allow survival. The arterial switch operation which switches the arteries to their anatomical positions is the operation of choice today. Long-term monitoring is unavoidable due to possible later complications that are found in 5-25% of cases and often require reintervention, e.g. stenosis of the pulmonary artery, coronary artery insufficiency, dilation of the neo-aortic root, neo-aortic stenosis or insufficiency.[20]

CASE REPORT: U. J., born in 1987 with D-TGA, underwent arterial switch surgery with correction of associated anomalies: closure of the atrial and ventricular septal defect and ductus arteriosus, as well as a commissurotomy of the pulmonary valve and correction of peripheral pulmonary stenoses. She underwent three more complex cardiac surgeries during childhood, including the replacement of the aortic valve with a biological prothesis (25 mm) in 2001 due to significant aortic insufficiency, and correction of aortic coarctation after unsuccessful dilatation in 2002. She experienced no further clinical difficulties, and gave birth naturally to a healthy boy in 2010. Soon after, she began experiencing progressively worse symptoms due to degeneration of the artificial aortic valve (maximal systolic gradient 110mmHg, mean 80mmHg, with preserved global systolic function of the left ventricle). A conventional cardiac surgical procedure, which would be her fifth, was proposed, but the patient was reluctant due to other alternative treatments being considered and the fact that she was a single mother. After detailed evaluation of the situation, in cooperation with a center outside the country, a decision was reached and a

FIGURE 3.



Echocardiographic image – Doppler of the aortic valve before and after the transcatheter aortic valve implantation procedure that indicates a significant gradient reduction.

balonski ekspandirajućom transkateterskom valvulom (Sapien XT, Edwards Lifesciences Inc., Irvine, CA). Postproceduralno bolesnica je bila klinički vrlo dobro, a i nakon godinu dana praćenja, na UZV kontrolama maksimalni sistolički gradijent iznosi 23 mmHg, srednji 14 mmHg (**slika 3**). Mlada majka se mogla vratiti svome sinu nakon minimalne odsutnosti.

DISKUSIJA: Za razliku od tipičnih kardioloških bolesnika, u PSGO skupini radi se prvenstveno o mladoj populaciji, gdje je poseban naglasak na kvaliteti života. Na primjeru ove mlade pacijentice vidljiva je raznolikost mogućih anomalija, kao i trajna mogućnost deterioracije i potrebe za reintervencijom, bilo kateterskom, bilo operativnom. U pacijentice je došlo do razvoja značajne aortne insuficijencije (zalistak je izvorno pulmonalni) te je bila potrebna implantacija zalistka već sa 14 godina.[21] Unatoč brojnim operacijama ova je mlada žena ostvarila i materinstvo i smatra da ima dobru kvalitetu života. Očekivano, nakon 13 godina od implantacije aortne proteze došlo je do degeneracije biološkog zalistka s teškom stenozom. Izašli smo u susret samohranoj majci i njezinoj želji da produljimo vrijeme do sljedeće operacije te je odlučeno, da se, usprkos vrlo limitiranom iskustvu s perkutanim valvulama na aortnoj poziciji u kongenitalnoj bolesti, učini TAVI.[22] Ipak, dugoročni rezultati zasad su nepoznati u skupini mladih bolesnika sa TAVI procedurom i postoji rizik za ranom degeneracijom zalistka. Naša bolesnica jedna je od najmlađih u svijetu u koje je učinjena procedura inače predviđena za stariju populaciju.

ZAKLJUČAK: Mladi bolesnici s prirođenim srčanim greškama jedinstvena su populacija bolesnika prema kompleksnosti njihovih dijagnoza i mogućih komplikacija. Zahtijevaju multidisciplinarni pristup ne samo liječnika specijalista iz naše ustanove, već katkad i suradnje s internacionalnim centrima radi optimalnog zbrinjavanja. Pacijentica će biti redovno praćena u PSGO centru, a u slučaju progresije degeneracije zalistka dolazi u obzir više opcija, od ponovne kardiokirurške operacije do perkutane reimplantacije, nadamo se sve savršenijih zalistaka.

transcatheter aortic valve implantation (TAVI) procedure was performed:"valve in valve" with 26 mm balloon-expandable transcatheter valve (Sapien XT, Edwards Lifesciences Inc., Irvine, CA, USA). After the procedure, the patient is clinically fine, and after a year of follow up the maximal systolic gradient in ultrasound tests was 23 mmHg, mean 14 mmHg (**Figure 3**). The young mother could return to her son after only a brief absence.

DISCUSSION: As opposed to typical cardiologic cases, patients with ACHD come primarily from a young population, which places special emphasis on quality of life. This case illustrates the diversity of possible anomalies, as well as the constant possibility of deterioration leading to reintervention, either catheter-based or surgical. Our patient developed significant aortic insufficiency (the valve was originally pulmonary) and required valve implantation already at 14 years of age.[21] Despite numerous surgeries, this young woman has become a mother and considers her quality of life to be high. As expected, after 13 years since valve implantation, the biological implant began to degrade, causing serious stenosis. To accommodate the single mother's request to delay the next surgery, we decided to perform a TAVI procedure despite very limited experience with percutaneous valves at the aortic position in CHD.[22] However, long-term outcomes are not yet known for young patients who underwent TAVI procedure, and there is a risk of early valve degeneration. Our patient is one of the youngest in the world to undergo a procedure otherwise intended for the elderly.

CONCLUSION: Young patients with CHD are a unique patient population regarding the complexity of diagnosis and possible complications. They require a multidisciplinary approach not only from the specialist from our center, but occasionally also conferring with international centers to decide on the optimal treatment. The patient will receive regular follow up in the ACHD center, and several options are available in case of further valve degeneration, including reoperation and percutaneous reimplantation of ever-improving valves.

Zaključak

Ovim smo prikazom željeli upoznati širu kardiološku javnost s potrebom organizacije specijaliziranog centra za PSGO te naporima koje ulažemo u Kliničkom bolničkom centru Zagreb da se liječenje te skupine bolesnika unaprijedi. Prikazali smo i primjere pacijenata kod kojih je specijalizirana skrb dovela do postavljanja ispravne dijagnoze i rješenja ili poboljšanja zdravstvenoga stanja.

Conclusion

The aim of this review article was to inform the wider cardiologic public of the necessity of organizing a specialized ACHD center and of the efforts of the University Hospital Centre Zagreb to improve the treatment of these patients. We also described cases in which specialized care resulted in correct diagnosis and successful treatment or an improvement in overall health.

LITERATURE

1. Wren C, O'Sullivan JJ. Survival with congenital heart disease and need for follow up in adult life. Heart. 2001;85:438–43. **DOI:** http://dx.doi.org/10.1136/heart.85.4.438
2. Šeparović Hanževački J, Malčić I, Ivanac Vranešić I. Congenital heart diseases in Croatia – a review of current state and goals. Cardiol Croat. 2012;7(11-12):276–82.
3. Malčić I, Dilber D. Distribucija i analiza ishoda kongenitalnih srčanih bolesti u Hrvatskoj. Hrvatska epidemiološka studija (2002-2007). Lijec Vjesn. 2011;133(3-4):81–8. **PubMed:** http://www.ncbi.nlm.nih.gov/pubmed/21612102?dopt=Abstract
4. Kahr PC, Diller GP. Almanac 2014: congenital heart disease. Cardiol Croat. 2015;10(1-2):11-22. **DOI:** http://dx.doi.org/10.15836/ccar.2015.11
5. Mylotte D, Pilote L, Ionescu-Ittu R, et al. Specialized adult congenital heart disease care: the impact of policy on mortality. Circulation. 2014;129:1804–12. **DOI:** http://dx.doi.org/10.1161/CIRCULATIONAHA.113.005817
6. Baumgartner H, Bonhoeffer P, De Groot NM, et al.; Task Force on the Management of Grown-up Congenital Heart Disease of the European Society of Cardiology (ESC). Association for European Paediatric Cardiology (AEPC); ESC Committee for Practice Guidelines (CPG). ESC Guidelines for the management of grown-up congenital heart disease (new version 2010). Eur Heart J. 2010;31(23):2915–57. **DOI:** http://dx.doi.org/10.1093/eurheartj/ehq249
7. Dearani JA, Connolly HM, Martinez R, Fontanet H, Webb GD. Caring for adults with congenital cardiac disease: successes and challenges for 2007 and beyond. Cardiol Young. 2007;17 Suppl 2:87–96. **DOI:** http://dx.doi.org/10.1017/S1047951107001199
8. Valente AM, Gauvreau K, Assenza GE, et al. Contemporary predictors of death and sustained ventricular tachycardia in patients with repaired tetralogy of Fallot enrolled in the INDICATOR cohort. Heart. 2014;100:247–53. **DOI:** http://dx.doi.org/10.1136/heartjnl-2013-304958
9. Ferraz Cavalcanti PE, Sá MP, Santos CA, et al. Pulmonary valve replacement after operative repair of tetralogy of Fallot: meta-analysis and meta-regression of 3118 patients from 48 studies. J Am Coll Cardiol. 2013;62:2227–43. **DOI:** http://dx.doi.org/10.1016/j.jacc.2013.04.107
10. Babu-Narayan SV, Kilner PJ, Li Wei, et al. Ventricular fibrosis suggested by cardiovascular magnetic resonance in adults with repaired tetralogy of Fallot and its relationship to adverse markers of clinical outcome. Circulation. 2006;113:405–13. **DOI:** http://dx.doi.org/10.1161/CIRCULATIONAHA.105.548727
11. Pedersen LM, Pedersen TA, Ravn HB, Hjortdal VE. Outcomes of pregnancy in women with tetralogy of Fallot. Cardiol Young. 2008;18(4):423–9. **DOI:** http://dx.doi.org/10.1017/S1047951108002345
12. Harrison DA, Siu SC, Hussain F, MacLoghlin CJ, Webb GD, Harris L. Sustained atrial arrhythmias in adults late after repair of tetralogy of Fallot. Am J Cardiol. 2001;87(5):584–8. **DOI:** http://dx.doi.org/10.1016/S0002-9149(00)01435-1
13. Philip F, Muhammad KI, Agarwal S, Natale A, Krasuski RA. Pulmonary vein isolation for the treatment of drug-refractory atrial fibrillation in adults with congenital heart disease. Congenit Heart Dis. 2012;7(4):392–9. **DOI:** http://dx.doi.org/10.1111/j.1747-0803.2012.00649.x
14. Warnes CA. Transposition of the great arteries. Circulation. 2006;114:2699–709. **DOI:** http://dx.doi.org/10.1161/CIRCULATIONAHA.105.592352
15. Graham TP Jr, Bernard YD, Mellen BG, et al. Long-term outcome in congenitally corrected transposition of the great arteries: a multi-institutional study. J Am Coll Cardiol. 2000;36:255–61. **DOI:** http://dx.doi.org/10.1016/S0735-1097(00)00682-3
16. Koželj M, Cvijić M, Berden P, Podnar T. A 6-year follow-up study of adult patients with congenitally corrected transposition. Cardiol Young. 2014;19:1–8. **DOI:** http://dx.doi.org/10.1017/S1047951114002479
17. Scherptong RWC, Vliegen HW, et al. Tricuspid valve surgery in adults with a dysfunctional systemic right ventricle repair or replace? Circulation. 2009;119:1467–72. **DOI:** http://dx.doi.org/10.1161/CIRCULATIONAHA.108.805135
18. Therrien J, Barnes I, Somerville J. Outcome of pregnancy in patients with congenitally corrected transposition of the great arteries. Am J Cardiol. 1999;84:820–4. **DOI:** http://dx.doi.org/10.1016/S0002-9149(99)00444-0
19. Fulton DR, Fyler DC. D-Transposition of the Great Arteries. In: Nadas Pediatric Cardiology, 2nd ed, Keane JF, Lock JE, Fyler DC (Eds), Saunders Elsevier, Philadelphia, PA 2006.
20. Tobler D, Williams WG, Jegatheeswaran A, et al. Cardiac outcomes in young adult survivors of the arterial switch operation for transposition of the great arteries. J Am Coll Cardiol. 2010;56:58–64. **DOI:** http://dx.doi.org/10.1016/j.jacc.2010.03.031
21. Khairy P, Clair M, Fernandes SM, et al. Cardiovascular outcomes after the arterial switch operation for D-transposition of the great arteries. Circulation. 2013;127:331–9. **DOI:** http://dx.doi.org/10.1161/CIRCULATIONAHA.112.135046
22. Pasic M, Buz S, Unbehaun A, Hetzer R. Transcatheter aortic valve implantation combined with conventional heart surgery: hybrid approach for complex cardiac features. J Thorac Cardiovasc Surg. 2012;144:728–31. **DOI:** http://dx.doi.org/10.1016/j.jtcvs.2012.03.056